

CHAPTER ONE

1.1 INTRODUCTION

Electroconvulsive Therapy (ECT) refers to a procedure whereby an electrical stimulus is placed on the patient's head with the purpose of producing a generalized seizure, in order to treat a variety of psychiatric symptoms.¹

Convulsive therapy has been used to treat mental disorders since as early as the 16th century.¹ Its popularity grew popular in the 19th century and then with the advent of psychotropics declined in use. However, in comparison to psychotropics, ECT can act more effectively and more rapidly, with substantial clinical improvement.²

There has been progress made in terms of the practical application of ECT, which makes this treatment modality a safe procedure in comparison to what was depicted centuries ago.¹ Despite this, critics have expressed concern about variations in ECT use, even among consultant teams within the same hospital.³ There are various factors that have also limited its widespread use. This includes limited access, limited expertise, fear of adverse effects, such as cognitive impairment, as well as varying patient seizure threshold which is a challenge to the clinician.^{4,5} Towards the end of the 20th century there was a worldwide increase in interest in ECT research and many international studies were performed that sought to offer criteria to optimize the selection of patients, the technique, and outcome of ECT.⁶

The evolution of ECT highlights the many changes and challenges still faced by clinicians and as a result there is an absence of clearly defined management practices in South Africa (SA).⁷ Similar problems too have been documented in both the United Kingdom (UK) and the United States of America (USA).⁸ The differing provision of ECT worldwide, as well as within SA, coupled with limited local literature, makes this area worth investigating further. A review of ECT practice in a South African based public sector psychiatric hospital may therefore be of value and possibly assist in motivating for improving ECT guidelines and continuing to improve patient care in the future.

1.2 AIMS

1.2.1 To conduct a retrospective review of ECT practice at Tara Hospital over a ten year period commencing January 2006 to December 2015.

1.2.2 To describe the characteristics of ECT practice at Tara Hospital over a ten year period commencing January 2006 to December 2015

1.3 OBJECTIVES

1.3.1 To evaluate the use of ECT at Tara Hospital over a ten year period, in terms of the number of patients who received ECT, as well as the prevalence rate of ECT use expressed as a percentage of the total admissions to Tara Hospital's biological wards during this time.

1.3.2 To determine the socio-demographic and clinical factors of those patients that received ECT at Tara Hospital during January 2006 to December 2015.

1.3.3 To determine the anesthetic agents used, as well as the technical aspects of ECT performed at Tara Hospital over the ten year period.

1.3.4 To determine the clinical outcomes in those patients who received ECT, as well as the occurrence adverse effects.

1.4 LITERATURE REVIEW

ECT practice still remains controversial and stigma bound amongst patients and healthcare professionals alike, due to lack of research.⁷

It is used for a myriad of psychiatric conditions, from affective disorders to psychotic disorders. Although effective, its use is generally reserved for particularly challenging and often treatment resistant cases. This review will discuss the local and international guidelines pertaining to the practice of ECT, as well as factors affecting the outcome of response to ECT. It will also discuss the adverse effects related to ECT, which is often a deterrent to its use.

This literature review will demonstrate the lack of substantial literature pertaining to the prevalence of ECT in certain countries, particularly SA.⁷

1.4.1 ECT Studies Worldwide

1.4.1.1 International ECT Studies

In 2004, an audit of ECT services was performed in all ECT facilities in Norway.⁹ This was done as a clinician completed questionnaires, in order to evaluate Norwegian rates of ECT use, clinical characteristics, as well as the psychiatrists' perceptions towards ECT.⁹ The findings demonstrated that although Norwegian psychiatrists displayed positive attitudes to the use of ECT, it was still an under-utilized and unequally distributed treatment modality.⁹ They concluded that this was a similar problem in other first world countries, namely the United States of America (USA), as well as the United Kingdom (UK).⁹ The authors recommended that more research was required in Norway and first world countries.⁹

The lack of ECT research is also present in developing countries.¹⁰ In 2013, ten ECT providing hospitals across Iraq were audited to assess the practice of ECT and measure the degree of compliance with the standards of the Iraqi ECT Policy 2009.¹⁰ This was done by a self-completed questionnaire, as well as by reviewing clinical records and notes.¹⁰ In conclusion, recommendations were made to include more research and training of staff, as well as increase utilization of ECT.¹⁰

