INDICATIONS AND CLINICAL OUTCOMES OF ELECTROCONVULSIVE THERAPY AT MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA

DR. JANBIBI YUSUF MOHAMED

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DECLARATION

DECLARATION BY THE CANDIDATE

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Dr. Janbibi Yusuf Mohamed,

SM/PGPSY/01/18

Signature:..... Date:.....

DECLARATION BY SUPERVISORS

This thesis has been presented for examination with our approval as the supervisors;

Prof. Benson N. Gakinya,

Associate Professor, Department of Mental Health and Behavioural Sciences,

School of Medicine, Moi University.

Signature:..... Date:.....

Dr. Daniel W. Kinyanjui,

Senior lecturer, Department of Mental Health and Behavioural Sciences,

School of Medicine, Moi University.

Signature:..... Date:.....

LIST OF ABBREVIATIONS

APA	American Psychiatric Association
BFCRS	Bush-Francis Catatonia Rating Scale
BPRS	Brief Psychiatric Rating Scale
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
ECT	Electroconvulsive therapy
FDA	Food and Drug Administration**,** United States of America
MMSE	Mini-Mental Status Exam
MTRH	Moi Teaching and Referral Hospital
NACOSTI	National Commission for Science, Technology & Innovation
NICE	National Institute for Health and Care Excellence
PHQ-9	Patient Health Questionnaire-9
RCP	Royal College of Psychiatrists, of United Kingdom
UBACC	University of California, San Diego Brief Assessment of Capacity to Consent
WHO	World Health Organization
WPA	World Psychiatric Association

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ABSRACT

Background: Electroconvulsive therapy (ECT) is a non-invasive somatic treatment that is highly effective for severe mood, catatonic and psychotic disorders but remains underutilized, with a lot of variations in its use despite the international guidelines available. There is sparse ECT data across Africa, Kenya included, hence the need for local studies to add to literature, inform practice and contribute to local or national guidelines which are currently lacking.

Objective: To determine the indications and clinical outcomes of ECT at Moi Teaching and Referral Hospital (MTRH).

Methods: A prospective study that was conducted at MTRH Mental Health Unit on patients undergoing ECT. A minimum sample size of 31 was required, hence a census was conducted between September 2019 to April 2021, obtaining a sample size of 32. Participants were assessed twice, within 3 days before and after completion of the treatment course. Sociodemographic and clinical data were recorded onto a data collection form. Illness severity was assessed using: Brief Psychiatric Rating Scale (BPRS) for psychotic disorders, Patient Health Questionnaire-9 (PHQ-9) for depression, Bush-Francis Catatonia Rating Scale (BFCRS) for catatonia and Mini-Mental Status Exam (MMSE) for cognitive functioning. Response to ECT and change in cognitive functioning were determined by the difference between pre-ECT and post-ECT scores. A checklist was used for non-cognitive adverse effects. Categorical variables were summarized using frequencies and percentages while mean and standard deviation were used for continuous variables. Fisher's Exact test was used to test for associations between participants' clinical and sociodemographic characteristics and ECT outcomes.

Results: The mean age of the participants was 29.7 years, 59.4% were male. The major diagnostic indications were schizophrenia (34.4%) and catatonia (34.4%), depression was minor (6.3%). The clinical indications were treatment resistance (75%) and need for a rapid response (25%). Overall, 90.9% of participants had partial to complete improvement. The only characteristic significantly associated with a good response was the diagnosis of catatonia (p=0.005). Headache (41.2%) and muscle aches (29.4%) were common side effects, dental injuries were also relatively common (17.6%). One patient had cognitive impairment and one mortality occurred secondary to pulmonary thromboembolism after COVID-19 infection.

Conclusion: ECT in MTRH is used where pharmacotherapy has failed and when a rapid response is needed to save life. It is more commonly used for psychotic disorders and catatonia than for mood disorders. It is an effective intervention with mostly non-severe side effects, however there was a high proportion of dental injuries and one mortality during the study period.

Recommendations: The continued use of ECT at MTRH but with standard guidelines to ensure patient safety while maximizing its benefit. The guidelines should outline all the indications, cover screening procedures for thrombosis, techniques to limit oral injuries, monitoring of cognitive functioning and other side effects.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Electroconvulsive therapy (ECT) is a non-invasive somatic treatment in which a brief grand-mal seizure is induced using an electric current passed through the brain via scalp electrodes. This induces remission in majority of patients with severe mental disorders. The exact mechanism of action is still unknown, but there are several theories on how it may exert its therapeutic effect. The neurotransmitter theory postulates that ECT changes the level of neurotransmitters and the way brain receptors respond to them. ECT has been shown to elevate the metabolites of monoamine neurotransmitters in the cerebrospinal fluid (CSF) of patients with depression (Nikisch and Mathé, 2008). It enhances dopamine neurotransmission, downregulates serotonin receptors and alters glutamatergic transmission (Singh & Kar, 2017). Neuroplasticity theory states that ECT induces structural brain changes such as synaptogenesis, neurogenesis, dendrogenesis, angiogenesis and gliogenesis. Volume changes have been reported with ECT, in regions of the brain involved in processing emotions and memory such as the hippocampus, amygdala, anterior cingulate gyrus, medial and inferior temporal cortex (Ota et al., 2015). Brain-derived neurotrophic factor (BDNF), a protein that promotes survival of neurons, has been demonstrated to be low in patients with depression, with the levels normalizing after ECT (Brunoni et al., 2014; Molendijk et al., 2014). However, no association has been found yet between the structural brain changes and ECT outcomes (Singh & Kar, 2017). Neuroimaging studies have shown that ECT changes the functional connectivity in different brain areas (Kaiser et al., 2015). One study demonstrated an increase in right hippocampal connectivity in patients with depression, also suggesting this increased connectivity as a predictor of response to ECT (Abbott et

al., 2014). Neuroendocrine theory hypothesizes that seizures cause the hypothalamus to release stress hormones which play a role in mood regulation, such as adrenocorticotrophic hormone (ACTH) and cortisol by exciting diencephalic structures (Hasket, 2014). However, there is no evidence that the hormonal changes lead to symptomatic relief (Singh & Kar, 2017). ECT has anticonvulsant properties which can dampen abnormally active brain circuits, this is evidenced by the increased seizure threshold and decreased seizure duration with each treatment session, and an increase in gamma aminobutyric acid (GABA) levels (Sackeim, 2004), which is an inhibitory neurotransmitter. Through neuroimaging, ECT has been shown to change blood flow and glucose metabolism in various brain regions. Reduced regional blood flow and metabolic activity in the pre-frontal cortex leading to reduced neuronal activity has been observed in patients with depression following ECT (Nobler et al., 2001). Unfortunately, reduced regional blood flow and metabolism in the left middle temporal gyrus, especially with increased number of ECT treatments (Nobler et al., 2001), could possibly explain the memory deficits that are associated with ECT (Squire, 1986). Electroencephalographic (EEG) studies show an increase in slow wave activity following ECT (Singh & Kar, 2017), an increase in delta wave activity in the prefrontal cortex has been shown to be a predictor of clinical response (Sackeim et al., 1996; Fink 2002). There is a transient permeability in the blood brain barrier during ECT, caused by the increased blood pressure during the ictal phase, this may enhance certain neurochemical circulation thereby contributing to therapeutic outcome but also cognitive side effects, since the blood brain barrier is also protective against harmful agents (Andrade & Bolwig, 2014). Animal studies have demonstrated some epigenetic effects following ECT, which could possibly contribute to the therapeutic outcome (De Jong et al., 2014).

Electroconvulsive therapy is the only somatic treatment that originated from the early decades of the 20th century that is still in use today. The first somatic treatment was tried in 1917 by Julius Wagner who treated neurosyphilitic paresis through a high fever, by injecting patients with malarial blood, followed by quinine to treat the malaria. Most patients showed recovery and this great achievement was awarded the Nobel prize in 1927, being the first effective biological treatment for mental illness (Sabbatini, 1997). It was an era in which people with severe psychosis were institutionalized mostly for supportive care, the only available treatment being psychoanalysis which could only help patients with mild neurotic disorders (Sabbatini, 1997). Growing from that discovery, Manfred J. Sakel attempted to treat psychoses through insulin induced hypoglycemia and coma in 1927, accidentally causing a convulsion with an insulin overdose, and improving on his insulin shock therapy for treating patients with schizophrenia (Sakel, 1937). Chemical shock therapy using metrazol was then tried by Ladislaus von Meduna, a physician studying the brains of patients with epilepsy and those with schizophrenia, who thought that the two illnesses could not coexist (Sabbatini, 1997). The antagonism between schizophrenia and epilepsy is now known not to be true, however this misconception further fueled the research of shock therapy. Metrazol induced very severe convulsions causing serious fractures and caused a gloomy apprehension prior to the convulsions (Sabbatini, 1997). Insulin-induced convulsions required longer hospitalization and close follow up, however the convulsions could easily be stopped by the injection of either glucose or adrenaline (Sabbatini, 1997). In 1937, Ugo Cerletti, an Italian neurologist that specialized in epilepsy, got the idea of using electricity to induce convulsions, by watching pigs receiving electroshock as a form of anaesthesia before being butchered (Sabbatini, 1997). With the help of a colleague,

Lucio Bini, they developed a device that would deliver brief electric shocks, successfully treating a patient with schizophrenia in 1938, their machine delivering a 120-voltage sine-wave current (Cerletti and Bini 1938). Electroconvulsive therapy was the most outstanding progress in the history of shock therapy proving to be more effective and safer than the other methods which were eventually not practiced. The effectiveness of ECT for depression was later established in 1941 (Hemphill and Walter, 1941). Being one of the few available treatments, ECT gained popularity and was used in many mental hospitals. Lobotomy was the other somatic treatment that played a big role between 1930s to 1960s, but with considerable devastating outcome (Caruso & Sheehan, 2017). The discovery of chlorpromazine in 1952, followed by other neuroleptics, another major milestone in the field of psychiatry, led to a decline in the use of ECT. Also contributing to the low use of ECT was controversy and stigma surrounding the treatment (Okasha, 2007). This was mostly due to the violent nature of convulsions that were experienced then, and later its abuse in mental hospitals to control difficult patients in the 1950s. Social media also added to the stigma by painting it in a very negative picture (Jonathan Sadowsky, The Conversation, January 13, 2017). However not all patients responded to neuroleptics, hence electroconvulsive therapy use continued with renewed interest because it was and still is, the one treatment modality that proves to be highly efficacious and safe across a number of diagnoses. Thanks to continued research, modern advances in medicine and ethical guidelines that have been put in place by World Health Organization (WHO), World Psychiatric Association (WPA), American Psychiatric Association (APA), National Institute for Health and Care Excellence (NICE) and Royal College of Psychiatrists (RCP) of United Kingdom, it can now be practiced safely in a controlled setting. Electric charge is carefully titrated to produce an

adequate seizure, anaesthetics and muscle relaxants are administered to reduce pain and violent twitches; patient vitals are closely monitored. This form of ECT under light general anaesthesia and muscle relaxation is referred to as modified ECT. Old ECT machines used to administer a sine wave current (pulse width of 8 ms), which was associated with more cognitive side effects, currently this is not recommended (APA guidelines, RCP guidelines, NICE guidelines). Newer ECT machines produce brief pulse (pulse width of 0.5-1.5 ms) or ultra-brief pulse stimulus (pulse width of ≤0.3 ms), producing less cognitive side effects and reduced recovery time. Neuronal studies show that the ideal pulse width for neuron excitation is 0.1-0.2 ms (Loo et al., 2012), hence a shorter pulse width would avoid excitation of a neuron during the refractory period (Ranck, 1975). However, there is insufficient evidence for the superiority of ultra-brief pulse stimulation compared to brief-pulse stimulation (Loo et al., 2012).

ECT is used as first line treatment when a rapid response is urgently needed due to physical deterioration, high risk of suicide, severe depressive disorders with psychotic symptoms, when risks of other treatment outweigh risks of ECT and a history of poor medication response with good ECT response. It is used as a second line treatment mainly due to medication resistance or when a patient becomes intolerant to pharmacotherapy (APA's *Practice of Electroconvulsive Therapy*, 2001).

For the diagnostic indications, ECT has been found to be extremely effective for depressive disorders. The NICE Review of data from 18 trials involving 1144 patients concluded that ECT was significantly more effective than pharmacotherapy in depressive disorders (The, U.K., 2003). A study on ECT response in depression that involved 100 patients found a 91.4% response in patients without medication

resistance versus a 63.1% response in patients with medication resistance (Prudic et al., 1996).

ECT has also proven to be very beneficial for catatonia, a systematic review of 8 observational studies on catatonia reported a response rate ranging from 80-100% (Luchini et al., 2015). In another review involving 55 patients, a response rate of 85% was reported (Hawkins et al., 1995). ECT is also useful for bipolar mood disorder, in a study of treatment resistant bipolar disorder that involved 522 patients, the response rates observed were 68.1% for bipolar depression, 72.9% for mixed state, 75% for mania and 80.8% for catatonic bipolar disorder (Perugi et al., 2017). A review of ECT in acute mania reported a response rate of 80% in 589 patients (Mukherjee et al., 1994). ECT usefulness in schizophrenia remains controversial despite schizophrenia being the most common indication worldwide (leiknes et al., 2012), its success mostly depending on the clinical context and indication (Mitra & Thirthalli, 2018). A Cochrane review involving 26 trials, showed ECT to be beneficial for schizophrenia when compared to simulated ECT in the following areas: symptom improvement, hospital discharges and short-term relapses. However, ECT did not show superiority when directly compared to antipsychotics (Tharyan & Adams, 2005). On the other hand, a Nigerian randomized control trial that compared real ECT with simulated ECT showed that the improvement in schizophrenic patients receiving ECT was not significantly greater than the control group (Ukpong et al., 2002). A study involving 293 participants with treatment resistant schizophrenia showed a response rate of 54.6% to the combination of ECT and neuroleptic medication (Chanpattana & Chakrabhand, 2001). Other diagnostic indications for ECT include: schizoaffective disorder, neuroleptic malignant syndrome, obsessive compulsive disorder, Parkinson’s disease, intractable seizure disorders and self-injurious behavior in

autism. The United States Food and Drug Administration (FDA) consider ECT devices as class II only for the diagnoses of depression and catatonia, while for the other indications it is considered as class III (Kellner et al., 2019).

An acute course of ECT usually consists of 6-12 therapeutic sessions. However, this number is not fixed for any mental disorder, catatonia may resolve with as few as 3 sessions, while mania may need up to 15 sessions. End point for the acute session would be remission, clinical plateau or non-response. Continuation ECT is ECT administered in the first 6 months after the acute course with an aim to prolong remission. It could be weekly, monthly or symptom triggered. Maintenance ECT includes regular scheduled treatments, 6 months after the acute ECT course with an aim to prevent recurrence.

There are three common ways of placing the electrodes on the scalp, which determines the geometry of the electric field in the brain. The choice is decided by the efficacy, speed of treatment and the risk of cognitive side effects. Bitemporal (bilateral) electrode placement is the gold standard, it leads to a faster recovery but has a high risk of cognitive side effects. Right unilateral electrode placement has less cognitive side effects, but requires more treatment sessions (Kellner et al., 2010). The third option, bifrontal placement has no evidence yet of its superiority over the other two (Kellner et al., 2010).

ECT treatment at Moi Teaching and Referral Hospital (MTRH) is usually administered on an inpatient basis. Mostly the acute course of ECT is offered, on rare occasions continuation ECT is also administered, it is often done as an elective procedure and occasionally as an emergency. The standard hospital procedure includes an informed consent and baseline investigations (complete blood count, urea, electrolyte and creatinine levels). Modified ECT is practiced with propofol or

thiopental as the commonly used anaesthetic agents, succinyl choline as the muscle relaxant of choice. The machine used is thymatron IV, which produces brief pulse stimulus waveform. Bilateral electrode placement is invariably preferred by all the practitioners. The patient is usually starved from midnight. Benzodiazepines are sometimes stopped the night before the procedure while anticonvulsant mood stabilisers are usually continued. Treatment takes place inside the theatre where ECT is delivered inside an operating room, while a different room serves the same function of waiting and recovery area. Inside the treatment room, an intravenous line is inserted, a face mask is used to provide supplemental oxygen while the thymatron IV machine is set up and impedence is tested. Impedence is the resistance to overcome by the scalp and skull so that the stimulus is effectively conducted to the brain. Once impedence is confirmed, premedication with atropine is usually done, followed by injection of the anaesthetic agent and muscle relaxant. An oropharyngeal airway is inserted; no bite guard is used. The electrical charge to be delivered is calculated using the half age method for the first session and progressively increased with subsequent sessions due to an increase in the patient's seizure threshold. The energy is set and the treatment button is switched on allowing the electrical stimulus to be delivered. The sound of the machine changes after completion of stimulus delivery, upon which the treatment button is let go. The duration of the convulsion is noted through careful visual observation, as some light twitches occur despite muscle relaxation. Currently, EEG monitoring of the seizure is not possible. Vital signs (blood pressure, pulse, oxygen saturation and heart rhythm) are monitored during the entire procedure. Upon completion, the patient is wheeled to the recovery area where vital signs continue to be monitored as the patient regains consciousness. All medications used, vital signs, the energy setting and duration of the seizure are

recorded in the patient's file, including any complication if encountered. The number of ECT sessions is determined by the patient's clinical improvement and severity of side effects; usually comprising of 6-12 sessions, administered at 2-3 sessions per week, lasting between 2-6 weeks. The patient is usually maintained on pharmacotherapy during treatment and upon completion, to prevent relapse.

ECT has evolved to become a safe procedure through refinement in its technique. The side effects that can be encountered are either due to: the anesthesia used, anticholinergic drug used for premedication, muscle relaxant, electrical stimulus, or the seizure itself. Seizure related side effects include: prolonged seizures, missed seizures and post-ictal confusion which can range from mild confusion to delirium. Cognitive side effects reported include: impairment of attention, executive functioning and memory. Memory disturbance appears to be the most concerning adverse effect of ECT, the length and extent of the memory deficits are still debatable (Abrams, 2007). Techniques to reduce the incidence of cognitive side effects include the use of brief or ultra-brief pulse stimulus waveform and right unilateral electrode placement. No study has found any proof of brain damage due to ECT (Devanand et al., 1994; NICE ECT guidelines, 2009), a common misconception that the general public has and uses to add to the stigma of ECT. The mortality rate is low at 2.1 per 100,000 treatments compared to the mortality rate of general anaesthesia for surgical procedures which is 3.4 per 100,000 (Tørring et al., 2017), and mostly attributable to cardiac and pulmonary complications (Abrams, 1997). An ECT-related death is usually defined based on the time of death, one that happens soon after an ECT session, or if the cause of death is related to the ECT treatment such as cardiac arrest during the procedure (Tørring et al., 2017).

Due to the relative safety of ECT, there are no absolute contraindications but severe medical conditions can pose as relative contraindications, examples include raised intracranial pressure and recent myocardial infarction, among others. In such circumstances, ECT can only proceed with caution once patients are stabilized, under careful monitoring and if benefits outweigh the risks.

Other brain stimulation techniques that have been introduced include transcranial magnetic stimulation (TMS), a non-invasive treatment that has been approved for the treatment of depression. However, randomized controlled trials have failed to show its superiority over ECT in terms of efficacy (Milev et al., 2016). Vagus nerve stimulation, which involves indirect stimulation of the brain via electrical stimulus passed along the vagus nerve, has been approved for use in epilepsy and treatment resistant depression (Maley et al., 2018). Deep brain stimulation, an invasive method that involves implanting electrodes on targeted brain structures and connection to a battery placed on the chest, has been approved for treatment of obsessive-compulsive disorder, movement disorders and refractory epilepsy (Maley et al., 2018). Transcranial direct current stimulation (tDCS) involves passing a weak electrical stimulus to the brain via scalp electrodes, so as to stimulate neuronal activity without producing an action potential. Studies on this new treatment modality are still limited (Maley et al., 2018).

1.2 Problem statement

Electroconvulsive therapy remains underutilized despite being the most rapidly acting and effective treatment in psychiatry (Sackeim et al., 2004; Kerner et al., 2014). It is the only old somatic treatment that has weathered through the years, not disappointing in its clinical utility (Okasha, 2007). Prevalence studies reveal that it is still a rare treatment with a rate of 17 people per 100 000 per year receiving it, which is mostly reserved for treatment resistant cases (Lesage et al., 2016).

Across the world, there are a lot of variations in ECT utilization (Leiknes et al., 2012). Differences exist between countries, within a country and even within one hospital (Chanpattana et al., 2010). Differences range from the indication for ECT to the type of ECT used and how it is used. The variations also extend to the different international guidelines available with some regulatory bodies advocating for its first line use rather than always a last resort treatment (APA 2001, WPA, RCP). NICE guidelines still emphasize on its use as a last resort treatment unless a rapid response is needed in depression (NICE ECT guidelines, 2009).

There is limited research on general use of ECT in Africa, Kenya included. Its use is mainly based on literature from the West and several differences have emerged in the clinical and sociodemographic patient profile between developing and developed nations (Leiknes et al., 2012; Rakita et al., 2017).

Treatment resistance to pharmacotherapy continues to be a major clinical challenge which necessitates the use of ECT especially in developing nations where access to treatment is further limited by poor economic status. A community study of treatment resistant psychosis in the United Kingdom found a prevalence of 52% for treatment resistant schizophrenia and 19% for treatment resistant bipolar disorder (Beck et al., 2019). Clozapine is the neuroleptic treatment of choice for treatment resistant schizophrenia and even so 30-40% fail to respond to it (Meltzer, 1992). Clozapine

also has the serious side effect of agranulocytosis, requiring frequent blood monitoring hence sometimes leaving ECT as the more viable and necessary option in situations where follow up is poor. It is also estimated that around 40 to 50% of patients with depression do not respond to pharmacotherapy thus necessitating ECT (Carspecken et al., 2018).

Pharmacotherapy resistance and the speed of recovery that ECT offers renders it an essential treatment which still needs to be well explored with its usefulness clearly outlined. Standard guidelines are necessary to reduce variability in its utilisation and thus possibly decrease controversy and doubt.

1.3 Justification

There are limited local studies on ECT use in Kenya. A mixed study evaluating ECT use at Mathari hospital in Nairobi, done in 1989, looked into: the consent procedure, diagnostic indications, side effects, knowledge and attitudes of patients towards ECT and how beneficial the treatment was according to the patients' perspective (Kimathi, 1989). It did not objectively assess response to ECT using rating scales. A qualitative ECT study was done in 2018 that explored knowledge and attitudes of health personnel in public and private facilities in Kenya with regards to ECT provision. It was conducted in Nairobi, Nakuru and Eldoret counties (Ali et al., 2019).

There is need for an up-to-date quantitative study, relevant with time and modern practice which will reflect the evolution and improvement in ECT delivery such as change of electrical stimulus from sine wave to brief pulse.

Also taking into account the variability of ECT use, there is need for a study that looks at the impact of this treatment on the large psychiatric community that MTRH serves. A review of current practice and clinical outcomes is an important first step in

establishing how effective ECT is in our setting and identifying any treatment gaps to ensure the best outcomes for the patients.

The study aims to provide relevant up to date data that will guide clinical practice and possibly contribute to the development of a policy guide for ECT use which MTRH mental health unit and Kenya as a nation, are currently lacking.

1.4 Research question

What are the indications and clinical outcomes of electroconvulsive therapy among patients seen at MTRH?

1.5 Objectives

1.5.1 Broad objective

To determine the indications and clinical outcomes of electroconvulsive therapy at MTRH.

1.5.2 Specific objectives

1. To determine the indications for electroconvulsive therapy.
2. To assess the response to electroconvulsive therapy.
3. To assess the side effects of electroconvulsive therapy.

CHAPTER TWO

LITERATURE REVIEW

Worldwide an estimated one million patients receive ECT annually (Prudic et al., 2001). A meta-analysis of electroconvulsive therapy use from 1973 to 2013, which included 18 studies from 12 countries, revealed that ECT is a rare treatment with a composite event rate of 16.9/100,000 inhabitants (17 people per 100 000 receive ECT per year). Heterogeneity across regions was evident and a downward trend in the utilization of ECT across time was also noted. It was concluded that there were insufficient standard guidelines and proposed regular health audits to help portray utilization and impact of ECT, identify gaps in ECT service provision and improve on effectiveness (Lesage et al., 2016). A systematic review on contemporary use and practice of ECT worldwide which included seventy studies across 6 continents noted sparse country ECT register data with inadequate mandatory reporting especially in Africa and Latin America. It was observed that guidelines by APA and Royal College of Psychiatrists are not internationally followed, except in certain developed countries. The inpatient prevalence for ECT treatment was highest in Africa at 21–28% (Mugisha and Ovuga 1991; Selis et al., 2008), followed by 9–26% in Asia (Little 2003), 0.6-14% in Europe (Gazdag et al., 2004a; Zeren et al., 2003) and 0.4–1.3% in the United States (McCall et al., 1992; Sylvester et al., 2000). The worldwide average number of ECT sessions administered per patient was eight, main electrode placement used was bilateral. Unmodified ECT was still being used in Asia (over 90%), Africa, Latin America, Russia, Turkey and Spain. Main current used was brief-pulse waveform with a few sine-wave devices in some countries. Majority of patients were older women with affective disorders in America and European countries, versus younger men with schizophrenia in Asian countries. The main diagnoses for ECT in Africa were schizophrenia and psychotic conditions (60–83%) as represented by

South Africa, Nigeria and Malawi (Sijuwola 1985; Mugisha and Ovuga 1991; Selis et al., 2008). Training of clinicians was noted to be inadequate with sparse reporting of side effects and mortality. Some new trends were revealed like ECT use as first-line treatment as opposed to last resort only and increased use of outpatient ECT. The study recommended worldwide improvement of ECT utilization and practice, an international minimal data set standard to be used in all countries and continuous mandatory monitoring of ECT use through ECT registers (Leiknes et al., 2012).

A retrospective study of ECT at an Australian hospital involving 66 patients over a period of 2 years, had an equal representation of males and females (50%) and a mean age of 53.02 years, with treatment resistance as their major clinical indication and primary mood disorder as their major diagnostic indication at 59.1% followed by primary psychotic disorder at 40.9%. Majority of the patients (56.1%) had a previous history of having received ECT and 27.3% received maintenance ECT. The study noted an increase in younger males and the proportion of psychotic disorders compared to previous Australian studies. Treatment outcomes were not reported due to the retrospective nature of the study (Stormont et al., 2016).

A retrospective study on the practice of ECT at a training hospital in Turkey involving 1531 patients over a period of 18 months revealed mania as the main diagnostic indication for ECT (30.3%) followed by schizophrenia (29.5%), depression (15.2%), other non-organic psychotic disorders (14.4%), schizoaffective disorders (6.3%), substance induced psychosis (3.5%) and catatonic schizophrenia (0.7%). More males underwent ECT at 55.8% and the mean age of patients was 35.13 years. The range of ECT sessions given was 1-18, with a mean of 8.9. Complete improvement was noted in 78.6% of the patients, with partial improvement in 18.9% and minimal improvement in 2.5%. The common side effects reported were memory problems

(79.7%), followed by headache (34.5%) and muscle pain (27.8%). There were no ECT-related deaths, dental injuries or bone fractures during the survey period (Saatcioglu & Tomruk, 2008).

A 1-year retrospective study of ECT outcomes at a teaching hospital in Kathmandu, the capital city of Nepal, that included 39 patients, had a female predominance of 59% and a mean age of 29.85 years. The most common diagnostic indication was schizophrenia (35.89%) followed by post- partum psychosis (15.38%), mania (12.8%) and severe depression (7.69%). The mean duration of hospitalization was found to be 35.84 days ranging from 12 to 68 days. The mean number of ECT sessions received was 7.85 ranging from 4 to 14. In conclusion, ECT was found to be an effective treatment for various psychiatric disorders with all the patients having more than 50% reduction in symptom severity from the baseline (Pant et al., 2018).

A descriptive longitudinal study of ECT practice at Zomba hospital in Malawi, carried out over 2 months through a population census (N=47), revealed that the major diagnoses for ECT were mania (33%), psychosis (30%), postpartum psychosis (22%) and depression (15%). ECT was used as a first line treatment for postpartum psychosis where rapid improvement was desired. In the other diagnoses, it was used as second line after resistance to pharmacotherapy. 71-90% of the patients improved on ECT depending on the diagnostic indication. Majority of the ECT sessions were unmodified due to inadequate resources. No serious side effects were encountered, muscle aches were reported in 12.8% of the patients, oral cavity lesions in 8.5%, headaches in 8.5% and confusion in 6.4%. It was recommended that patients should be better informed of the procedure when acquiring consent, rating scales should be used to objectively assess the clinical effect of ECT and guide the number of sessions required, better titration of electrical dosage and the use of modified ECT. The study

concluded that low and middle income countries should strive for the best standards as supported by the resources available (Selis et al., 2008).

A retrospective audit of Khartoum National Hospital in Sudan that included all patients who received ECT in the year 2010 (N=269), revealed an inpatient treatment prevalence rate of 15%. Majority of their patients (80%) were under the age of 40 years. Mania was the major diagnostic indication of ECT at 43.8%, others included refractory depression at 18% and schizophrenia at 15.2%. Majority showed complete recovery at 81.8% while 15.3% had partial recovery and 1.1% showed no response. Clinical indications for ECT included pharmacotherapy resistance (51.4%), high psychomotor agitation and excitement (32%) and as a lifesaving procedure (13.8%). It was concluded that ECT is an effective treatment for bipolar affective disorders in developing countries (Osman et al., 2015).

A 10-year descriptive retrospective study of ECT at a neuropsychiatric hospital in Nigeria conducted between 2001 and 2010 that involved 154 case files, revealed schizophrenia as the major diagnosis at 60.3%, followed by depression at 20.1% and bipolar disorder at 11.7%. In 42.2% the specific indication was not mentioned but 24% was due to poor response to medication, 16.2% due to psychomotor retardation and suicidal ideation in 3.2%. Males formed 42.2% of the treatment population with 6.6 as the mean number of treatments per patient. Unmodified ECT was used in the first 3 years followed by a change to modified ECT. Mental state examination was used as an indicator of treatment effectiveness. Continuation ECT was given to 1 patient because of early relapse (within 2 weeks). Cognitive impairment was noted in 1.3%, anaesthetic complications in 1.3%, respiratory distress in 0.7% while 7.1% of the patients had treatment failure due to subtherapeutic seizures (less than 20 seconds). It was positively noted that there was formal training of registrars in their

facility before they start administering ECT. Study recommendations included the development of protocols to obtain consent, use of ECT order sheets containing basic information, improved reporting of adverse events, use of objective rating instruments to measure treatment outcomes, better documentation on treatment failure, improvement on restimulation and country-wide audits (Somoye et al., 2014).

A national South African survey of ECT practice revealed an age profile as follows: 89.2% of the patients were between 18-59 years, 0.2% were minors, and 10.6% were older than 60 years. The most common diagnosis for ECT was depression (84.8%), followed by psychosis (5.8%), catatonia (3.7%), mixed mania-depression (2.7%), mania (2.6%), postpartum psychosis/depression (0.2%) and anxiety disorders (0.1%). The study concluded that South Africa as an upper middle-income country had wide variations in service provision between the provinces. The exclusive use of modified ECT was noted. The study recommended an update of their current guidelines which would also serve as a tool for clinician training and accreditation of hospitals across the country (Benson-martin & Milligan, 2015).

A mixed study in Mathari hospital done in 1989, involving 43 patients revealed the exclusive use of modified ECT and bilateral electrode placement, with an average of 5.8 treatment sessions. The mean age of participants was 29.7 years and there were more females than males at 54%. The main diagnosis for ECT was depression (59%), followed by schizophrenia (23%), mania/hypomania (9%) and unspecified psychosis (7%). Of the patients with schizophrenia, 20% had catatonic schizophrenia. Majority of the patients attained satisfactory improvement (85%), while 9% did not have sufficient improvement. ECT had to be stopped in 4% of the patients due to hypomanic reaction and severe chest infection, while 1 patient (2%) absconded treatment. Only 2% of the patients thought they were adequately informed of the

procedure. Majority (88%) of the patients considered ECT as less upsetting than visiting a dentist. The common side effects were dizziness/drowsiness (91%), headache (7%), memory impairment (7%) although the patients regained their memories within 24 hours, confusion (5%), eyesight problems (5%) and nausea in 2% (Kimathi, 1989).

A qualitative research on ECT knowledge and practices by key personnel in public and private facilities in Kenya, conducted in Nairobi, Nakuru and Eldoret counties, revealed that lack of standardized guidelines on ECT practice led to lack of standardized training on the procedure. Despite key personnel having adequate knowledge, there were variations in pre-ECT preparation, stimulus dose calculation, adequacy of seizure and dose adjustment of psychotropic medication before and after ECT. Barriers to the use of evidence-based practice were lack of infrastructure, inadequate funding, inadequate training and negative perception by patients, relatives and even health care workers. The study recommended use of standardized guidelines, intense training on ECT, funding for new ECT machines, education and awareness creation on ECT to help deal with the negative perception towards the treatment (Ali et al., 2019).

ECT has several adverse effects, some being short term and treatable, others being more concerning such as memory impairment. A study in America on patients' report of side effects following ECT (N=23), revealed the prevalence of headache at 48%, muscle pain at 15% and nausea at 23% (Sackeim et al., 1987). Headaches and muscle aches following ECT are usually regarded as common, mild and treatable by analgesics, with preventive treatment being indicated in those with a history of severe headache (Dinwiddie et al., 2010). Nausea can be attributable to the headache or anaesthesia (Andrade et al., 2016), with propofol carrying a low risk of nausea (Shah

et al., 2010) while ketamine carries a high risk (Salehi et al., 2015). Dental injuries are also possible with ECT, due to direct stimulation of temporalis, masseter and pterygoid muscles which leads to forceful clenching of the jaw, hence the need for oral protection during the procedure with a bite block. A study on the incidence of oral injury involving 51 patients revealed an incidence of 10.1%, with abrasions of the lips and mucosa being common at 72.8%, bleeding of the gums at 22.7% and tooth avulsion at 4.5% (Jirakulsawat et al., 2012). Prolonged seizures (lasting more than 180 seconds) can occur in 1-2% of patients (Whittaker et al., 2007), they increase the risk of confusion and memory deficits. It is therefore advisable to terminate seizures at 120 seconds and continue with propofol for future treatments (Aloysi et al., 2014). Confusion was reported in 40% (Sackeim et al., 1987), usually related to the anaesthesia or the seizure itself, lasting minutes or longer and hence the importance of having the patient in a recovery area until reorientation, which usually takes about 30 minutes (Kellner et al., 2020). Patients on psychoactive medication such as lithium and dopaminergic agents are at a high risk of experiencing post-ECT delirium (Fink, 1993), a more severe form of confusion. A study of cognitive side effects following ECT in a community setting, that involved several cognitive tests in 347 patients across 7 hospitals showed deficits in: autobiographical memory, retention of newly learned information, simple reaction time and global cognitive status for patients who were tested within 3-7 days post-ECT, with significant improvement at 6 months post-ECT, at values better than the pre-ECT baseline. Use of sine wave stimulus and bilateral electrode placement were associated with short and long term deficits. Amnesia for autobiographical events was associated with bilateral electrode placement and a greater number of ECT treatments (Sackeim et al., 2007). The prevalence of cognitive side effects is highly variable, with some studies reporting

none (Osman et al., 2015), other studies reporting low proportions such as 2.1% in Malawi (Selis et al., 2008) to as high as 46.7% in Nigeria (Somoye et al., 2014) and 79.7% in Turkey (Saatcioglu & Tomruk, 2008). Cardiac side effects include hypertension at 67% risk if above 85 years of age (Tomac et al., 1997), tachycardia, atrial and ventricular arrhythmias and asystole. There is a parasympathetic discharge during the tonic phase of the seizure, which can lead to bradycardia or even asystole (Datto, 2000), this is why an anti-cholinergic such as atropine may be given as premedication to reduce the risk of severe bradycardia. The clonic phase of the seizure is accompanied by a sympathetic discharge resulting in hypertension and tachycardia. The haemodynamic changes resolve within 10-20 minutes after the seizure (Abrams, 2002). To reduce the risk encountered during the sympathetic discharge, it is important to identify patients with pre-existing cardiovascular risk factors (Datto, 2000). Short acting beta-blockers, among other drugs can be used to reduce hypertension and tachycardia, depending on individual patient cases, but beta-blockers also reduce seizure duration (McCall et al., 1997). Respiratory side effects include aspiration pneumonitis which is prevented by starving the patient 8 hours before the procedure, pulmonary embolism and neurogenic pulmonary oedema all of which are considered rare (Andrade et al., 2016). Mortality is also a rare event in ECT with a rate of 2.1 per 100 000 treatments (Tørring et al., 2017), and is usually attributable to a pre-existing medical illness or anaesthetic complication (Østergaard et al., 2014).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Design

A prospective longitudinal study was carried out, in which participants were assessed twice at an interval of 4-37 days depending on the treatment duration, assessment was done within 3 days before and after completion of the entire ECT course.