1.4.1.2 African Based ECT Studies

In 2006, a naturalistic prospective study of ECT was performed at a psychiatric hospital in Malawi over a two month duration.¹¹ The efficacy of ECT treatment was assessed with the "Clinical Global Impression" scale, as well as by a checklist which was used to determine ECT efficacy, and adverse effects.¹¹ In light of the noted efficacy, recommendations were made to improve ECT treatment standards.¹¹

1.4.1.3 South African Based ECT Studies

One of the first ECT studies in SA was conducted in 1991, regarding the practice of ECT in the Eastern Cape. In this retrospective review comparisons were made using the length of hospital stay between two groups of patients, the first group being those who received ECT and the second group who did not.⁸ This study found that patients who received ECT had a slightly longer hospital stay, although this was attributed to symptom severity rather than ECT-related.⁸ This study further recommended that more research be conducted on ECT practice in South Africa.⁸

1.4.1.4 South African ECT Utilization Rates

Despite the need for more research in SA, there was a paucity of local literature regarding the practice of ECT, until more recently a study was published in 2015, titled “A Survey of the Practice of Electroconvulsive Therapy in South Africa”.¹² This study focused on ECT utilization in both the private and public sector in South Africa during a twelve month period from 2011 to 2012.¹² A self-reported questionnaire was completed by both doctors and nurses who practiced ECT during this time and included aspects pertaining to frequency of use, equipment, monitoring, as well as indications for use.¹² Whilst there were forty two institutions in SA that had an ECT machine, thirteen sites reported that it was not in use.¹² Among the remaining twenty-nine sites that were able to provide ECT services, the ECT practice differed in terms of dosing strategies and monitoring.¹² This study too advocated for the need for regulation of ECT practice.¹²

1.4.2 Prevalence and ECT Utilization Rates

It has been estimated that, about one million patients worldwide receive ECT.¹³ This includes parts of Europe, the USA, Australia, New Zealand, as well as parts of Africa.¹³

The utilization of ECT may be calculated in various ways which may contribute to challenges in comparisons.¹⁴ The inpatient prevalence refers to the proportion or percentage of ECT treated patients among the inpatient population over a defined period.¹⁴ The annual inpatient prevalence rate of ECT practice in the USA ranges from 0.4-1.3%, whereas in Africa, annual inpatient prevalence rates of 23-25% have been

reported.¹⁵ In an earlier SA based study reviewing ECT practice at a hospital in the Transkei, it was found that 20.8% of inpatients, admitted between 1976 and 1982, received ECT in conjunction with medication.⁸

ECT prevalence can also be described as the rate of ECT use in the population per annum, also referred to as the “ECT Population Rate” or “ECT Administration Rate” (EAR).^{14,15} This is reported as a number out of 10,000 or 100,000 from the general population, for example 2.1 per 100, 000 people per annum in a specific country.^{14,15}

In a recent meta-analysis comparing ECT use since 1973 to 2013, in twelve first-world countries, the EAR occurred at a composite rate of 16.9 per 100,000 inhabitants.¹⁴ In light of this, it was concluded that ECT remains a rarely used treatment modality, reserved mainly for treatment-resistant psychiatric disorders.¹⁴ The global variability in ECT prevalence rates over this period, was attributed to insufficient standardization of ECT procedures and practices.¹⁴ Although, the authors exercised caution in generalizing between and within countries.¹⁴

Regarding SA ECT utilization in public and private hospitals, the SA based study published in December 2015, found significant differences.¹² According to this study 66.7% of ECT was performed in private hospitals, as opposed to 33.3 % in public sector hospitals.¹² The number of persons treated with ECT per 10,000 persons per year was found to be 0.22.¹²

Despite ECT being utilized worldwide, there are many differences in its practice, as well as how prevalence and ECT utilization rates are reported in the literature, making it somewhat challenging to compare and contrast.³ In addition, significant differences in ECT practice even amongst clinicians have been described.³ Indeed, the reasons for these differences are multi-factorial and encompass not only the various organizations of psychiatric services and access to care, but also professional and cultural beliefs particularly surrounding the safety of ECT and its stigmatization in the community.¹⁶