3.2 Study Area

The study was done at MTRH mental health unit, one of the 9 facilities that offer ECT in Kenya.

3.2.1 Background of study area

Moi Teaching and Referral Hospital (MTRH) is a level 6 hospital located along Nandi Road in Eldoret town, Uasin Gishu County. It was started in 1917 as a native cottage hospital with an inpatient capacity of 60, later becoming a district hospital and eventually a referral hospital in 1998. It is also a teaching hospital partnering with Moi University College of Health Sciences. Currently MTRH has an inpatient capacity of 1002, with Mental Health Unit forming one of the major departments. The unit has an 80 bed inpatient capacity, but sometimes admits more than 80 due to the large population it serves. The common admission diagnoses include schizophrenia, bipolar mood disorder and substance related disorders (Muhia et al., 2018). ECT services were being offered since the 1990s but inconsistently, until the hospital acquired the Thymatron IV machine in 2015, thus offering regular ECT services.

MTRH serves the large Western and North Rift regions and neighbouring areas from Uganda, with an estimated population of 24 million. A cross sectional study that was done in Nandi county of western Kenya revealed a lifetime prevalence of any DSM-5 mental disorder of 45.5%, using the Mini International Neuropsychiatric Interview (MINI) Version 7 (Kwobah et al., 2017). A 2013 population based household survey carried out in Kisumu, western Kenya using the Clinical Schedule Revised (CSR)

found that the overall prevalence of common mental disorders was 10.3% (Jenkins et al., 2015).

MTRH serves the people directly and as a National Referral Hospital too.

3.3 Study population

Patients who underwent electroconvulsive therapy at the Mental Health Unit of MTRH between September 2019 and April 2021 (20 months).

3.4 Sample Size

It was estimated that an average of 2 patients receive ECT per month based on ECT theatre lists from April 2018 to April 2019. This was against a probable 100 unique patients admitted per month. The study estimated an ECT inpatient prevalence of 2%.

Using Fisher's formula to determine the sample size: $n_0 = \frac{z^2 pq}{e^2}$

Where:

$n_0 =$ The calculated sample size

$z^2 = the\ square\ of$ z − value at 95% Confidence Interval

(at 1.96)

p = estimated prevalence of ECT (at 2%)

q = 1 − p (the proportion of patients not undergoing ECT)estimated at 98%

e^2 = The square of the margin of error (5%)

Therefore, substituting the variables for exact values:

$n_0 = \frac{1.96^2 * 0.02 * 0.98}{0.05^2}$ = 30.12.

A minimum of 31 patients undergoing ECT were to be enrolled in this study, a census technique was used because of the small calculated sample size, a 16-month duration had been estimated to be sufficient for data collection. However due to the Covid-19 pandemic which affected most elective procedures, the study duration was extended to 20 months after ethical clearance, obtaining a sample size of 32 by the end of the

study period. 2 patients were excluded due to lack of capacity to consent and lack of consenting guardians.

3.5 Eligibility Criteria

3.5.1 Inclusion criteria

i. All patients who received acute course of ECT as their treatment option between September 2019 and April 2021 (20 months).

3.5.2 Exclusion criteria

i. Patients who had not completed their acute course of treatment by the end of the study period.

ii. Patients who lacked capacity to consent and lacked a guardian to consent on their behalf.

3.5.3 Criteria for acute ECT

i. Course of treatment aimed at inducing remission.

ii. Usually comprises of 6-12 sessions, but the number is not fixed. The number of sessions is determined by the patient's clinical improvement, side effect profile, or the withdrawal of consent by the patient and their family.

iii. Usually administered as 2-3 sessions per week.

3.6 Study Procedure

Psychotic disorders were assessed using Brief Psychiatric Rating Scale (BPRS), an 18-item questionnaire that takes around 20 minutes to fill. It is one of the most commonly used rating scales worldwide and is locally used to screen for psychotic disorders in the MTRH Academic Model for Prevention and Treatment of HIV/AIDS **(**AMPATH) clinic. One study showed reliability expressed by intra-class correlation $R = 0.78$, $p. < 0.001$, for the total scale and a validity correlation of $R = 0.66$, $p. < 0.01$ when considering degree of severity as the global estimate (Andersen et al., 1986).

Depression was assessed using Patient Health Questionnaire (PHQ-9), a 9-item questionnaire that takes around 10 minutes to fill. It is a widely used tool for depression and is locally used to screen for depression in the MTRH AMPATH clinic. A study done to assess PHQ-9 among adults living with HIV in Western Kenya revealed high internal consistency with coefficient alpha of 0.78 and test-retest reliability of 0.59. Good Construct validity was shown through a strong association between PHQ-9 and general health rating. Culturally relevant content validity was shown through four focus groups and minor modifications to the PHQ-9 instructions (Monahan et al., 2008).

Catatonia was assessed using Bush-Francis Catatonia Rating scale, a 23-item scale which takes around 10 minutes to fill. This tool is widely used for rating catatonia, with a high inter-rater reliability of 0.93 and good construct validity through strong correlation with other catatonia rating scales (Sienaert et al., 2011).

Cognitive impairment was assessed using the mini mental state exam (MMSE), a 30-point questionnaire that is used to screen and track the progress of cognitive functioning over time, usually administered over 10 minutes. It covers five areas of cognitive functioning which include: orientation, registration, attention and calculation, recall, and language. It is a widely used tool with internal consistency ranging between alpha levels 0.54 and 0.96, high test-retest reliability and strong correlation with other tests as evidence of construct validity (Tombaugh & Mclntyre, 1992). It is locally used in the Alcohol and Drug Abuse Rehabilitation (ADAR) ward MTRH to screen for cognitive impairment.

Non-cognitive side effects were assessed using a check list based on the common side effects associated with ECT, provided in appendix 4.

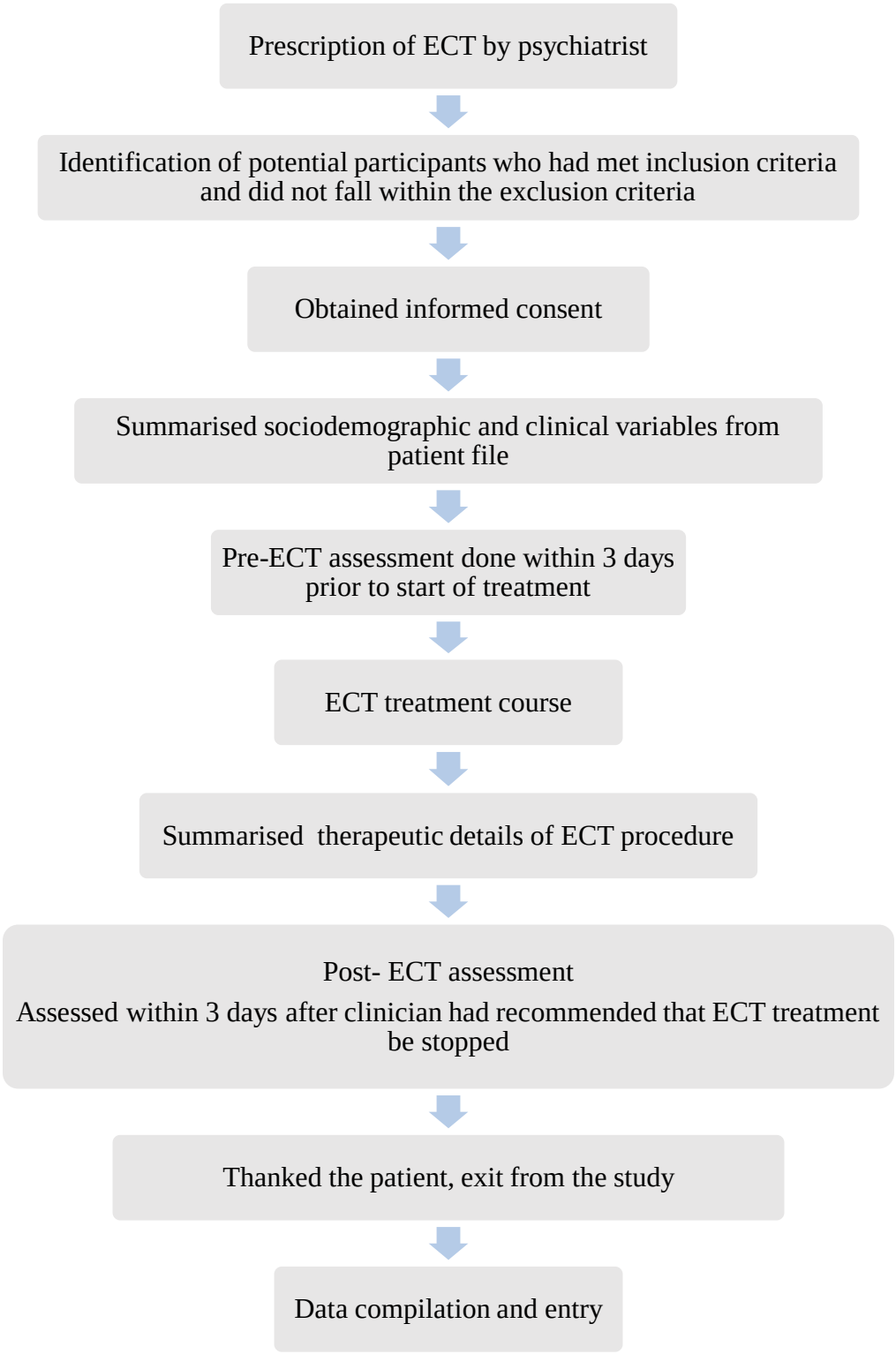
The first encounter with the patient was after the attending psychiatrist had recommended ECT and patient or guardian had consented. Patient and their guardian were then approached, purpose of study explained to them, patient's capacity to consent assessed and then consent for participation sought either from patient or guardian based on the result.

A basic information sheet, provided in appendix 2, was used to record the clinical and sociodemographic profile of the patients. It was filled using data from the participant's file. Clinical profile included the DSM V diagnosis, specific indication for ECT, current pharmacotherapy, comorbid psychiatric and medical conditions. Sociodemographic profile included age, gender, marital status, education level, occupation and residence. An objective rating scale was then administered before the start of ECT, together with a mini-mental status exam.

The second encounter with the participant was within 3 days after completion or termination of treatment as determined by the attending psychiatrist, before discharge. The same rating scale was applied, together with mini-mental status exam. The check list for non-cognitive side effects was also filled at this point.

Treatment details were obtained from the participant's file, they included: date of admission, date of starting and ending ECT treatment, number of ECT sessions, duration of seizure, anaesthetic agent and muscle relaxant used, documented side effects.

Summary of study implementation



3.7 Study Measurements

Dependent variables

- Levels of response
- Side effects

Independent variables

1. Sociodemographic variables:
    - Age
    - Sex
    - Marital status
    - Occupation
    - Level of education
    - Residence
2. Treatment variables:
    - Type of current pharmacotherapy
    - Duration of seizures
    - Number of ECT sessions
3. Clinical variables:
    - DSM V diagnosis
    - Clinical indication for ECT
    - Co-morbid psychiatric conditions
    - Co- morbid medical/surgical conditions

3.8 Data management and analysis

Hard copies of the data collection tools were used to collect data and they were checked for completeness on a daily basis by the researcher. Data was entered into an

access database regularly where completeness and consistency of the data was checked again. Hard copies were stored in a study file and locked in a cabinet while the soft copies were password protected.

Data was imported into SPSS version 23 where coding, cleaning and analysis was done. Descriptive statistics was done to summarize the data, where frequencies and percentages were used to summarize categorical variables such as sex, marital status, education level, DSM V diagnosis, indication for ECT. The findings were presented in tables and pros form. Numerical variables such as age, duration of seizures and number of ECT sessions were summarized using measures of central tendency (mean/median) and spread (range) where appropriate. The findings were appropriately presented in tables.

Response to acute ECT and change in cognitive functioning was assessed by calculating the difference between pre-ECT scores and post-ECT scores and presenting this difference as actual values or percentages. The difference was then summarized using measures of central tendency (mean). Non-cognitive side effects of ECT were summarized using frequencies and corresponding percentages.

Fisher's Exact test was adopted to test for the association between participant's clinical and sociodemographic characteristics and ECT outcomes. This study used a critical value of ≤ 0.05 to determine whether the effect of the clinical and sociodemographic characteristics (independent variables) were statistically significant. A bivariate analysis technique was used to compute the odds of ECT outcomes at 95% confidence interval.

3.9 Ethical Considerations

Ethical clearance for the research was sought from Institutional Research and Ethics Committee (IREC) of Moi University, and approved on 29th August 2019, approval number 0003419 (appendix 7.1). An authorization permit for the study was obtained

from the Chief Executive Officer of MTRH (appendix 7.3). Research approval was obtained from National Commission for Science, Technology and Innovation NACOSTI/P/19/1526 (Appendix 7.4). An approval for continuation of the study was obtained on 29th August 2020 (appendix 7.2).

The study was descriptive, there were no interventions other than tools to screen for illness severity and side effects.

Consent was sought after an adequate explanation of the research and its significance. A modified tool was used to assess for capacity to consent. It was adopted from 2 validated tools, the 10-item UCSD brief assessment of capacity to consent (UBACC) and 5-item Evaluation to Sign Consent (ESC). It assessed the subject's ability to understand information, retain it and use the information to make a decision which they could communicate. Where participants lacked the capacity to consent due to severity of the illness, consent was sought from their guardian. The participant and their guardians were treated with respect and dignity, and were free to opt out of the study at any point.

Patient confidentiality was maintained. No personally identifiable data were recorded; data was anonymous. Maximum effort was put in place to protect the research data.

CHAPTER FOUR

4.0 RESULTS

4.1 Participants' Sociodemographic and Clinical Characteristics

This study enrolled 32 participants who were scheduled for electroconvulsive therapy between September 2019 and April 2021. The mean age of participants was 29.13 (±9.83) years, with an age range of 17-55 years. Majority (59.4%) of the participants were male, 15 (46.9%) were living in peri-urban settlements, 24 (75%) were single, 17 (53.1%) had achieved some level of primary education while 15 (46.9%) were engaged in informal employment (Table 4.1).

Table 4.1: Participants sociodemographic Characteristics

Characteristic		n (%); Mean (SD)
Age (years)		29.1 (±9.8)
Age Groups (years)	10-19	5 (15.6)
	20-29	13 (40.6)
	30-39	9 (28.1)
	40-49	3 (9.4)
	50-59	2 (6.3)
Gender	*Male*	19 (59.4)
	Female	13 (40.6)
Residence	*Urban*	5 (15.6)
	Peri-Urban	15 (46.9)
	Rural	12 (37.5)
Marital Status	*Single*	24 (75.0)
	Married	7 (21.9)
	Divorced	1 (3.1)
Level of Education	*No formal Education*	1 (3.1)
	Primary	17 (53.1)
	Secondary	8 (25.0)
	Tertiary	6 (18.8)
Occupation	*Formal Employment*	2 (6.3)
	Informal Employment	15 (46.9)
	Unemployed	12 (37.5)
	Student	3 (9.4)

Five (15.6%) of the participants had a previous history of ECT treatment. The most common comorbid psychiatric condition was substance use disorder (15.6%) followed by equal proportions of depression, intellectual disability, conversion disorder and alcohol-induced dementia (3.1%). The most common comorbid medical conditions were Post-COVID 19 and COVID-19. Olanzapine was the most commonly prescribed antipsychotic followed by haloperidol. Diazepam was the only benzodiazepine used, while a single participant used pramipexole as a dopaminergic agent (Table 4.2).

Table 4. 2: Participants Clinical Characteristics (N=32)

Clinical Characteristic	Sub-type	n (%)
History of previous ECT	Yes	5 (15.6%)
	No	27 (84.4%)
Comorbid psychiatric condition	Substance use disorder	5 (15.6)
	Depression	1 (3.1)
	Intellectual disability	1 (3.1)
	Conversion disorder	1 (3.1)
	Alcohol induced dementia	1 (3.1)
Comorbid medical condition	Post-COVID-19	2 (6.2)
	COVID-19	1 (3.1)
	Retroviral disease	1 (3.1)
	Parkinsonism	1 (3.1)
	Benign prostatic hypertrophy	1 (3.1)
Antipsychotics	Olanzapine	15 (46.9)
	Haloperidol	9 (28.1)
	Clozapine	2 (6.3)
	Quetiapine	2 (6.3)
	Risperidone	1 (3.1)
	Flupentixol	1 (3.1)
	Aripiprazole	1 (3.1)
Mood Stabilizers	Sodium Valproate	3 (9.4)
	Carbamazepine	1 (3.1)
	Lithium	1 (3.1)
Anti-depressants	Fluoxetine	2 (6.3)
	venlafaxine	1 (3.1)
Benzodiazepine	Diazepam	5 (15.6)
Dopaminergic Agents	Pramipexole	1 (3.1)

4.2 Diagnostic and Clinical Indications for ECT

Psychotic disorders were the most common diagnoses for ECT (59.3%) and they included schizophrenia (34.4%), bipolar mood disorder-mania (9.4%), schizoaffective disorder (6.3%), post-partum psychosis (6.3%) and psychosis not otherwise specified (3.1%). Catatonia was the second most common diagnosis (34.4%). Major depression was a minor diagnostic indication (6.3%) as shown on Table 4.3.

Table 4. 3: Distribution of Participants based on Diagnostic Indication

DSM-V Diagnosis	**Frequency (n)**	**Percentage (%)**
Psychotic Disorders	*19*	*59.3*
Schizophrenia	11	34.4
Bipolar mood disorder-mania	3	9.4
Schizoaffective disorder	2	6.3
Post-partum psychosis	2	6.3
Psychosis not otherwise specified	1	3.1
Catatonia	11	34.4
Major depression	2	6.3
Total	**32**	**100**

The major clinical indication for ECT among 24 (75%) of the study participants was treatment resistance followed by need of a rapid response in 8 participants (25%). All the 8 patients who needed a rapid response due to their deteriorating physical condition had catatonia (Table 4.4). The 3 catatonic patients who underwent ECT due to treatment resistance had catatonic schizophrenia.

Table 4. 4: Clinical indication for ECT

DSM V Diagnosis	Indication for ECT		Total
	Treatment resistance	Rapid Response	
Schizophrenia	11	0	11
Bipolar mood disorder-mania	3	0	3
Major depression	2	0	2
Schizoaffective disorder	2	0	2
Post-partum psychosis	2	0	2
Psychosis not otherwise specified	1	0	1
Catatonia	3 (27.3)	8 (72.7)	11
Catatonic schizophrenia	*3*	*3*	*6*
Catatonia-bipolar mood disorder	*0*	*1*	*1*
Catatonia-substance use disorder	*0*	*3*	*3*
Unspecified catatonia	*0*	*1*	*1*
Total	**24 (75.0%)**	**8 (25.0%)**	**32 (100%)**

4.3 Assessment of Participants' response to ECT

A total of 253 ECT sessions were administered, with a mean number of 7.41 (±2.79) sessions per patient, ranging between 2 to 12 sessions. The mean duration of convulsions was 21.4 (±7.8) seconds, ranging from 5 to 50 seconds. The duration of ECT treatment was 18.7 (±8.1) days on average with a range of 3 to 37 days. The duration from admission to treatment based on indication for ECT was an average of 33.7 (±21.4) days, range of 6-95 days for treatment resistance and 7.8 (±1.98) days, range of 4-10 days for rapid response.

This study assessed 34 acute ECT treatment courses among the 32 participants enrolled. This is because 2 participants had a repeat ECT treatment within the study period.

For psychotic disorders, patient response was assessed using Brief Psychiatric Rating Scale (BPRS). The study assessed 20 ECT courses using BPRS, but one patient died

before post-assessment. The difference in scores were assessed for each disorder (table 4.5).

Table 4. 5: Average Pre-BPRS and Post-BPRS Scores

Diagnosis	**Mean BPRS**		**Difference (%)**
	Pre- Score	**Post- Score**	
Schizophrenia	62 (n=12)	37.9 (n=11)	24.1 (38.9%)
Bipolar mood disorder-mania (n=3)	58	30	28 (48.3%)
Schizoaffective disorder (n=2)	74	39.7	34.3 (46.4%)
Post-partum psychosis (n=2)	60.5	24	36.5 (60.3%)
Psychosis not otherwise specified (n=1)	49	24	25 (51.0%)
Overall	62.4	34.7	**27.7 (44.4%)**

The degree of improvement was quantified and used to categorize patients into non-response, mild improvement and much improvement. A cut-off of 20% was used for minimally improved and 50% for much improvement based on other studies (Leucht et al., 2005; Bighelli et al., 2018). Non-response was noted in 3 patients (15.8%), one patient each with schizophrenia, bipolar mood disorder-mania and schizoaffective disorder. Mild improvement was observed in 7 (36.8%) and much improvement in 9 (47.4%) of the 19 ECT treatments conducted (Table 4.6).

Table 4. 6: Degree of BPRS Improvement stratified by DSM-V diagnosis

DSM-V Diagnosis	**Degree of BPRS Improvement**			**Total**
	No response (0-19%)	***Mild*** (20-49%)	***Much*** (≥50%)	
Schizophrenia	1	6	3	10
Bipolar mood disorder-mania	1	0	2	3
Schizoaffective disorder	1	0	2	3
Post-partum psychosis	0	1	1	2
Psychosis not otherwise specified	0	0	1	1
Total	**3 (15.8%)**	**7 (36.8%)**	**9 (47.4%)**	**19 (100%)**

Patient response in catatonia was assessed using the Bush Francis Catatonia Rating Scale (BFCRS). This study assessed 12 ECT courses for catatonia. The mean pre-BFCRS score was 19.75 with an average post-BFCRS score of 2.58 leading to a reduction of 17.17 (86.9%) as shown in table 4.7.

Depression was assessed using Patient Health Questionnaire-9 (PHQ-9). Response to treatment is defined as a reduction in score by 5 (Kroenke et al., 2001) and remission as a score of 5 or less. Two patients underwent ECT due to major depression and both patients achieved remission. The mean reduction in PHQ-9 score was 20.5 (87.2%) as shown in Table 4.7.

Table 4. 7: Change in scores for depression and catatonia

Diagnosis	**Mean pre-score**	**Mean post-score**	**Difference (%)**
Catatonia (n=12) (BFCRS)	19.75	2.58	17.2 (**86.9%)**
Depression (n=2) (PHQ-9)	23.5	3	20.5 (**87.2%)**

Cumulatively, patient improvement was witnessed in 30 ECT treatments (90.9%), ranging from mild (21.2%) to marked improvement (69.7%), irrespective of the assessment tool used. There was no improvement observed in 3 participants (9.1%), all of them with psychotic disorders, while one participant died prior to post ECT assessment. All participants with catatonia and depression had marked improvement, while majority of participants with schizophrenia (60%) had mild improvement (Table 4.8).

Table 4.8: Patient improvement following ECT *(BPRS, Bush-Francis and PHQ-9 tools)*

DSM-V Diagnosis	**ECT Improvement**			**Total**
	No Improvement	Mild Improvement	Marked Improvement	
Schizophrenia	1	6	3	10
Bipolar mood disorder-manic phase	1	0	2	3
Schizoaffective disorder	1	0	2	3
Post-partum psychosis	0	1	1	2
Psychosis not otherwise specified	0	0	1	1
Catatonia	0	0	12	12
Major depression	0	0	2	2
Total	3 (9.1%)	7 (21.2%)	23 (69.7%)	33 (100%)

Bivariate analysis was done using Fisher's Exact test to look for possible associations between participants' sociodemographic and clinical characteristics with ECT outcomes. Catatonia was significantly (p=0.005) associated with marked improvement by nearly two-folds (OR=1.909; 95% CI: 1.270, 2.870) following electroconvulsive therapy. However, age (p=0.311), gender (p=0.707), clinical indication of rapid response (p=0.071), psychiatric comorbidity (p=0.217),

medical/surgical comorbidity (p=0.627), duration of convulsions (p=0.923) and history of electroconvulsive therapy (p=0.664) were not significantly associated with marked improvement following electroconvulsive therapy (Table 4.9).

Table 4.9: Test of Association between participants' characteristics and ECT Outcome

Characteristic	**OR (95% CI)**	**p-value**
Catatonia	1.909 (1.270, 2.870)	**0.005**
Major Depression	-	0.645
Schizoaffective disorder	-	0.422
Bipolar mood disorder-mania	-	0.422
Schizophrenia	-	0.582
Indication (Treatment Resistance)	0.880 (0.76, 1.02)	0.560
Indication (Rapid Response)	1.667 (1.210, 2.295)	0.071
Psychiatric Comorbidities	1.422 (0.966, 2.093)	0.217
Medical or Surgical Comorbidities	0.840 (0.396, 1.784)	0.627
History of ECT	1.179 (0.710, 1.957)	0.664
Age	-	0.311
Gender (Male)	1.146 (0.714, 1.841)	0.707

4.4 Side Effects of ECT

Most participants had an improvement in cognitive functioning after ECT, as assessed within three days after completion of the ECT course. The mean pre-mini-mental status exam (pre-MMSE) score was 16.14 (±6.51) among 22 respondents compared to a mean post-MMSE score of 23.06 (± 5.63) among 31 respondents. 12 respondents lacked a pre-MMSE score due to mutism. 3 respondents lacked post-MMSE scores due to persistence of mutism in 2 catatonic participants and mortality in 1 participant with schizophrenia. Only 1 participant had a decline of cognitive functioning, with a post-MMSE score of 18 compared to the pre-MMSE score of 20 (Table 4.10).

Table 4.10: Average change in MMSE Scores

DSM-V Diagnosis	**Average Pre-MMSE score**	**Average Post-MMSE score**
Schizophrenia	15.5	20.2
Bipolar mood disorder-manic phase	16.3	25.3
Major depression	27	30
Schizoaffective disorder	10.3	23
Post-partum psychosis	15.5	24
Psychosis not otherwise specified	26	29
Catatonia	N/A	23.1
Overall MMSE	16.1 (±6.5)	23.1 (± 5.6)

Non-cognitive side effects were also assessed within three days of ECT completion. Headaches (41.2%) were the most common side effect reported followed by muscle aches (29.4%). Nausea/Vomiting (17.6%) and dental complications (17.6%) were equally common. ECT was stopped prematurely in one patient due to a dental complication. Unfortunately, there was one ECT-related mortality. No cardiovascular complications or prolonged seizures were reported (Table 4.11).

Table 4.11: Side-effects reported (N=34)

Side Effects	**n (%)**
Headache	14 (41.2)
Muscle Aches	10 (29.4)
Nausea/Vomiting	6 (17.6)
Dental complications	6 (17.6)
Mortality	1 (2.9)
Post-ictal confusion	1 (2.9)
Cognitive impairment	1 (2.9)
Dysphagia	1 (2.9)

CHAPTER FIVE

5.0 DISCUSSION

5.1 Sociodemographic and Clinical Profile

The sociodemographic profile of the 32 participants recruited in this study is in keeping with most African (Selis et al., 2008; Osman et al., 2015) and Asian studies (Chanpattana et al., 2010), in that ECT recipients are likely to be young and male unlike the elderly female profile of Western studies (Leiknes et al., 2012). This study found 59.4% of the participants were male, and the mean age of all participants was 29.1 years. Similarly, a 1-year retrospective study done in Sudan (N=269) found 56.9% of the ECT recipients to be male with 80% of participants less than 40 years in age (Osman et al., 2015). A prospective study done in Malawi involving 47 participants had a proportion of 51.1% as male with an age range of 17-37 years (Selis et al., 2008). However, a study done in Kenya more than 30 years ago (N=43), showed a similar mean age of 29.7 years but a slightly more female predominance of 54% (Kimathi, 1989), this could be explained by depression which is usually more prevalent among women, being the major diagnostic indication in that study. A 10-year retrospective study in Nigeria also found 57.8% of its 154 participants to be female with an overall mean age of 35.5 years (Somoye et al., 2014). A retrospective hospital based study in Nepal involving 39 participants found 59% to be female with a mean age of 29.9 years (Pant et al., 2018). A retrospective audit of ECT at an Australian hospital (N=66) found an equal proportion of males and females with a mean age of 53 years (Stormont et al., 2016).

Majority (75%) of the participants were single, this is slightly higher than the previous Kenyan study which had a proportion of 65% (Kimathi, 1989). A Nigerian study had 53.9% of its participants as single (Somoye et al., 2014). The high figures may reflect the difficulty in maintaining strong interpersonal relationships in severe mental

illnesses. The higher Kenyan figures compared to Nigeria, may be explained by the younger mean age.

Majority (96.9%) of the participants in this study had achieved some level of primary education, this is a bigger proportion than the previous Kenyan study which revealed 88% (Kimathi, 1989). This could be explained by the introduction of free primary education in Kenya from the year 2003 which has increased access to primary level of education. The study in Nigeria revealed a similar proportion to our study of 92.2% (Somoye et al., 2014), probably attributable to the similar sociodemographic profile.

About half (46.9%) of the participants earned a living through informal employment, with 37.5% unemployed. This could be explained by the lower proportion of participants who had achieved secondary education (25%) and tertiary education (18.8%). The covid-19 pandemic which occurred 3 months after the study started, also contributed to job losses and economic instability. The Nigerian study had an unemployment proportion of 69.5% (Somoye et al., 2014). Africa as a continent has been struggling with high unemployment rates especially for the youth (African Development Bank Group, 2016). Also, most patients who undergo ECT tend to have severe forms of mental illnesses which interfere significantly with adaptive functioning leading to lower employment rates (Luciano & Meara, 2014).

Out of the 32 participants, 5 (15.6%) had a substance-use disorder. This finding is threefold higher than that reported in a South African study (N=19) at 5.3% (Ramiah, 2018). Furthermore 4 (12.4%) participants enrolled in this study had comorbid psychiatric disorders, which is close to that reported in South Africa at 15.8% (Ramiah, 2018).

Medical comorbidities were found in 18.8% of the study participants, they included COVID-19, retroviral disease, Parkinsonism and benign prostatic hypertrophy (BPH). This was similar to 15.4% reported in a Turkish study that only had female participants (N=26), with hypothyroidism as the only reported comorbidity (Ozdemir et al., 2016). A study in Nepal with 39 participants reported medical co-morbidity in 25.6% of the patients (Pant et al., 2018), after excluding pregnancy and post-partum period as comorbidities. A study involving 151 participants in North-India reported a higher proportion of 70.2% (Grover et al., 2018). However, the researchers mainly targeted elderly patients, and as patients advance in age, so is their likelihood of having multiple medical comorbidities. In South Africa, the proportion of medical comorbidities was estimated at 57.9% (Ramiah, 2018), but the participants were also older with a mean age of 50 years.

5.2 Indications for ECT

Among the 32 participants enrolled in this study, 11 (34.4%) presented with schizophrenia and 2 (6.3%) with depression. A study in Nepal (N=39) found schizophrenia to be the major diagnostic indication at 35.9% and depression at 7.7% (Pant et al., 2018). This finding was also similar to a study conducted in Malawi (N=47) where 30% had psychotic disorders such as schizophrenia, but the proportion of depression was higher at 15% (Selis et al., 2008). Lower proportions of schizophrenia were reported in the previous Kenyan study at 23%, with depression being the main diagnosis for ECT at 59% (Kimathi, 1989). A much lower proportion of schizophrenia was reported in the Sudanese study (N=269) at 15.2%, where mania which is also a psychotic disorder was the major diagnostic indication at 43.8%, with depression at 18.2% (Osman et al., 2015). A study in North India (N=151 elderly participants) also reported a low proportion of Schizophrenia at 3.9%, with depression

accounting for 89.6% of the indications (Grover et al., 2018). The study in Nigeria (N=154), showed a higher proportion of schizophrenia at 60.4% and depression at 20% (Somoye et al., 2014). A retrospective study in Ghana also had schizophrenia at 63.1% and depression at 6.5% (Addo et al., 2020). As much as depression is the most preferred indication for ECT, there is variability in the diagnostic indications around the globe (Leiknes et al., 2012), however the usefulness of ECT for schizophrenia cannot be denied (Grover et al., 2019).

Catatonia was reported among 11 (34.4%) of the participants, a finding which is double that reported in Nepal at 15.4% (Pant et al., 2018), however, the difference could be attributed to the reclassification of catatonia. Most hospital-based studies classified catatonia as a subtype of schizophrenia while in this study, catatonia was considered as a separate diagnosis as per DSM-V, this made comparison difficult.

Three (9.4%) of this study's participants had bipolar mood disorder-mania which was similar to the previous Kenyan study at 9% (Kimathi, 1989). However, higher proportions of this indication were reported in Malawi at 33% (Selis et al., 2008) and in Sudan at 43.8% (Osman et al., 2015).

There were equal proportions of schizoaffective disorders and post-partum psychosis among the study participants at 6.3% each. The proportion of schizoaffective disorder in this study is similar to that reported in Turkey at 6.3% (Saatcioglu & Tomruk, 2008), Nigeria at 6.5% (Somoye et al., 2014) and Sudan at 8% (Osman et al., 2015). A slightly lower proportion of post-partum psychosis was reported in Sudan at 4% (Osman et al., 2015), and a higher proportion in Malawi at 22% (Selis et al., 2008).

Psychosis not otherwise specified was the least prevalent diagnostic indication at 3.1%. This was similar to 7% reported in the previous Kenyan study (Kimathi, 1989).

A retrospective study from North India in adolescents receiving ECT (N=25), had a proportion of 8% (Grover et al., 2013).

Psychotic disorders being the leading diagnostic indication for ECT in most African countries may also reflect the diagnostic profile of the inpatients where psychotic conditions are the most prevalent, for instance, the common diagnoses at MTRH include schizophrenia, bipolar mood disorder and substance related disorders (Muhia et al., 2018). This is further compounded by the fact that Clozapine, the antipsychotic of choice in treatment-resistant psychosis is expensive to use and follow up in developing nations.

As concerns clinical indications, treatment resistance was the major indication at 75%, followed by the need for a rapid response at 25%. In Sudan, treatment resistance was also the major indication at 52% while rapid response was at 13.8%, however, ECT was also offered as a first choice treatment in 32% of the patients (Osman et al., 2015). An Indian study on elderly patients receiving ECT revealed treatment resistance in 62.3% of its 151 patients and need for a rapid response in 49.6%, other indications included treatment of first choice in 47.6% and Suicidality in 45% (Grover et al., 2018).

5.3 Assessment of Participants' Response to ECT

The mean number of ECT sessions was 7.4 per patient, slightly higher than the previous Kenyan study which had 5.8 (Kimathi, 1989) and Nigerian study which had 6.6 (Somoye et al., 2014), but similar to a study in Nepal which had 7.85 (Pant et al., 2018). The study in Turkey had a mean number of 8.9 sessions (Saatcioglu & Tomruk, 2008). These differences could be attributed to the diagnostic or clinical indications and technique used. The seizure duration ranged from 5 to 50 seconds, comparable to the Malawian study which ranged from 13 to 44 seconds (Selis et al.,

2008). There are no specific ECT guidelines currently being followed at the hospital or national level (Ali et al., 2019). APA guidelines suggest a minimum of 15 seconds seizure duration for efficacy (APA's *Practice of Electroconvulsive Therapy*, 2001), requiring restimulation if the seizure is short. On the other hand, RCP guidelines do not specify a seizure duration (The ECT Handbook- Royal College of Psychiatrists, Page 161). The previous Kenyan study which tried to identify gaps and challenges in knowledge and practice of ECT in Kenya, highlighted the need for guidelines to standardize practice so as to achieve the full benefit of ECT (Ali et al., 2019).

ECT continues proving its utility in the treatment of severe mental disorders, 90.9% of the participants in this study had partial to complete improvement. This is similar to the study done in Sudan that reported 97.1% of partial to complete improvement (Osman et al., 2015), and in Malawi that reported an improvement of 71-90% depending on the diagnostic indication (Selis et al., 2008). A retrospective study in Turkey showed a partial to complete remission of 97.5% where the major indication for ECT was depression (Saatcioglu & Tomruk, 2008). A 13-year retrospective study in Pakistan, revealed partial to good response in 95% of the 126 participants, with depression also being the major diagnostic indication (Naqvi & Khan, 2005). The previous Kenyan study showed that 93% of the 43 participants, found the treatment useful, based on their perspective (Kimathi, 1989).