1.4.3 Guidelines for the Use of ECT

1.4.3.1 International Guidelines

According to the NICE Guidelines, good clinical practice involves determining the risks and benefits when prescribing ECT for an individual patient, and ensuring that the benefits outweighs the risk.¹⁷ There are numerous factors which must be assessed including the indications, quality of psychiatric symptoms, previous pharmacological treatments, a previous response to ECT and medical co-morbidities.¹⁷ Risks include ECT-related adverse effects, anesthetic-related adverse effects and complications due to medical co-morbidities.¹⁷ The patient's preference is paramount, and determination of valid informed consent or assent is vital.¹⁷ After each ECT session, the patient's clinical condition should be assessed for adverse effects and this should be monitored throughout the course of ECT.¹⁷ ECT should not continue once there is an adequate clinical response, the presence of adverse effects or in the absence of informed consent.¹⁷

The Royal College of Psychiatrists founded the ECT Accreditation Service (ECTAS), which objectively measures the quality of ECT services.³⁰ ECTAS ensure that ECT service standards in the UK are upheld by regular monitoring and visitations to the registered service sites.³⁰ It was shown in 2003 that 80% of patients who received ECT provided positive feedback about the service.³⁰

1.4.3.2 Local Guidelines

The legislation pertaining to the use of ECT in South Africa is Section 35 of the Mental Health Care Act (MHCA) No. 17 of 2002.¹⁸ The provisions by the MHCA and the Department of Health Guidelines require that it is only performed by a qualified medical practitioner with specialized training in mental healthcare.¹⁸ An ECT register should be available and kept accordingly.¹⁸ It is mandatory that every quarter, a detailed patient register, the Form 47, should be provided to the Mental Health Review Board (MHRB).¹⁸ However, it has been noted that there is a paucity of established ECT treatment guidelines, and limited training expertise, in South Africa.⁷ ECT practices are often unfamiliar in the majority of local hospitals.⁷

1.4.4 Indications for ECT

According to the NICE Guidelines, there are four major indications for the use of ECT.¹⁷ Firstly, when there is a dire urgency for a quick response and recovery.^{17,18} Secondly, when ECT is less harmful than other available treatment options.^{17,18} Thirdly, when the patient has had a good previous response to ECT and lastly, when the patient advocates for its use.^{17,18} These conditions will be discussed further.

ECT is indicated as a first-line management in potentially life-threatening conditions in order to obtain a rapid clinical improvement of severe symptoms.¹⁷ This may include catatonic patients who are mute and not eating, patients with a high suicide risk or severely psychomotor agitated patients.¹⁷

ECT is also prescribed first-line, in instances where the benefit is greater than the risk and it poses less harm than other treatment alternatives, for example in patients with many medical co-morbidities where certain psychotropic medication may be contra-indicated, such as in severe renal or liver disease.^{17,18} ECT may also be used first-line in elderly patients who respond poorly or cannot tolerate psychotropic medication.¹⁷

ECT may also be prescribed as a first-line management for severe mood disorders, such as severe depression or intractable, severe mania.¹⁷

The second-line use of ECT generally occurs when other treatment options have failed and patients are deemed treatment resistant or there have been contra-indications to other conventional treatments, for example for treatment resistant mood disorders or treatment resistant schizophrenia.¹⁷ However, ECT is not indicated for uncomplicated schizophrenia.¹⁷

There are certain neuro-psychiatric disorders where ECT may be indicated as a second or third-line form of treatment namely, cerebrovascular disorders, the neuro-cognitive disorders of various etiologies, as well as Parkinson's Disease.¹⁷

The South African Society of Psychiatrists (SASOP) indications are largely harmonious with the NICE Guidelines.¹⁹ SASOP recommends that ECT be considered first-line in catatonic patients, pregnant patients, patients where there has been a previous good

response to ECT or when the benefit is greater than the risk namely, for severely agitated patients.¹⁹ It also recommends that its use schizophrenia be reserved for treatment resistant cases, unless any of the above first-line conditions are prescedent.¹⁹ This same is true for both depressive and bipolar disorders.¹⁹