For schizophrenia, the mean pre-BPRS score was 62, reducing by 24.1 (38.9%) to a post-score of 37.9. A study in Nepal reported a mean pre-BPRS score of 75.9 that reduced by 28 to a post-score of 47.9 (Pant et al., 2018), but the study used a 24-item BPRS tool unlike this study which used an 18-item tool, resulting in higher scores but an overall similar difference. A higher pre-ECT BPRS score (18-item) was also reported in Thailand (Chanpattana & Somchai, 2001) at 72.4 with a post-score of 43.7

which could have been because of more severe illness, although the difference was still similar to this study at 28.7.

For bipolar mood disorder-mania, there was a BPRS reduction of 28 (48.3%). The study in Nepal had an almost similar difference of 27.1 (Pant et al., 2018). For post-partum psychosis (n=2) the BPRS score reduced by 36.5 (60.3%). This was higher than that reported in Nepal (n= 6), which reduced by 25 (Pant et al., 2018). ECT has proven to be very effective for postpartum psychosis with rapid response rates (Rundgren et al., 2018). Schizoaffective disorder had a BPRS reduction of 34.3 (46.4%) while psychosis not otherwise specified had a reduction of 25 (51%).

Overall for all the psychotic disorders (n=19), there was a BPRS reduction of 27.7 (44.4%), which is similar to the Nepalese study (N=39) which had a reduction of 27.1 (Pant et al., 2018). A retrospective study in India (n=7) reported a BPRS reduction of 23.1 (Grover et al., 2013).

There was good treatment response for catatonia (n=12), with an improvement of 86.9% on the BFCRS, this proportion was similar to a prospective study done in Italy on 26 catatonic patients with bipolar mood disorder, where there was an improvement of 82.1% on BFCRS (Medda et al., 2015). A study on adolescent response to ECT in North India (n=9) reported a greater degree of improvement of 91.6% on the BFCRS (Grover et al., 2013). ECT has been proven to be efficacious for catatonia which is why it was reclassified as a class II device by the FDA in 2018, from the previous class III (Kellner et al., 2019).

Depression (n=2) was highly responsive to ECT with the patients achieving remission. The mean pre-PHQ-9 score was 23.5 and post-score was 3, a reduction of 20.5 (87.2%). A study on ECT in depression that had 137 participants, of which 29

also had comorbid borderline personality disorder, reported marked improvement with a mean pre-PHQ-9 score of 20.4 and a post-score of 6.4, a reduction of 14 (Lee et al., 2019). The degree of improvement was greater in this study which could be attributed to the extremely small sample size.

Although this study noted that being male increased the likelihood of having ECT response, this relationship was not statistically significant. Furthermore, old versus young age also did not significantly affect treatment response. These findings compare to that reported by a prospective study conducted in the Netherlands on 83 patients with depression, where neither gender nor age predicted the likelihood of ECT response (Van Waarde et al., 2013). In a meta-analysis of remission of depression following ECT, older age was found to be weakly associated with remission while gender was not significantly associated (Haq et al., 2015). Contrastingly, in a systematic review for ECT in schizophrenia, younger age was found to be a predictor of good response (Grover et al., 2019).

This study did not find any statistically significant association between indication for ECT (treatment failure vs rapid response) and treatment outcome. This compares to an older retrospective review conducted in Canada on patients with depression (Lam et al., 1999) where no significant difference was noted between patients who had treatment resistance as an indication for ECT and those who did not. A different study that was reporting from the consortium for research in electroconvulsive therapy (CORE) did not find medication failure to be of any predictive value as concerns remission of depression (Rasmussen et al., 2007). This contrasts with the meta-analysis of clinical predictors of remission in depression where medication failure significantly predicted poor outcome (Haq et al., 2015).

Also noted was that a previous history of ECT did not significantly predict outcome (p=0.664). However, in the Netherlands study, having previously undergone ECT treatment was a significant predictor (p=0.003) of response (Van Waarde et al., 2013).

Finally, this study found a statistically significant association between having the diagnosis of catatonia and ECT response (p=0.005). This positive association between catatonia and good ECT outcome is in line with several studies which link psychomotor retardation and motor manifestations of catatonia with good ECT response (Sienaert et al., 2014; Leroy et al., 2018; Heijnen et al., 2019; Kellner et al., 2020). A systematic review conducted in Italy, noted that ECT response rates for patients with catatonia ranged between 80% to 100% and ECT was superior to any other therapy in psychiatry for catatonic patients (Luchini et al., 2015).

5.4 Side Effects of ECT

The most common side effect was headache (41.2%) followed by muscle aches (29.4%). These are relatively common side effects that are usually short-lived and can be relieved by analgesics (Dinwiddie et al., 2010). A study on subjective side effects following ECT reported a prevalence of headache at 48% and muscle aches at 15% (Sackeim et al., 1987). A retrospective study in turkey (N=1531) reported slightly lower but similar proportion of headache at 34.5% and muscle aches at 27.8% (Saatcioglu & Tomruk, 2008). An audit of ECT practice in Kashmir (N=90) reported headache at 34.5% and muscle aches at 18.9% (Dar et al., 2014). Contrastingly the prospective study in Malawi reported lower occurrence of headache at 8.5% and muscle aches at 12.8% despite the use of `unmodified ECT. The previous Kenyan study on ECT also reported low occurrence of headache at 7% with no muscle aches (Kimathi, 1989).

This study reported nausea/vomiting at 17.6% similar to 23% nausea reported in the study on subjective side effects following ECT (Sackeim et al., 1987). Nausea is usually related to the anaesthesia or headache, and prevention of the headache tends to reduce the nausea (Andrade et al., 2016). Propofol is associated with reduced nausea compared to barbiturates (Datto, 2000), interestingly it was the agent of choice in majority of the ECT sessions in this study.

Dental complications were also relatively common at 17.6% and the reason for discontinuation of ECT in 1 participant. The study in Malawi reported a lower proportion at 8.5% (Selis et al., 2008), despite the use of unmodified ECT. However, this could be attributed to the definition of dental injury as this study also included minor injuries such as bruises and bleeding from the tongue, mucosa and gums; and not just injuries to the teeth. A study on oral injuries in patients undergoing ECT in Thailand found an incidence of 10.1% (Anchala Jirakulsawat, 2012). People with severe mental illnesses are more likely to have poor dental health compared to the general population (Patel & Gamboa, 2012), guidelines to reduce the incidence of dental injuries during ECT are still lacking (Muzyka et al., 2017). Despite muscle relaxation during ECT, there is direct stimulation of temporalis, masseter and pterygoid muscles which leads to forceful jaw clenching. American Psychiatric Association (APA) and the Royal College of Psychiatrists (RCP) guidelines recommend the use of a bite block, however no oral guard has been found to be fully protective and poor technique can still lead to injuries (Minneman, 1995). Brief dental screenings are advised before ECT to identify those at risk, such as a mobile tooth, followed by appropriate treatment to reduce the risk (Datto, 2000; Muzyka et al., 2017). Routine dental screening was not performed prior to ECT in this study, no bite blocks were used during the ECT procedure.

Cognitive impairment and post-ictal confusion were noted in 1 patient each (2.9%). Cognitive impairment was assessed by comparing pre and post-MMSE scores. Cognitive improvement was noted in all but one patient. Memory was not assessed as a separate entity. In the previous Kenyan study post-ictal confusion was noted in 5% and impaired memory in 7% of the sample, with a recovery of memory within 24 hours (Kimathi, 1989). In the Malawian study post ictal confusion was noted in 6.4% and impaired memory in 2.1% (Selis et al., 2008). The retrospective study in Nigeria reported impaired memory in a much higher proportion, 46.7% (Somoye et al., 2014). Cognitive side effects remain a major concern in the delivery of ECT, despite improvement in technique and stimulus used. Most of the impairment tends to be short-term, with anterograde amnesia, attention and executive functioning mostly recovering within two weeks if affected (Semkovska & McLoughlin, 2010). Retrograde amnesia usually resolves within a few weeks for many patients, but for a minority it may resolve extremely slowly or even persist (APA's *Practice of Electroconvulsive Therapy*, 2001), however the degree and duration of retrograde amnesia still remains highly debatable (Abrams, 2007). There are factors that confound the identification of this impairment such as: severity of the mental illness, use of psychotropic medication, the dose of anaesthetic and anti-cholinergic drugs used for pre-medication (Andrade et al., 2016).

There was one ECT-related mortality (2.9%) that resulted from pulmonary thrombo-embolism, in a patient who had just recovered from asymptomatic covid-19, soon after the second ECT session. The patient had multiple risk factors for a thromboembolic event including: immobility, covid-19 (Miesbach & Makris, 2020) and use of clozapine. The thrombus had gone undetected and was revealed on autopsy (Hillow et al., 2021). Mortality associated with ECT is an extremely rare event, with a

rate of 2.1 per 100, 000 treatments (Tørring et al., 2017). Usually attributable to a pre-existing medical illness or anaesthetic complication (Østergaard et al., 2014). There are two case reports of fatal pulmonary embolism following ECT that both reported prolonged inactivity prior to the ECT (Weber et al., 1973; Kursawe & Schmikaly, 1988). Psychiatric inpatients are at a high risk of venous thromboembolism and majority of patients are asymptomatic (Takeshima et al., 2018). Antipsychotics have been shown to increase the risk for thrombosis, with second-generation antipsychotics carrying a higher risk, clozapine being the most implicated (Shulman et al., 2013). ECT may possibly dislodge a thrombus despite muscle relaxation (Mamah et al., 2005). Those with identified venous thromboembolism can still undergo ECT after appropriate treatment and stabilization to reduce the risk of further thromboembolic events due to motor inhibition (Suzuki et al., 2008). According to RCP guidelines, deep venous thrombosis (DVT) is considered a relative contraindication to ECT until anticoagulated in order to reduce the risk of pulmonary embolism (The ECT handbook, page 126). A study on 32 patients who underwent ECT while either on an oral anticoagulant or warfarin, concluded that ECT is relatively safe in such patients (Centanni et al., 2021). There is also a case report study on 2 patients that safely underwent ECT after pulmonary embolism but on anticoagulant therapy (Suzuki et al., 2008).

One catatonic patient with alcohol induced parkinsonism reported dysphagia after the first two sessions of ECT, it was non-severe and short-lived and did not recur with the rest of the ECT sessions. There is no relationship between dysphagia and the ECT procedure, it may possibly have been a manifestation of the parkinsonism, as dysphagia is commonly reported in Parkinson’s disease (Coates, 1997).

CHAPTER SIX

6.0 CONCLUSIONS, RECOMMENDATIONS AND STUDY LIMITATIONS

6.1 Conclusion

This study assessed the indications and clinical outcomes of electroconvulsive therapy among the mental health unit patients of Moi Teaching and Referral Hospital. The recipients of the treatment were notably younger, with a slight male predominance. ECT is more commonly used for psychotic disorders and catatonia than for mood disorders such as depression. For clinical indications, it was positively noted that ECT is not only reserved as a last resort for treatment resistance, but also used as a first line therapy where a rapid response is required to save life. ECT was found to be an effective intervention as an overall treatment response was observed in 90.9% of the patients, ranging from mild to complete improvement. Depression which was assessed using the Patient Health Questionnaire-9 (PHQ-9) tool was the most responsive to ECT with a reduction of 20.5 (87.2%) in symptomatology, the patients achieving remission after ECT. Catatonia which was assessed using Bush-Francis Catatonia Rating Scale (BFCRS) was also very responsive to ECT with a mean reduction of 17.2 (86.9%) in score, all patients achieving marked symptomatic improvement ranging from 50-100%. Psychotic disorders which were assessed using Brief Psychiatric Rating Scale (BPRS) responded variably to ECT with an overall reduction of 27.7 (44.4%) in the score, ranging from good response in post-partum psychosis with a reduction of 36.5 (60.3%) to mild improvement in schizophrenia with a BPRS reduction of 24.1 (38.9%). The diagnosis of Catatonia was the only clinical characteristic that was significantly associated with having a good response to ECT ($p=0.005$). Using the mini-mental state examination (MMSE) to assess cognitive functioning, there was marked cognitive improvement among the study participants,

with only one participant having cognitive impairment. ECT is a relatively safe procedure with most of the side effects encountered being non-severe such as headaches and muscle aches; however, caution still needs to be taken as a high proportion of dental injuries were observed, with a single mortality reported during the study period which was secondary to pulmonary thromboembolism after COVID-19 infection.

6.2 Recommendations

This study recommends the continued use of electroconvulsive therapy at MTRH, however, there are aspects that can be improved upon to maximize its benefit and minimize any potential harm. There is a need to develop standardized local or national guidelines for its use to reduce inter-user variability as the different international guidelines available have some discrepancies in the diagnostic and clinical indications for ECT. American Psychiatric Association (APA) and the Royal College of Psychiatrists (RCP) advocate for its use as first line treatment for psychotic and mood disorders instead of reserving it as an option for treatment resistance only. They include clinical indications such as patient preference, previous positive response and high risk of suicidality. On the other hand, National Institute for Health and Care Excellence (NICE) guidelines have limited its use to treatment resistance and life threatening situations. Currently, there are no specific guidelines being used at MTRH, this could lead to underutilisation of ECT and inconsistent training of clinicians.

The guidelines should also cover the side effects associated with electroconvulsive therapy and the appropriate measures to limit them. A check-list for ECT side effects with regular screening during the treatment course would ensure they are detected early with timely intervention. A brief dental screening prior to ECT would help to

limit oral injuries by identifying high risk patients such as those with mobile teeth that could possibly be avulsed during the procedure and risk aspiration. The RCP guidelines recommend the use of a tightly rolled 4-inch swab as an effective and disposable bite block to limit dental injuries while the APA guidelines recommend a bite block made of flexible material with maximal cushioning in the molar area. To limit the factors that predispose patients to mortality during treatment, a screening for venous thromboembolism in high risk patients should be carried out such as physical evaluation for lower limb pain and swelling especially if unilateral, accompanied by a D-dimer test where appropriate. High risk patients include those with prolonged immobility especially in those with motor retardation or catatonia, COVID-19 and use of atypical antipsychotics such as clozapine. An objective assessment of cognitive functioning is also necessary so as to detect and quantify any cognitive impairment. Two simple tools that could be used include a Mini-Mental Status Exam (MMSE) or Montreal Cognitive Assessment (MOCA) at baseline and on completion of ECT, or during the procedure whenever indicated.

Future research is also needed to assess the patients and care givers' knowledge, attitude and perspective of the treatment. This would enable stigma to be addressed, misconceptions to be dealt with, and improvements to be made that are tailored to the patients' needs.

6.3 Study Limitations

The small sample size which was made even smaller by the variable diagnoses, mostly allowing for descriptive statistics with limited inferential conclusions.

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REFERENCES

Abbott, C. C., Jones, T., Lemke, N. T., Gallegos, P., McClintock, S. M., Mayer, A. R., ... & Calhoun, V. D. (2014). Hippocampal structural and functional changes associated with electroconvulsive therapy response. *Translational psychiatry*, *4*(11), e483-e483.

About Us. Retrieved from https://www.mtrh.go.ke/?page_id=598

Abrams R. (1997). The mortality rate with ECT. Convuls Ther 13:125–127.

Abrams, R. (2002). *Electroconvulsive therapy*. Oxford University Press.

Abrams, R. (2007). Does bilateral ECT cause persistent cognitive impairment? *Journal of ECT*, *23*(2), 61–62. https://doi.org/10.1097/yct.0b013e3180544997

Addo FM, Adjaottor, E.S, Amoah, C, Appiah, F, Asare, J, Amankwaah, G. B. (2020). *The Impact of ECT on the Mean Duration of Hospitalisation of Patients in the Psychiatric Unit, KATH, Kumasi, Ghana*. *6*(7), 1279–1285.

African Development Bank Group. (2016). *Jobs for Youth in Africa Catalyzing youth opportunity across Africa The role of the African Development Bank*. 1–2.

Ali, N. A., Owiti, F., Kigamwa, P., & Kumar, M. (2019). A Qualitative Exploration of Gaps and Challenges in Knowledge and Practices of Electroconvulsive Therapy by Key Personnel in Public and Private Mental Health Units in Kenya. *Frontiers in Psychiatry*, *10*(October), 1–11. https://doi.org/10.3389/fpsyt.2019.00697

Aloysi AS, Bryson EO, Kellner CH. Management of prolonged seizures during electroconvulsive therapy. Indian J Psychol Med 2014;36(2):220–1.

Anchala Jirakulsawat, R. . (2012). *Incidence of Oral Injury and Risk Factors Associated with Oral Injury in Psychiatric Patients Undergoing Electroconvulsive Therapy in Siriraj Hospital*. *31*(3), 257–261.

Andersen, J., Larsen, J. K., Alex, K., Nielsen, M., Schultz, V., Behnke, K., Bj, N., Andersen, J., Jk, L., Korner, A., V, N. B. M. S., Behnke, K., & The, B. N. (1986). *The brief psychiatric rating scale : schizophrenia , reliability and validity studies*. 6–9.

Andrade, C., & Bolwig, T. G. (2014). Electroconvulsive therapy, hypertensive surge, blood-brain barrier breach, and amnesia: Exploring the evidence for a connection. *Journal of ECT*, *30*(2), 160–164. https://doi.org/10.1097/YCT.0000000000000133

Andrade, C., Arumugham, S. S., & Thirthalli, J. (2016). Adverse Effects of Electroconvulsive Therapy. *Psychiatric Clinics of North America*, *39*(3), 513–530. https://doi.org/10.1016/j.psc.2016.04.004

Beck, K., McCutcheon, R., Stephenson, L., Schilderman, M., Patel, N., Ramsay, R., & Howes, O. D. (2019). Prevalence of treatment-resistant psychoses in the community: A naturalistic study. *Journal of Psychopharmacology*, *33*(10), 1248-1253.

Benson-martin, J. J., & Milligan, P. D. (2015). *O RIGINAL S TUDY A Survey of the Practice of Electroconvulsive Therapy in South Africa*. *31*(4), 253–257. https://doi.org/10.1097/YCT.0000000000000239

Bighelli, I., Huhn, M., Schneider-Thoma, J., Krause, M., Reitmeir, C., Wallis, S., Schwermann, F., Pitschel-Walz, G., Barbui, C., Furukawa, T. A., & Leucht, S. (2018). Response rates in patients with schizophrenia and positive symptoms receiving cognitive behavioural therapy: a systematic review and single-group meta-analysis. *BMC Psychiatry 2018 18:1*, *18*(1), 1–10. https://doi.org/10.1186/S12888-018-1964-8

Brunoni AR, Baeken C, Machado-Vieira R, Gattaz WF, Vanderhasselt MA. BDNF blood levels after electrocon- vulsive therapy in patients with mood disorders: a sys- tematic review and meta-analysis. World J Biol Psychiatry 2014;15:411-418.