1.4.4.1 Indications for ECT in Pregnancy

It has been noted that in pregnancy ECT is associated with less adverse effects to mother and child than pharmacological treatments and as a result its use is preferable in pregnancy, postpartum and lactation period.² ECT is recommended as first-line treatment in all trimesters of pregnancy, the puerperium and lactation, provided the benefit outweighs the risk.² This includes instances of serious mental disorders, treatment resistance or particularly challenging suicidality or psychomotor agitation.²⁰ Treatment should occur in conjunction with an obstetrician for optimal fetal and maternal monitoring.²⁰

1.4.4.2 Indications for ECT in Children and Adolescents

Children and adolescents pose a vulnerable group in psychiatry.² Treatment is heavily stigmatized and so too is the utilization of ECT, particularly as there is a lack of research and effects to the developing brain are not well defined.^{16,18} ECT is not frequently prescribed in this population as psychiatrists are reluctant to use ECT in this population group due to the lack of research, the ethical and legal implications, the perception of its potentially adverse effects to a developing brain and lack of expertise.¹⁸ However, it is hypothesized that generally the same indications for adults are applied to children and adolescents.^{16,18} The APA guidelines advocate that patients less than eighteen years of age should receive ECT as a last line after other treatments have failed or if they are deemed more harmful than ECT.² A consultation must be sought from another psychiatrist who has sufficient skill in managing patients less than eighteen years of age.² When this pertains to the use of ECT in patients less than twelve years of age, it is mandatory than two psychiatrists are consulted, both whom are skilled in treating children.² The prescription of ECT should therefore be done after careful consideration of the risks, benefits, previous medication trials, as well as liaison with child psychiatrists.²¹

1.4.5 Efficacy

The research pertaining to the efficacy of ECT has been inconsistent at times, although the general consensus leans in favor of ECT use.²²

In 2003, the UK ECT Review Group compared ECT to placebo and antidepressant drugs in the management of depression.²² This meta-analysis revealed that ECT was more efficacious in comparison to placebo and antidepressants.²² In 2008, a meta-analysis demonstrated that its efficacy was, “significantly superior in all comparisons: ECT versus simulated ECT, ECT versus placebo, ECT versus antidepressants in general, ECT versus TCAs and ECT versus MAOIs”.²³ However, these findings were slightly contradicted by a literature review published in 2010 where it was found that its efficacy was only slight in comparison to placebo in the acute phase of treatment.²⁴ In 2012, another meta-analysis was performed evaluating the efficacy of ECT in unipolar and bipolar depression.²⁴ The results demonstrated that, while the response of the non-ECT patient groups varied, the ECT patient groups responded favourably.²⁵ Further research has shown that ECT is efficacious in both the depressive and manic phases of bipolar disorder.²⁶ In the treatment of bipolar disorder, ECT was shown to have an approximate efficacy of 80%, making it possibly superior to lithium.²⁷

ECT has also proven effective in schizophrenia and non-affective psychotic spectrum disorders.^{28,29} The efficacy of ECT was supported in schizophrenic patients with delusions or psychomotor agitation.²⁸ In a meta-analysis from 1982 to 2004, it was found that ECT resulted in a greater improvement of 80% reduction in symptoms, fewer relapses and a shorter duration of hospital admission.²⁹ Comparably, to efficacy in the treatment of mood disorders, ECT for treatment resistant schizophrenia is not as well studied and warrants further research.²⁹

1.4.6 Adverse effects

ECT is considered a low-risk intervention, with a mortality rate of approximately 0.002%.³ Its use is permissible in the elderly, pregnant patients, as well as those with medical comorbidities.³¹ Patients undergo a history, physical examination and pre-anesthetic assessment before commencing ECT.⁴ This also includes certain blood tests, metabolic

screen, as well as electrocardiography (ECG).⁴ These investigations are performed to minimize the risk involved with the procedure.⁴ These risks may stem from pre-existing medical conditions, anesthetic-related events and procedure-related adverse effects.¹⁵ Pre-existing medical conditions will be discussed further under contra-indications to ECT. The adverse reactions to ECT may be separated into anesthesia-related and procedure-related adverse effects.

Anesthetic-related adverse effects include cardiovascular effects, such as autonomic instability and development of arrhythmias.³² Neurological complications that may occur due to anesthesia include a delirium, raised seizure threshold and raised intracranial pressure.³² The research has advocated that a thorough pre-ECT anesthetic assessment should be done to mitigate potential anesthetic-related complications.³²

Procedure-related adverse effects may occur immediately after ECT, and some may subside within a few hours to days, and others persistent as more longer-term.³³ The cognitive adverse effects which are among these, have frequently stigmatized the use of ECT.

The immediate procedure-related adverse effects occur during ECT or a few minutes thereafter.³³ These effects impact on the seizure duration and include prolonged seizures and status epilepticus.³³ The APA defines prolonged seizures as seizures greater than 2 minutes, whereas status epilepticus is a seizure duration of greater than 5 minutes or continuous seizures without recovery.² An entity of non-convulsive status epilepticus warrants clinical attention as this may cause a prolonged delirium and as a result, EEG monitoring should always be performed during ECT.^{33,34} The frequency of these effects requires more research, although status epilepticus is noted to be rare.^{33,34} Risk factors include concurrent medical disorders, certain medications and electrolyte imbalances, all of which drastically effect the seizure threshold.^{33,34} The risk factors are generally noted in the pre-assessment period and preventative measures may be taken.³²

In the acute period post ECT, patients may complain of fatigue (73%), headache (48%), nausea and vomiting (23%) and myalgia (15%).³⁵ These symptoms last a few hours to a few days and respond well to symptomatic treatments.³⁵ Other potential adverse effects

of ECT include oral and dental trauma, such as lacerations or fractures. However these are preventable due to advent of muscle relaxation and appropriate mouth protection, and occur infrequently.³² Cardiac complications are uncommon following ECT, but can be significant. These include arrhythmias and acute coronary events, although the incidence is reduced by a thorough assessment of a baseline ECG prior to ECT.³² Other adverse effects may include cerebrovascular events post ECT, however these are rare and ECT has also been done with success post cerebrovascular events.^{34,20}

Regarding the adverse effects affecting cognition, this is often a source of concern. However, ECT is not solely responsible for changes in cognition in psychiatric patients undergoing the procedure, as there are numerous contributing factors.² These include the underlying mental illness, the presence of a family history of a neuro-cognitive disorder, pre-existing poor cognition due to mental or neurological illness, or medication contributing to poor cognition.² It is therefore emphasized that cognition be assessed prior to commencing a course of ECT and be monitored throughout the course of ECT (at least weekly), as it may even improve with therapy.²

Immediately after an ECT session, there may be a varying period of confusion or delirium, lasting from a few minutes to hours, and this is common to the etomidate period. There may be deficits in awareness and orientation, which generally resolve spontaneously and may be preventable depending on the choice anesthetic agent, ECT technique and/or correction of underlying medical disorder.²

The most chronic changes to cognition affect memory, although not all facets of memory are compromised to the same grade and it is noted that impersonal memory is greater affected than autobiographical memory.² Changes in memory will be dependent on various elements such as the ECT technicalities (stimulus waveform, electrode placement, localization of seizure, pattern of activation) and patient-related factors (vulnerabilities to developing memory impairment).³⁶ Methods of reducing cognitive adverse risk factors include use of rapid pulses, non-dominant electrode placement, and reducing stimulus charge.³⁷ Furthermore, long-term deficits have been noted in retrograde and anterograde memory.³⁸ However the changes may be transient and recover post cessation of ECT.³⁹ It has also been noted that this is more so for bilateral electrode

placement than unilateral placement.³⁹ Overall though, the general consensus suggests that memory deficits are usually temporary, even amongst patients receiving bitemporal ECT and improvement has been shown at three months post cessation of therapy.⁴⁰

When counselling the patient on cognitive adverse effects, it must also be mentioned that psychiatric disorders and medication may contribute to a decline in memory rather than necessarily the ECT procedure itself.⁴¹ Frequently, patients and the public are unaware of this and tend to hold ECT culpable.⁴¹