C. Coates, A. M. O. B. (1997). *Dysphagia in Parkinson's disease*.

Carspecken, C. W., Borisovskaya, A., Lan, S. T., Heller, K., Buchholz, J., Ruskin, D., & Rozet, I. (2018). Ketamine anesthesia does not improve depression scores in electroconvulsive therapy: a randomized clinical trial. *Journal of neurosurgical anesthesiology*, *30*(4), 305-313.

Caruso, J. P., & Sheehan, J. P. (2017). Psychosurgery, ethics, and media: A history of Walter Freeman and the lobotomy. *Neurosurgical Focus*, *43*(3), 1–8. https://doi.org/10.3171/2017.6.FOCUS17257

Centanni, N. R., Craig, W. Y., Whitesell, D. L., Zemrak, W. R., & Nichols, S. D. (2021). Safety of ECT in patients receiving an oral anticoagulant. *Mental Health Clinician*, *11*(4), 254–258. https://doi.org/10.9740/mhc.2021.07.254

Cerletti, U., & Bini, L. (1938). Un nuovo metodo di shockterapie:'l'elettroshock'(riassunto). *Reale Accademia Medica (Communicazione alla seduta del 28 maggio 1938-XVI della Reale Accademia Medica di Roma.), Rome*.

Chanpattana, W., & Chakrabhand, M. S. (2001). Combined ECT and neuroleptic therapy in treatment-refractory schizophrenia: prediction of outcome. *Psychiatry Research*, *105*(1-2), 107-115.

Chanpattana, W., Kramer, B. A., Kunigiri, Þ. G., & Gangadhar, B. N. (2010). *O RIGINAL S TUDY A Survey of the Practice of Electroconvulsive Therapy in Asia*. *26*(1), 5–10.

Dar, M. A., Wani, R. A., Rather, Y. H., Wani, Z. A., Hussain, A., Shah, M. S., Haq, I., & Ahmad, K. (2014). *An Audit of Clinical and Sociodemographic Profile of Electroconvulsive Therapy in Kashmir*. *17*(4).

Datto, C. J. (2000). Side effects of electroconvulsive therapy. *Depression and Anxiety*, *12*(3), 130–134. https://doi.org/10.1002/1520-6394(2000)12:3<130::AID-DA4>3.0.CO;2-C

De Jong, J. O. Z., Arts, B., Boks, M. P., Sienaert, P., Van Den Hove, D. L. A., Kenis, G., … Rutten, B. P. F. (2014). Epigenetic effects of electroconvulsive seizures. *Journal of ECT*, *30*(2), 152–159.

Dinwiddie, S. H., Huo, D., & Gottlieb, O. (2010). The course of myalgia and headache after electroconvulsive therapy. *Journal of ECT*, *26*(2), 116–120.

Fink, M. (1993). Post-ECT delirium. Convuls Ther 9:326–330.

Fink, M. (2002). EEG changes with antipsychotic drugs. *American Journal of Psychiatry*, *159*(8), 1439-1439.

Grover, S., Malhotra, S., Varma, S., Chakrabarti, S., Avasthi, A., & Mattoo, S. K. (2013). Electroconvulsive therapy in adolescents: a retrospective study from north India. *The journal of ECT*, *29*(2), 122-126.

Grover, S., Satapathy, A., Chakrabarti, S., & Avasthi, A. (2018). Electroconvulsive Therapy among Elderly patients: A study from Tertiary care centre in north India. *Asian Journal of Psychiatry*, *31*(January), 43–48.

Grover, S., Sahoo, S., Rabha, A., & Koirala, R. (2019). ECT in schizophrenia: A review of the evidence. *Acta Neuropsychiatrica*, *31*(3), 115–127.

Haq, A. U., Sitzmann, A. F., Goldman, M. L., Maixner, D. F., & Mickey, B. J. (2015). Response of depression to electroconvulsive therapy: a meta-analysis of clinical predictors. *The Journal of clinical psychiatry*, *76*(10), 0-0.

Haskett RF. Electroconvulsive therapy's mechanism of action: neuroendocrine hypotheses. J ECT 2014;30:107-110

Hawkins, I. M. (1995). Archer K. *Strakowski SM, et al: Somatic treat—ment of catatonia. Int] Psychiatry Med*, *25*, 345-369.

Heijnen, W. T. C. J., Kamperman, A. M., Tjokrodipo, L. D., Hoogendijk, W. J. G., van den Broek, W. W., & Birkenhager, T. K. (2019). Influence of age on ECT efficacy in depression and the mediating role of psychomotor retardation and psychotic features. *Journal of Psychiatric Research*, *109*(September 2018), 41–47. https://doi.org/10.1016/j.jpsychires.2018.11.014

Hillow, M. A., Kwobah, E. K., Gakinya, B., & Omari, F. (2021). Sudden Death After Electroconvulsive Therapy in the Context of Coronavirus Disease 2019. *The Journal of ECT*, *Publish Ah*(3), 2020–2021.

Jenkins, R., Othieno, C., Ongeri, L., Sifuna, P., Ongecha, M., Kingora, J., Kiima, D., Omollo, R., & Ogutu, B. (2015). *Common mental disorder in Nyanza province , Kenya in 2013 and its associated risk factors – an assessment of change since 2004 , using a repeat household survey in a demographic surveillance site*. 1–12.

Jirakulsawat, A., Siriussawakul, A., Triyasunant, N., Wangdee, A., Jiraroch, Y., & Chiripu, M. (2012). Incidence of Oral Injury and Risk Factors Associated with Oral Injury in Psychiatric Patients Undergoing Electroconvulsive Therapy in Siriraj Hospital. *Siriraj Medical Journal*, *64*(5), 145-148.

Kaiser RH, Andrews-Hanna JR, Wager TD, Pizzagalli DA. Large-scale network dysfunction in major depressive disorder: a meta-analysis of resting-state functional connectivity. JAMA Psychiatry 2015;72:603-611.

Kellner, C. H., McCall, W. V., Spaans, H. P., & Sienaert, P. (2019). The FDA final order on ECT devices, finally. *The Journal of ECT*, *35*(2), 69-70.

Kellner, C. H., Obbels, J., & Sienaert, P. (2020). When to consider electroconvulsive therapy (ECT). *Acta Psychiatrica Scandinavica*, *141*(4), 304–315.

Kerner, N., & Prudic, J. (2014). Current electroconvulsive therapy practice and research in the geriatric population. *Neuropsychiatry*, *4*(1), 33.

Kimathi K. M. (1989). Evaluation of Electroconvulsive Therapy (ECT) in Mathari Hospital. Master of Medicine (Psych) Dissertation University of Nairobi.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ- 9: validity of a brief depression severity measure. *Journal of general internal medicine*, *16*(9), 606-613.

Kursawe HK, & Schmikaly R. (1988). *Fatal pulmonary embolism following mitigated electroconvulsive therapy. A case report from the intensive care viewpoint*.

Kwobah, E., Epstein, S., Mwangi, A., Litzelman, D., & Atwoli, L. (2017). Prevalence of psychiatric morbidity in a community sample in Western Kenya. *BMC Psychiatry*, 1–6.

Lam, R. W., Bartley, S., Yatham, L. N., Tam, E. M., & Zis, A. P. (1999). Clinical predictors of short-term outcome in electroconvulsive therapy. *Canadian Journal of Psychiatry*, *44*(2), 158–163. https://doi.org/10.1177/070674379904400206

Lee, J. H., Kung, S., Rasmussen, K. G., & Palmer, B. A. (2019). Effectiveness of Electroconvulsive Therapy in Patients With Major Depressive Disorder and Comorbid Borderline Personality Disorder HHS Public Access. *J ECT*, *35*(1), 44–47.

Leiknes, K. A., Schweder, L. J. von, & Høie, B. (2012). Contemporary use and practice of electroconvulsive therapy worldwide. *Brain and Behavior*, *2*(3), 283–344. https://doi.org/10.1002/brb3.37

Leroy, A., Naudet, F., Vaiva, G., Francis, A., Thomas, P., & Amad, A. (2018). Is electroconvulsive therapy an evidence-based treatment for catatonia? A systematic review and meta-analysis. *European Archives of Psychiatry and Clinical Neuroscience*, *268*(7), 675–687. https://doi.org/10.1007/s00406-017-0819-5

Lesage, A., Lemasson, M., Medina, K., Tsopmo, J., Sebti, N., Potvin, S., & Patry, S. (2016). *The Prevalence of Electroconvulsive Therapy Use Since 1973*. *00*(00), 1–7. https://doi.org/10.1097/YCT.0000000000000320

Leucht, S., Kane, J. M., Kissling, W., Hamann, J., Etschel, E., & Engel, R. (2005). Clinical implications of Brief Psychiatric Rating Scale scores. *British Journal of Psychiatry*, *187*(OCT.), 366–371. https://doi.org/10.1192/bjp.187.4.366

Loo, C. K., Katalinic, N., Martin, D., & Schweitzer, I. (2012). A review of ultrabrief pulse width electroconvulsive therapy. *Therapeutic Advances in Chronic Disease*, *3*(2), 69–85. https://doi.org/10.1177/2040622311432493

Luciano, A., & Meara, E. (2014). Employment status of people with mental illness: National survey data from 2009 and 2010. *Psychiatric Services*, *65*(10), 1201–1209. https://doi.org/10.1176/appi.ps.201300335

M, S., I, J. N., & P, M. (2013). Thrombotic complications of treatment with antipsychotic drugs. *Minerva Medica*, *104*(2), 175–184.

Mamah, D., Lammle, M., & Isenberg, K. E. (2005). Pulmonary embolism after ECT. *Journal of ECT*, *21*(1), 39–40.

McCall, W. V., Zvara, D., Brooker, R., & Arias, L. (1997). Effect of esmolol pretreatment on EEG seizure morphology in RUL ECT. *Convulsive therapy*, *13*(3), 175-180.

Medda, P., Toni, C., Luchini, F., M, G. M., Mauri, M., & Perugi, G. (2015). *Catatonia in 26 patients with bipolar disorder : clinical features and response to electroconvulsive therapy*. *2*, 892–901. https://doi.org/10.1111/bdi.12348

Meltzer, H. Y. (1992). Treatment of the neuroleptic-nonresponsive schizophrenic patient. *Schizophrenia bulletin*, *18*(3), 515-542.

Miesbach, W., & Makris, M. (2020). COVID-19: Coagulopathy, Risk of Thrombosis, and the Rationale for Anticoagulation. In *Clinical and Applied Thrombosis/Hemostasis* (Vol. 26). https://doi.org/10.1177/1076029620938149

Minneman, S. A. (1995). A history of oral protection for the ECT patient: Past, present, and future. In *Convulsive Therapy* (Vol. 11, Issue 2, pp. 94–103). Lippincott Williams & Wilkins.

Mitra, S., & Thirthalli, J. (2018). ECT in Schizophrenia: Does indication affect the outcome? *Asian Journal of Psychiatry*, *32*(November 2017), 5–7.

Molendijk ML, Spinhoven P, Polak M, Bus BA, Penninx BW, Elzinga BM. Serum BDNF concentrations as peri- pheral manifestations of depression: evidence from a sys- tematic review and meta-analyses on 179 associations (N=9484). Mol Psychiatry 2014;19:791-800.

Monahan, P. O., Shacham, E., Reece, M., Kroenke, K., Ong'or, W. O., Omollo, O., Yebei, V. N., & Ojwang, C. (2008). Validity/Reliability of PHQ-9 and PHQ-2 Depression Scales Among Adults Living with HIV/AIDS in Western Kenya. *Journal of General Internal Medicine*, *24*(2), 189.

Muhia, J., Waithera, L., Omega, K. G., Fkwamboka, B., & Songole, R. (2018). *Effects of Bipolar Relapse on Bipolar Patients in Moi Teaching and Referral Hospital*. *4*(3), 1–5. https://doi.org/10.26717/BJSTR.2018.04.001059

Mukherjee, S., Sackeim, H. A., & Schnur, D. B. (1994). Electroconvulsive therapy of acute manic episodes: a review of 50 years' experience. *American Journal of Psychiatry*, *151*(2), 169-176.

Muzyka, B. C., Glass, M., & Glass, O. M. (2017). Oral health in electroconvulsive therapy a neglected topic. *Journal of ECT*, *33*(1), 12–15. https://doi.org/10.1097/YCT.0000000000000351

Nabila Amin final Thesis on ECT Nov, 2018. (n.d.).

Naqvi, H., & Khan, M. M. (2005). *Use of Electroconvulsive Therapy at a University Hospital in Karachi , Pakistan : A 13-Year Naturalistic Review*. *21*(3), 158–161.

NICE. Guidance on the use of electroconvulsive therapy. London: National Institute for health and care excellence (2009).

Nikisch G, Mathé AA. CSF monoamine metabolites and neuropeptides in depressed patients before and after electroconvulsive therapy. Eur Psychiatry 2008;23:356-359.

Nobler, M. S., Oquendo, M. A., Kegeles, L. S., Malone, K. M., Campbell, C., Sackeim, H. A., & Mann, J. J. (2001). Decreased regional brain metabolism after ECT. *American Journal of Psychiatry*, *158*(2), 305–308.

Odayar, K., Eloff, I., & Esterhuysen, W. (2018). Clinical and demographic profile of catatonic patients who received electroconvulsive therapy in a South African setting. *South African Journal of Psychiatry*, *24*, 1–5. https://doi.org/10.4102/sajpsychiatry.v24i0.1100

Okasha, T. A. (2007). *Electro-Convulsive Therapy (ECT): an Egyptian perspective Correspondence : February*, 22–24.

Osman, A. H., Ali, Z. E., Kareem, K. A., & Suleiman, N. (2015). Electroconvulsive Therapy (ECT) in Sudan, Probing Differences between Africa and the West. *Health*, *07*(09), 1098–1104. https://doi.org/10.4236/health.2015.79125

Østergaard, S. D., Bolwig, T. G., & Petrides, G. (2014). No causal association between electroconvulsive therapy and death: A summary of a report from the Danish health and medicines authority covering 99,728 treatments. *Journal of ECT*, *30*(4), 263–264. https://doi.org/10.1097/YCT.0000000000000169

Ota M, Noda T, Sato N, Okazaki M, Ishikawa M, Hattori K, et al. Effect of electroconvulsive therapy on gray matter volume in major depressive disorder. J Affect Disord 2015;186:186-191.

Özdemir, A., Poyraz, C. A., Erten, E., Çırakoğlu, E., & Tomruk, N. (2016). Electroconvulsive therapy in women: a retrospective study from a mental health hospital in Turkey. *Psychiatric Quarterly*, *87*(4), 769-779.

Pant, S. B., Upadhyaya, S., Ojha, S. P., Chapagai, M., Tulachan, P., & Dhungana, S. (2018). Clinical outcome of patients with psychiatric illness following Electroconvulsive therapy in a teaching hospital in Kathmandu. *Journal of Institute of Medicine*, *40*, 1.

Perugi, G., Medda, P., Toni, C., Mariani, M. G., Socci, C., & Mauri, M. (2017). The role of electroconvulsive therapy (ECT) in bipolar disorder: effectiveness in 522 patients with bipolar depression, mixed-state, mania and catatonic features. *Current neuropharmacology*, *15*(3), 359-371.

Prudic, J., Haskett, R. F., Mulsant, B., Malone, K. M., Pettinati, H. M., Stephens, S., ... & Sackeim, H. A. (1996). Resistance to antidepressant medications and short-term clinical response to ECT. *The American journal of psychiatry*, *153*(8), 985-992.

Prudic, J., Olfson, M., & Sackeim, H. A. (2001). Electro-convulsive therapy practices in the community. *Psychological medicine*, *31*(5), 929-934.

Rakita, U., Bingham, K., Fung, K., & Giacobbe, P. (2017). *Factors Associated With Global Variability in Electroconvulsive Therapy Utilization*. *00*(00), 1–7. https://doi.org/10.1097/YCT.0000000000000405

Ramiah, C. *A retrospective record review of electroconvulsive therapy (ECT) at a specialist psychiatric hospital in Johannesburg* (Doctoral dissertation).

Rasmussen, K. G., Mueller, M., Knapp, R. G., Husain, M. M., Rummans, T. A., Sampson, S. M., ... & Kellner, C. H. (2007). Antidepressant medication treatment failure does not predict lower remission with ECT for major depressive disorder: a report from the consortium for research in electroconvulsive therapy. *Journal of Clinical Psychiatry*, *68*(11), 1701-1706.

Ranck, J.B., Jr (1975) Which elements are excited in electrical stimulation of mammalian central nervous system: a review. Brain Res 98: 417–440.

Rundgren, S., Brus, O., Båve, U., Landén, M., Lundberg, J., Nordanskog, P., & Nordenskjöld, A. (2018). Improvement of postpartum depression and psychosis after electroconvulsive therapy: A population-based study with a matched comparison group. *Journal of Affective Disorders*, *235*, 258–264. https://doi.org/10.1016/j.jad.2018.04.043

Saatcioglu, O., & Tomruk, N. B. (2008). Practice of electroconvulsive therapy at the research and training hospital in Turkey. *Social Psychiatry and Psychiatric Epidemiology*, *43*(8), 673–677. https://doi.org/10.1007/s00127-008-0351-z

Sabbatini, R. M. (1997). The history of shock therapy in psychiatry. *Brain & Mind: Electronic Magazine on Neuroscience*, (4), 10-12

Sackeim, H. A., Luber, B., Katzman, G. P., Moeller, J. R., Prudic, J., Devanand, D. P., & Nobler, M. S. (1996). The effects of electroconvulsive therapy on quantitative electroencephalograms: relationship to clinical outcome. *Archives of general psychiatry*, *53*(9), 814-824.

Sackeim, H. A. (2004). Convulsant and anticonvulsant properties of electroconvulsive therapy: Towards a focal form of brain stimulation. *Clinical Neuroscience Research*, *4*(1–2), 39–57. https://doi.org/10.1016/j.cnr.2004.06.013

Sackeim, H. A., Prudic, J., Fuller, R., Keilp, J., Lavori, P. W., & Olfson, M. (2007). The cognitive effects of electroconvulsive therapy in community settings. *Neuropsychopharmacology*, *32*(1), 244–254. https://doi.org/10.1038/sj.npp.1301180

Sakel, M. (1937). Vienna, Austria. *The SAGE International Encyclopedia of Travel and Tourism*. https://doi.org/10.4135/9781483368924.n502

Salehi, B., Mohammadbeigi, A., Kamali, A. R., Taheri-Nejad, M. R., & Moshiri, I. (2015). Impact comparison of ketamine and sodium thiopental on anesthesia during electroconvulsive therapy in major depression patients with drug-resistant; a double-blind randomized clinical trial. *Annals of cardiac anaesthesia*, *18*(4), 486.

Selis, M. A., Kauye, F., & Albert, F. (2008). *The Practice of Electroconvulsive Therapy in Malawi*. *24*(2), 137–140.

Semkovska, M., & McLoughlin, D. M. (2010). Objective cognitive performance associated with electroconvulsive therapy for depression: A systematic review and meta-analysis. *Biological Psychiatry*, *68*(6), 568–577. https://doi.org/10.1016/j.biopsych.2010.06.009

Shah, P. J., Dubey, K. P., Watti, C., & Lalwani, J. (2010). Effectiveness of thiopentone, propofol and midazolam as an ideal intravenous anaesthetic agent for modified electroconvulsive therapy: A comparative study. *Indian journal of anaesthesia*, *54*(4), 296.

Shulman, M., Njoku, J., & Manu, P. (2013). Thrombotic complications of treatment with antipsychotic drugs. *Minerva Medica*, *104*(2), 175-184.

Sienaert, P., Rooseleer, J., & Fruyt, J. De. (2011). Measuring catatonia : A systematic review of rating scales. *Journal of Affective Disorders*, *135*(1–3), 1–9. https://doi.org/10.1016/j.jad.2011.02.012

Sienaert, P., Dhossche, D. M., Vancampfort, D., De Hert, M., & Gazdag, G. (2014). A clinical review of the treatment of catatonia. *Frontiers in Psychiatry*, *5*(NOV), 1–10. https://doi.org/10.3389/fpsyt.2014.00181

Singh, A., & Kar, S. K. (2017). How electroconvulsive therapy works?: Understanding the neurobiological mechanisms. *Clinical Psychopharmacology and Neuroscience*, *15*(3), 210–221. https://doi.org/10.9758/cpn.2017.15.3.210

Somoye, E. B., Onifade, P. O., Oluwaranti, A. O., & Adeniji, A. A. (2014). A 10-year descriptive study of electroconvulsive therapy at the Neuropsychiatric Hospital, Aro, Abeokuta. *Journal of ECT*, *30*(4), 315–319. https://doi.org/10.1097/YCT.0000000000000095

Spence, D. (2009). Who benefits? In *Bmj* (Vol. 339). https://doi.org/10.1136/bmj.b4207

SQUIRE, L. R. (1986). Memory Functions as Affected by Electroconvulsive Therapy. *Annals of the New York Academy of Sciences*, *462*(1), 307–314. https://doi.org/10.1111/j.1749-6632.1986.tb51265.x

Stormont, B., Diedricks, A. A., & Kidd, G. (2016). A retrospective chart audit of electroconvulsive therapy at a regional Australian hospital. *Australasian Psychiatry*, *24*(5), 493–496. https://doi.org/10.1177/1039856216632397

Suzuki, K., Takamatsu, K., Takano, T., Tanabe, Y., Fujiyama, K., & Matsuoka, H. (2008). Safety of electroconvulsive therapy in psychiatric patients shortly after the occurrence of pulmonary embolism. *Journal of ECT*, *24*(4), 286–288. https://doi.org/10.1097/YCT.0b013e31816c434a

Takeshima, M., Ishikawa, H., Shimizu, K., Kanbayashi, T., & Shimizu, T. (2018). Incidence of venous thromboembolism in psychiatric inpatients: A chart review. *Neuropsychiatric Disease and Treatment*, *14*, 1363–1370. https://doi.org/10.2147/NDT.S162760

Tharyan, P., & Adams, C. E. (2005). Electroconvulsive therapy for schizophrenia. *Cochrane Database of Systematic Reviews*, (2).

The, U. K. (2003). Efficacy and safety of electroconvulsive therapy in depressive disorders: a systematic review and meta-analysis. *The Lancet*, *361*(9360), 799-808.

Tomac, T. A., Rummans, T. A., Pileggi, T. S., & Li, H. (1997). Safety and efficacy of electroconvulsive therapy in patients over age 85. *The American Journal of Geriatric Psychiatry*, *5*(2), 126-130.

Tombaugh, T. N., & Mclntyre, N. J. (1992). *The Mini-Mental State Examination :* 922–935.

Tørring, N., Sanghani, S. N., Petrides, G., Kellner, C. H., & Østergaard, S. D. (2017). The mortality rate of electroconvulsive therapy: a systematic review and pooled analysis. *Acta Psychiatrica Scandinavica*, *135*(5), 388–397. https://doi.org/10.1111/acps.12721

Ukpong, D. I., Makanjuola, R. O., & Morakinyo, O. (2002). A controlled trial of modified electroconvulsive therapy in schizophrenia in a Nigerian teaching hospital. In *West African journal of medicine* (Vol. 21, Issue 3, pp. 237–240).

Van Diermen, L., Van Den Ameele, S., Kamperman, A. M., Sabbe, B. C. G., Vermeulen, T., Schrijvers, D., & Birkenhäger, T. K. (2018). Prediction of electroconvulsive therapy response and remission in major depression: Meta-analysis. *British Journal of Psychiatry*, *212*(2), 71–80. https://doi.org/10.1192/bjp.2017.28

Van Waarde, J. A., Van Oudheusden, L. J. B., Heslinga, O. B., Verwey, B., Van Der Mast, R. C., & Giltay, E. (2013). Patient, treatment, and anatomical predictors of outcome in electroconvulsive therapy a prospective study. *Journal of ECT*, *29*(2), 113–121. https://doi.org/10.1097/YCT.0b013e31827e0d02

Wagner-jauregg, J. (1993). Julius Wagner-Jauregg (1857-1940), 137–143.

Weber, D. L., Ruvolo, C., & Cashin, P. (1973). (1973). Sudden death following electroconvulsive therapy. *New York State Journal of Medicine, 73(8), 1000–1001*.

Whittaker, R., Scott, A., & Gardner, M. (2007). The prevalence of prolonged cerebral seizures at the first treatment in a course of electroconvulsive therapy. *The journal of ECT*, *23*(1), 11-13.

APPENDICES

Appendix 1: Time Frame

ACTIVITY	START	END
Proposal Writing	January 2019	April 2019
Presentation of Proposal to the Psychiatry department	May 2019	End of May 2019
IREC Review	June 2019	August 2019
Collection of Data	September 2019	April 2021
Data Analysis	May 2021	July 2021
Thesis writing and presentation to the Psychiatry department	August 2021	October 2021
Presentation of Thesis to the School of Medicine for Examination purposes and Defense	November 2021	March 2022

Appendix 2: Budget

ITEM	**AMOUNT (KSH)**
Stationery	20,000
Airtime	5,000
Transport	15,000
Data handling	40,000
Printing and binding services	15,000
Reimbursement for participant's relative transport	10,500 (35 × sh 300)
Contingencies (10% of total cost)	10,550
Total cost	116,050

Appendix 3: Consent Form

Study Title: Practice and Clinical Outcomes of Electroconvulsive Therapy in Moi Teaching and Referral Hospital

Principal Investigator: Dr. Janbibi Yusuf
Part 1 registrar
Organization: Department of psychiatry
Moi University

Part I: Information Sheet

Greetings.

You are being asked to take part in a research study. This information is provided to tell you about the study. Please read this form carefully. You will be given a chance to ask questions. If you decide to be in the study, you will be given a copy of this consent form for your records.

Taking part in this research study is voluntary. You may choose not to take part in the study. You will still continue with your treatment. Saying no will not affect your rights to health care or services. You are also free to withdraw from this study at any time. If after data collection you choose to quit, you can request that the information provided by you be destroyed under supervision and thus not used in the research study. You will be notified if new information becomes available about the risks or benefits of this research. Then you can decide if you want to stay in the study

Purpose of the study

The purpose of the study is to find out the characteristics of patients who undergo electroconvulsive therapy at MTRH mental unit, to find out whether the treatment is beneficial for them and the nature of its side effects.

Type of Research Project

It is a descriptive and analytic research where I will assess the nature and severity of your illness before and after treatment, and describe the course of your treatment once it is completed.

Why have you been identified to Participate in this study?

All the patients undergoing electroconvulsive therapy during this study period will be assessed, if they consent.

How long will the study last?

The study will run over a course of 16 months.

You will be in this study for the duration of your treatment (2-6 weeks), you will be assessed twice, before and after treatment. It will take up approximately 40 minutes of your time for each assessment.

What will happen to me during the study?

If you consent to the study, before you begin your treatment of electroconvulsive therapy, you will be assessed using two questionnaires so as to grade the severity of your illness and level of cognitive (brain) functioning. Once you complete your treatment, you will be assessed using the same questionnaires so as to grade the response to treatment and note any side effects.

Your sociodemographic data, clinical details of your illness and treatment procedure will be obtained from your hospital file.

All the information will be kept confidential.

What side effects or risks can I expect from being in the study?

Since the study is not interventional there are no side effects. However, assessment using the questionnaires will take up some of your time. Some questions may be uncomfortable to answer.

Are there benefits to taking part in this study?

The study will enable us to determine how beneficial or not beneficial electroconvulsive therapy treatment is, and how we can give this treatment in a way that best addresses the needs of our patients. You may not benefit personally from this study at this point in time, however your future treatment may be guided by the findings of this study.

Reimbursements

Your guardian will be reimbursed ksh 300 for their transport to the hospital to witness the consent signing and step in where there will be no capacity to sign consent.

Who do I call if I have questions about the study?

If you have any questions regarding the study, please do not hesitate to contact the research team using the phone number or email provided.

Dr. Janbibi Yusuf

Phone**:** 0707180531

E- Mail address: janbibi_y@hotmail.com

If you have questions about your rights as a research subject, you may contact

Institutional Review Ethics Committee (IREC) 053 33471 Ext.3008. IREC is a group of people that reviews studies for safety and to protect the rights of study subjects.

Will the information I provide be kept private?

All reasonable efforts will be made to keep your protected information private and confidential. Using or sharing of your protecteted information will follow National privacy guidelines. There will be no linking of the information directly to you. By signing the consent document for this study, you are giving permission for the use and disclosure of your personal information.

The questionnaire results will be retained in your hospital file, as part of your personal health data.

Unless otherwise indicated, this permission to use or share your Personal Information does not have an expiration date. If you decide to withdraw your permission, we ask that you contact Dr. Janbibi Yususf and let her know that you are withdrawing your permission. At that time, we will stop further collection of any information about you. However, the health information collected before this withdrawal may continue to be used for the purposes of reporting and research quality.

Your treatment, payment or enrollment in any health plans or eligibility for benefits will not be affected if you decide not to take part. You will receive a copy of this form after it is signed.

FOMU YA IDHINI

Study Title: The Practice and Clinical Outcomes of Electroconvulsive Therapy in Moi Teaching and Referral Hospital

Mada cha mradi: Utendakazi na Matokeo ya kimatibabu ya huduma ya 'Electroconvulsive therapy', katika hospitali ya rufaa na mafunzo ya Moi

Mfatiti Mkuu: Daktari Janbibi Yusuf
Part 1 registrar
Shirika: Idara ya magonjwa ya akili
Chuo kikuu cha Moi

Sehemu ya Kwanza: Ukurasa wa ujumbe

Maamkuzi

Umeulizwa kuhusika kwenye mradi wa utafiti. Ujumbe huu unapeanwa kukujulisha kuhusu mradi. Tafadhali soma ujumbe huu kwa makini. Utapewa nafasi ya kuuliza maswali. Iwapo utaamua kuwa kwenye mradi, utapewa nakala hii ya idhini kwa ajili ya rekodi zako.

Kushiriki katika utafiti huu ni kwa hiari yako. Unaweza amua kutoshiriki kwenye mradi. Bado utaendelea na matibabu yako. Kukosa kushiriki hakutaathiri haki yako ya huduma za matibabu. Pia una uhuru wa kujiondoa kutoka kwenye mradi huu kwa wakati wowote. Iwapo baada ya kukusanya 'data' yako na ukaamua kujiondoa, unaweza omba ujumbe wako uliopeana uharibiwe chini ya usimamizi na kwa hio usitumike kwenye mradi wa utafiti. Utajulishwa iwapo ujumbe mpya utatokea kuhusu hatari au umuhimu wa utafiti huu. Kisha utaamua iwapo ungependa kuendelea katika mradi huu.

Lengo la Mradi

Lengo la mradi huu ni kutaka kujua sifa za wagonjwa ambao wanapitia huduma ya ‘electroconvulsive therapy’ katika kitengo cha magonjwa ya akili kwenye hospitali ya rufaa na mafunzo ya Moi, kutambua iwapo matibabu yana umuhimu kwao na pia hali ya madhara yake.

Aina ya mradi wa utafiti

Ni utafiti wa kimaelezo na kiuchunguzi ambapo nitapima hali na kiwango cha ugonjwa wako kabla na baada ya matibabu, na kuelezea hatua za matibabu yako mara yatakapokamilika.

Kwa nini umechaguliwa kushiriki kwenye mradi huu?

Wagonjwa wote wanaopokea matibabu ya ‘electroconvulsive therapy’ wakati wa mradi huu watachunguzwa, iwapo watakubali.

Je, mradi huu utakamilika kwa kipindi kipi?

Mradi utaendelea kwa kipindi cha miezi kumi na sita (16).

Utakuwa kwenye mradi huu kwa kipindi cha matibabu yako (wiki 2-6), utachunguzwa mara mbili, kabla na baada ya matibabu. Itachukuwa takriban muda wa dakika arobaini (40) za wakati wako kwa kila uchunguzi.

Nini kitanitendekea wakati wa mradi?

Iwapo utakubali kushiriki kwenye mradi, kabla ya kuanza matibabu yako ya ‘electroconvulvive therapy’, utachunguzwa kutumia hojaji mbili ili kupata kiwango cha ugonjwa wako na uwezo wa utendakazi wa akili yako. Pindi utakapomaliza matibabu yako, utachunguzwa kutumia hojaji zile zile ili kubainisha jinzi mwili wako unaitikia matibabu na kutambua madhara yoyote.

Ujumbe wako wa kibinafsi, taarifa za kimatibabu kuhusu ugojwa wako na taratibu za kimatibabu zitatolewa kwenye rekodi zako (faili) ya hospitali.

Taarifa hizi zote zitawekwa kwa siri

Je, ni madhara yepi au hatari ipi naweza tarajia kutokana na kushiriki kwenye mradi?

Kwa vile mradi si wa kupeana huduma, hakuna madhara yoyote. Hata hivyo, uchunguzi kutumia hojaji utachukua baadhi ya muda wako. Huenda maswali mengine yasikufurahishe kuyajibu.

Je, kuna faida katika kushiriki utafiti huu?

Utafiti huu utatusaidia kutathmini iwapo kuna manufaa au hakuna manufaa yoyote yanayosababishwa na huduma ya 'electroconvulsive therapy' na jinsi tunavyoweza kupeana matibabu haya kwa njia ambayo inashughulikia mahitaji ya wagonjwa wetu kwa njia bora. Huenda usinufaike kibinafsi kutokana na mradi huu kwa wakati huu, hata hivyo, matibabu yako ya usoni yataweza kuelekezwa na matokeo ya mradi huu.

Fidia

Mlezi wako atafidiwa Ksh 300 kwa usafiri wake hospitali ili kushuhudia idhini hii na kukusimamia idhini kama itahitajika.

Ni nani nitakayewasiliana naye iwapo nina maswali kuhusu utafiti?

Ukiwa na swali lolote kuhusiana na utafiti, tafadhali usisite kuwasiliana na timu ya utafiti ukitumia nambari ya simu au barua pepe iliyopeanwa.

Daktari. Janbibi Yusuf
Simu**:** 0707180531
Barua pepe: janbibi_y@hotmail.com

Ukiwa na maswali kuhusiana na haki yako kama mshiriki wa utafiti unaweza wasiliana na taasisi ya ukaguzi wa maadili (IREC) 05333471 Ext.3008. IREC ni

kikundi cha watu ambao hupitia miradi kwa ajili ya usalama na pia kulinda haki za wanaohusika kwenye utafiti.

Je, taarifa nitakazopeana zitahifadhiwa kwa siri?

Juhudi za kutosha zitafanywa ili kuziweka taarifa zako zilizotunzwa kwa siri. Kutumia au kupeana taarifa zako za siri itafuata taratibu za faragha za kitaifa. Hakutakuwepo kuhusisha taarifa moja kwa moja kwako. Kwa kutia sahihi fomu ya idhini ya utafiti huu, unapeana ruhusa ya kutumia taarifa zako za kibinafsi. Matokeo ya hojaji yatahifadhiwa kwenye faili yako ya hospitali kama sehemu ya taarifa kuhusu afya yako.

Isipokuwa kwa lingine ambalo limeonyeshwa, idhini hii ya kutumia au kupeana taarifa zako haina muda wa kumalizika. Iwapo utaamua kuondoa idhini yako, tunaomba kwamba uweze kuwasiliana na Daktari Janbibi Yusuf na umjulishe kuwa unaondoa idhini yako. Kwa wakati huo tutakoma kuendelea na ukusanyaji wa taarifa kukuhusu. Hata hivyo, taarifa za kiafya zilizochukuliwa kabla ya kuondoa idhini yako zaweza kuendelea kutumika kwa minajili ya kuwasilisha na ubora wa utafiti.

Matibabu yako, malipo au usajili wako katika mipango yoyote ya afya au ustahiki wa faida haitaathirika iwapo utaamua kutoshiriki. Utapata nakala ya fomu hii baada ya kusainiwa.

Part II: EVALUATION TO SIGN CONSENT FORM

Subject code _____ Evaluation Date _____

PROCEDURE:

This evaluation is to be done after the subject and guardian have gone through the basic information part of the consent. The evaluator may select the language to use in asking the questions in order to help the patient understand them.

A**. Is the patient alert and able to communicate with the examiner?**

Yes_____ No_____

B. Can the patient communicate the purpose of the study? Yes_____ No_____

1. Why is this study being done?

C. Can the patient retain the information that was communicated to them?

Yes_____ No_____

2. Describe some of the risks or discomforts that you may experience if you choose to participate in this study?

3. What are the benefits of participating in this study?

4. Do you have to be in this study?

5. If you are in the study and stop your participation, will you still be able to receive regular care?

6. What will happen if you decide not to be in the study?

7. Who should you contact if you have questions or experience a problem while in the study?

D. Can the patient use or weigh that information as part of their decision-making process? Yes_____ No_____

E. Can the patient communicate their decision (by talking, using sign language or any other means)? Yes_____ No_____

If the answer is no to any of the 5 parts of the capacity assessment, consider the subject as lacking the capacity to consent.

SIGNATURES:

I hereby certify that the above participant is alert, able to communicate and able to give acceptable answers to the items above.

_____ _____

Evaluator Date Witness Date

I hereby certify that the above participant is not alert/able to communicate/give acceptable answers to the items above, and therefore **does not have the capacity to consent to this study.**

_____ _____

Evaluator Date Witness Date

Where the patient lacks capacity to give consent, their closest guardian can decide on their behalf.

Part III: Consent of Subject:

I have read or have had read to me the description of the research study. The investigator or his/her representative has explained the study to me and has answered all of the questions I have at this time. I have been told of the potential risks and discomforts as well as the possible benefits of the study.

I freely volunteer to take part in this study.

_____	_____	_____
Name of Participant	Signature/thumbprint	Date & Time

I give consent on behalf of _____ so that he/she takes part in this study. **Relationship to subject _____**

_____	_____	_____
Name of Representative/Guardian	Signature/thumbprint	Date & Time

_____	_____	_____
Name of person Obtaining Consent	Signature of person Obtaining Consent	Date

_____	_____	_____
Name of Investigator	Signature of Investigator	Date

Sehemu III: Idhini ya mshiriki

Nimesoma au nimesomewa maelezo kuhusu mradi huu. Mtafiti au mwakilishi wake amenielezea kuhusu utafiti huu na amejibu maswali yote niliyo nayo kwa wakati huu. Nimeambiwa kuhusu hatari zinazoweza tokea na madhara na vile vile faida ninazoweza kupata kutokana na utafiti huu.

Kwa uhuru najitolea kushiriki katika utafiti huu.

_____ _____ _____

Jina la mshiriki Sahihi ya Mshiriki/ Kidole Tarehe na wakati

Napeana idhini kwa niaba ya _____ ili yeye ashiriki katika utafiti huu. Uhusiano kwa mshiriki _____.

_____ _____ _____

Jina la mwakilishi/ Mlezi Sahihi/ kidole Tarehe na wakati

_____ _____ _____

Jina la anayepokea idhini Sahihi ya anayepokea idhini Tarehe

_____ _____ _____

Jina la mtafiti Sahihi ya mtafiti Tarehe

Appendix 4.1: Basic Information Sheet

Participant code …….	
Age ……..	
Sex	Male……. Female…….
Residence	Urban…… Semi-urban…….... Rural……...
Marital status	Single……. Married……. divorced……. In a relationship…….
Education level	None…. Primary…. Secondary…. Tertiary….
Occupation	Formal employment …… Informal employment ……. Unemployed ……. Retired ….....
DSM V Diagnosis	……..
Indication for ECT	……..
Comorbid psychiatric condition	…….
Comorbid medical/surgical condition	…….
Current pharmacotherapy	…….
Previous history of ECT treatment	Yes…… No……

APPENDIX 5.1: Brief Psychiatric Rating Scale (BPRS)

CLIENT NAME: _____ DATE: _____
CLIENT ID#: _____ MD: _____

BRIEF PSYCHIATRIC RATING SCALE (BPRS)

Please enter the score for the term which best describes the patient's condition.

0 = not assessed, 1 = not present, 2 = very mild, 3 = mild, 4 = moderate, 5 = moderately severe, 6 = severe, 7 = extremely severe

1. **SOMATIC CONCERN** Degree of concern over present bodily health. Rate the degree to which physical health is perceived as a problem by the patient, whether complaints have a realistic basis or not. SCORE ☐	10. **HOSTILITY** Animosity, contempt, belligerence, disdain for other people outside the interview situation. Rate solely on the basis of the verbal report of feelings and actions of the patient toward others; do not infer hostility from neurotic defenses, anxiety, nor somatic complaints. (*Rate attitude toward interviewer under "uncooperativeness"*). SCORE ☐
2. **ANXIETY** Worry, fear, or over-concern for present or future. Rate solely on the basis of verbal report of patient's own subjective experiences. Do not infer anxiety from physical signs or from neurotic defense mechanisms. SCORE ☐	11. **SUSPICIOUSNESS** Brief *(delusional or otherwise)* that others have now, or have had in the past, malicious or discriminatory intent toward the patient. On the basis of verbal report, rate only those suspicions which are currently held whether they concern past or present circumstances. SCORE ☐
3. **EMOTIONAL WITHDRAWAL** Deficiency in relating to the interviewer and to the interviewer situation. Rate only the degree to which the patient gives the impression of failing to be in emotional contact with other people in the interview situation. SCORE ☐	12. **HALLUCINATORY BEHAVIOR** Perceptions without normal external stimulus correspondence. Rate only those experiences which are reported to have occurred within the last week and which are described as distinctly different from the thought and imagery processes of normal people. SCORE ☐
4. **CONCEPTUAL DISORGANIZATION** Degree to which the thought processes are confused, disconnected, or disorganized. Rate on the basis of integration of the verbal products of the patient; do not rate on the basis of patient's subjective impression of his own level of functioning. SCORE ☐	13. **MOTOR RETARDATION** Reduction in energy level evidenced in slowed movements. Rate on the basis of observed behavior of the patient only; do not rate on the basis of patient's subjective impression of own energy level. SCORE ☐
5. **GUILT FEELINGS** Over-concern or remorse for past behavior. Rate on the basis of the patient's subjective experiences of guilt as evidenced by verbal report with appropriate affect; do not infer guilt feelings from depression, anxiety or neurotic defenses. SCORE ☐	14. **UNCOOPERATIVENESS** Evidence of resistance, unfriendliness, resentment, and lack of readiness to cooperate with the interviewer. Rate only on the basis of the patient's attitude and responses to the interviewer and the interview situation; do not rate on basis of reported resentment or uncooperativeness outside the interview situation. SCORE ☐
6. **TENSION** Physical and motor manifestations of tension "nervousness", and heightened activation level. Tension should be rated solely on the basis of physical signs and motor behavior and not on the basis of subjective experiences of tension reported by the patient. SCORE ☐	15. **UNUSUAL THOUGHT CONTENT** Unusual, odd, strange or bizarre thought content. Rate here the degree of unusualness, not the degree of disorganization of thought processes. SCORE ☐
7. **MANNERISMS AND POSTURING** Unusual and unnatural motor behavior, the type of motor behavior which causes certain mental patients to stand out in a crowd of normal people. Rate only abnormality of movements; do not rate simple heightened motor activity here. SCORE ☐	16. **BLUNTED AFFECT** Reduced emotional tone, apparent lack of normal feeling or involvement. SCORE ☐
8. **GRANDIOSITY** Exaggerated self-opinion, conviction of unusual ability or powers. Rate only on the basis of patient's statements about himself or self-in-relation-to-others, not on the basis of his demeanor in the interview situation. SCORE ☐	17. **EXCITEMENT** Heightened emotional tone, agitation, increased reactivity. SCORE ☐
9. **DEPRESSIVE MOOD** Despondency in mood, sadness. Rate only degree of despondency; do not rate on the basis of inferences concerning depression based upon general retardation and somatic complaints. SCORE ☐	18. **DISORIENTATION** Confusion or lack of proper association for person, place or time. SCORE ☐

Appendix 4.2: Treatment Information Sheet

DATE OF ADMISSION: _____

NUMBER OF ECT SESSIONS: _____

DATE OF FIRST ECT SESSION: _____

DATE OF LAST ECT SESSION: _____

ANAESTHETIC USED: _____

MUSCLE RELAXANT USED: _____

ANY VITAL ABNORMALITY: _____

ECT SESSION	DURATION OF CONVULSION (SECONDS)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Appendix 5.2: Patient Health Questionnaire-9 (PHQ-9)

Participant code: _____ Date: _____

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____

=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

Appendix 5.3: Bush-Francis Catatonia Rating Scale (BFCRS)

BUSH-FRANCIS CATATONIA RATING SCALE

Use presence or absence of items 1-14 for screening
Use the 0-3 scale for items 1-23 to rate severity

1. Excitement: Extreme hyperactivity, constant motor unrest which is apparently non-purposeful. Not to be attributed to akathisia or goal directed agitation 0 = Absent 1 = Excessive motion 2 = Constant motion, hyperkinetic without rest periods 3 = Full-blown catatonic excitement, endless frenzied motor activity	**2. Immobility/stupor:** Extreme hypoactivity, immobile, minimally responsive to stimuli 0 = Absent 1 = Sits abnormally still, may interact briefly 2 = Virtually no interaction with external world 3 = Stuporous, non-reactive to painful stimuli
3. Mutism: Verbally unresponsive or minimally responsive 0 = Absent 1 = Verbally unresponsive to majority of questions; incomprehensible whisper 2 = Speaks less than 20 words/ 5 min 3 = No speech	**4. Staring:** Fixed gaze, little or no visual scanning of environment, decreased blinking. 0 = Absent 1 = Poor eye contact, repeatedly gazes less than 20 seconds between shifting of attention; decreased blinking 2 = Gaze held longer than 20 seconds, occasionally shifts attention 3 = Fixed gaze, non-reactive
5. Posturing/catalepsy: Spontaneous maintenance of posture(s), including mundane (e.g. sitting or standing for long periods without reacting). 0 = Absent 1 = Less than 1 minute 2 = Greater than one minute, less than 15 minutes 3 = Bizarre posture, or mundane maintained more than 15 minutes	**6. Grimacing:** Maintenance of odd facial expressions. 0 = Absent 1 = Less than 10 seconds 2 = Less than 1 minute 3 = Bizarre expression(s) or maintained more than 1 minute
7. Echopraxia/echolalia: Mimicking of examiner's movements/speech 0 = Mimicking of examiner's movements/speech 1 = Occasional 2 = Frequent 3 = Constant	**8. Stereotypy:** Repetitive, non-goal-directed motor activity (e.g. finger-play; repeatedly touching, patting or rubbing self); abnormality not inherent in act but in frequency. 0 = Absent 1 = Occasional 2 = Frequent 3 = Constant
9. Mannerisms: Odd, purposeful movements (hopping or walking tiptoe, saluting passers-by or exaggerated caricatures of mundane movements); abnormality inherent in act itself. 0 = Absent 1 = Occasional 2 = Frequent 3 = Constant	**10. Verbigeration:** Repetition of phrases or sentences (like a scratched record). 0 = Absent 1 = Occasional 2 = Frequent 3 = Constant
11. Rigidity: Maintenance of a rigid position despite efforts to be moved, exclude if cog-wheeling or tremor present. 0 = Absent 1 = Mild resistance 2 = Moderate 3 = Severe, cannot be repositured	**12. Negativism:** Apparently motiveless resistance to instructions or attempts to move/examine patient. Contrary behavior, does exact opposite of instruction 0 = Absent 1 = Mild resistance and/or occasionally contrary 2 = Moderate resistance and/or frequently contrary 3 = Severe resistance and/or continually contrary
13. Waxy Flexibility: During reposituring of patient, patient offers initial resistance before allowing himself to be repositioned, similar to that of a bending candle. 0 = Absent 3 = Present	**14. Withdrawal:** Refusal to eat, drink and/or make eye contact. 0 = Absent 1 = Minimal PO intake/interaction for less than 1 day 2 = Minimal PO intake/interaction for more than 1 day 3 = No PO intake/interaction for 1 day or more

BUSH-FRANCIS CATATONIA RATING SCALE (CONT.)

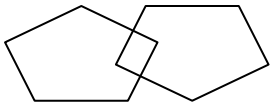
15. Impulsivity: Patient suddenly engages in inappropriate behavior (e.g. runs down hallway, starts screaming or takes off clothes) without provocation. Afterwards can give no, or only a facile explanation. 0 = Absent 1 = Occasional 2 = Frequent 3 = Constant or not redirectable	**16. Automatic obedience:** Exaggerated cooperation with examiner's request or spontaneous continuation of movement requested. 0 = Absent 1 = Occasional 2 = Frequent 3 = Constant
17. Mitgehen: "Anglepoise lamp" arm raising in response to light pressure of finger, despite instruction to the contrary. 0 = Absent 3 = Present	**18. Gegenhalten:** Resistance to passive movement which is proportional to strength of the stimulus, appears automatic rather than willful. 0 = Absent 3 = Present
19. Ambitendency: Patient appears motorically "stuck" in indecisive, hesitant movement. 0 = Absent 3 = Present	**20. Grasp reflex:** Per neurological exam 0 = Absent 3 = Present
21. Perseveration: Repeatedly returns to same topic or persists with movement. 0 = Absent 3 = Present	**22. Combativeness:** Usually in an undirected manner, with no, or only a facile explanation afterwards. 0 = Absent 1 = Occasionally strikes out, low potential for injury 2 = Frequently strikes out, moderate potential for injury 3 = Serious danger to others
23. Autonomic abnormality: Circle: temperature, BP, pulse, respiratory rate, diaphoresis. 0 = Absent 1 = Abnormality of one parameter (excluding pre-existing hypertension) 2 = Abnormality of two parameters 3 = Abnormality of three or more parameters	**TOTAL:**_____

Appendix 5.4: Mini Mental State Examination (MMSE)

Subject code: _____ Date: _____

<u>Instructions:</u> Ask the questions in the order listed. Score one point for each correct response within each question or activity.

Maximum Score	**Patient's Score**	**Questions**
5		"What is the year? Season? Date? Day of the week? Month?"
5		"Where are we now: Country? County? Town/city? Hospital? Floor?"
3		The examiner names three unrelated objects clearly and slowly, then asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible. Number of trials: _____
5		"I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65, …) Stop after five answers. Alternative: "Spell WORLD backwards." (D-L-R-O-W)
3		"Earlier I told you the names of three things. Can you tell me what those were?"
2		Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them.
1		"Repeat the phrase: 'No ifs, ands, or buts.'"
3		"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)
1		"Please read this and do what it says." (Written instruction is "Close

		your eyes.")
1		"Make up and write a sentence about anything." (This sentence must contain a noun and a verb.)
1		"Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) 
30		TOTAL

(Adapted from Rovner & Folstein, 1987)

Appendix 6: Checklist for Non-Cognitive Side Effects

Subject code: _____ Date: _____

SIDE EFFECT	Presence (✔) or absence (✕)
Headache	
Muscle aches	
Nausea	
Post-ictal delirium	
Cardiovascular complication	
Respiratory complication	
Dental complication	
Prolonged seizure	
Other side effect (specify)	
Mortality	

Appendix 7.1: Approval from IREC

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/2/3

Reference: IREC/2019/140
Approval Number: 0003419

29th August, 2019

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
29 AUG 2019
APPROVED
P. O. Box 4606 - 30100 ELDORET

Dr. Janbibi Yusuf Mohamed,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Dr. Mohamed,

PRACTICE AND CLINICAL OUTCOMES OF ELECTROCONVULSIVE THERAPY IN MOI TEACHING AND REFERRAL HOSPITAL, ELDORET

This is to inform you that ***MU/MTRH-IREC*** has reviewed and approved your above research proposal. Your application approval number is ***FAN:0003419.*** The approval period is ***29th August, 2019 – 28th August, 2020.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MU/MTRH-IREC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MU/MTRH-IREC*** within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MU/MTRH-IREC*** within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MU/MTRH-IREC.***

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Sincerely

DR. S. NYABERA
DEPUTY-CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH; Dean - SOP; Dean - SOM
Principal - CHS; Dean - SON; Dean - SOD

Appendix 7.2: Approval for continuation from IREC

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/2/3

29th August, 2020

Reference: IREC/2019/140
Approval Number: 0003419

Dr. Janbibi Yusuf Mohamed,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
29 AUG 2020
APPROVED
P. O. Box 4606 - 30100 ELDORET

Dear Dr. Mohamed,

RE: CONTINUING APPROVAL

The Institutional Research and Ethics Committee has reviewed your request for continuing approval to your study titled:-

"Practice and Clinical Outcomes of Electroconvulsive Therapy in Moi Teaching and Referral Hospital, Eldoret".

Your proposal has been granted a Continuing Approval with effect from 29th August, 2020. You are therefore permitted to continue with your study.

Note that this approval is for 1 year; it will thus expire on 28th August, 2021. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

DR. S. NYABERA
DEPUTY-CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc: CEO - MTRH
Principal - CHS
Dean - SOM
Dean - SOD
Dean - SPH
Dean - SON

Appendix 7.3: Approval to conduct Research at MTRH

An ISO 9001:2015 Certified Hospital

MOI TEACHING AND REFERRAL HOSPITAL

Telephone :(+254)053-2033471/2/3/4
Mobile: 722-201277/0722-209795/0734-600461/0734-683361
Fax: 053-2061749
Email: ceo@mtrh.go.ke/directorsofficemtrh@gmail.com

Nandi Road
P.O. Box 3 – 30100
ELDORET, KENYA

Ref: ELD/MTRH/R&P/10/2/V.2/2010

3rd September, 2019

Dr. Janbibi Yusuf Mohamed,
Moi University,
School of Medicine,
P.O. Box 4606-30100
ELDORET-KENYA.

APPROVAL TO CONDUCT RESEARCH AT MTRH

Upon obtaining approval from the Institutional Research and Ethics Committee (IREC) to conduct your research proposal titled:-

"Practice and Clinical Outcomes of Electroconvulsive Therapy in Moi Teaching and Referral Hospital, Eldoret".

You are hereby permitted to commence your investigation at Moi Teaching and Referral Hospital.

for **DR. WILSON K. ARUASA, *MBS***
CHIEF EXECUTIVE OFFICER
MOI TEACHING AND REFERRAL HOSPITAL

cc - Senior Director, (CS)
- Director of Nursing Services (DNS)
- HOD, HRISM

Appendix 7.4: NACOSTI License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **994190**

Date of Issue: **30/September/2019**

RESEARCH LICENSE

This is to Certify that Dr.. janbibi muhamed of Moi University, has been licensed to conduct research in Uasin-Gishu on the topic: PRACTICE AND CLINICAL OUTCOMES OF ELECTROCONVULSIVE THERAPY IN MOI TEACHING AND REFERRAL HOSPITAL, ELDORET for the period ending : 30/September/2020.

License No: **NACOSTI/P/19/1526**

994190

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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