1.4.7 Contra-indications

When prescribing ECT, the benefit of therapy must outweigh the medical and medication risks.²⁰ There are few absolute contra-indications to ECT, namely pheochromocytoma.²⁰ The relative contra-indications include increased intracranial pressure, certain cardiovascular conduction defects, as well as aortic and cerebral aneurysms.²⁰

1.4.8 Technical Aspects of ECT

1.4.8.1 Electrode Placement

Electrode placement can be bitemporal, bifrontal or right unilateral depending on the clinical indication.⁴² The preferred placement of electrodes worldwide, in about eighty percent of patients, has been noted to be bilateral.⁴²

The bitemporal positioning of electrodes was first used when performing ECT and proved useful in certain instances, namely catatonia, medical co-morbidities, as well as highly suicidal patients.^{42,43} However its major drawback was the association with cognitive impairment.^{42,43} Bifrontal electrode placement was derived from the thought that the greater the distance from the temporal lobes and hippocampi, the less the degree of cognitive impairment.^{42,43} However, the literature is inconclusive in this regard.^{42,43} The positioning of right unilateral, or rather non-dominant electrodes, was based on the premise that by preserving the language centers of the dominant hemisphere, there may be a reduction in the degree of cognitive impairment.^{42,43} However, this was not always established, although the degree of post-ictal delirium was of a slightly shorter duration in

non-dominant electrode placement and most patients were re-orientated after about twenty minutes.^{42,43}

In a trial performed from 2001 to 2006, the efficacy of the different electrode positioning was evaluated in a sample of two hundred and thirty individuals with unipolar and bipolar depression.⁴³ The bilateral placements required stimulus intensities of about one and a half times the seizure threshold in comparison to the non-dominant position which was six times the threshold.⁴³ In terms of efficacy, all positions did lead to a reduction of the depressive symptoms, but the response was faster in bilateral (bitemporal) placement.⁴³ As demonstrated by this study, the non-dominant electrode placement requires a higher stimulus intensity in order to be effective, but may be useful in reducing the degree of retrograde amnesia and other cognitive parameters.^{42,43} More research would be useful in this regard about possibly other electrode placements and the minimum effective stimulus.

1.4.8.2 Seizure Threshold & Stimulus Intensity

In order for ECT to be efficacious, a generalized seizure is required.⁴⁴ The seizure duration is paramount, and a seizure duration of at least twenty-five seconds is considered clinically sufficient.⁴⁵ There is a fine balance between stimulus intensity and seizure threshold and the point at which the stimulus intensity exceeds the seizure threshold is the best predictor of the subsequent efficacy versus the side-effects, and therefore reflects the effective dose of ECT.⁴⁶ The stimulus intensity must be above the patient's seizure threshold for seizure induction.¹³ As the individual seizure thresholds vary in a wide range, determining optimal initial stimulus intensity is a challenge to the clinician.¹³ Furthermore, there is uncertainty about the actual beneficial factors of a generalized seizures that may be deemed "adequate" theoretically.⁴⁷ There are also limited means of determining the actual degree to which stimulus intensity will surpass the seizure threshold.⁴⁷ This often immeasurable degree is independent of actual administered dose, and yet it defines the clinical outcome and side effects.⁴⁷ Additionally, significant unpredictability exists amongst patients in determining their seizure thresholds and this may related to demographic factors such as age and gender, as well as technical factors such as electrode placement.⁴⁷ Finally, the seizure duration is not an isolated

parameter of treatment efficacy as there is a dynamic interplay among the stimulus dose, seizure duration and patient factors, all of which greatly influence outcome.⁴⁷

In a study of patients with schizophrenia, it was found that a rapid clinical response was associated with a greater stimulus intensity above the seizure threshold.⁴⁸ This, albeit narrow therapeutic window, greatly impacts on efficacy and requires further study.⁴⁹ The results of this study parallels results another study on depressive patients.⁵⁰

In ECT practice the stimulus charge is considered the stimulus dose.² On the ECT machine the joule setting is generally expressed as percentage amperage in millicoulombs (mC) which represents the total charge administered to a patient per session.² In both the literature and clinical practice, it is noted that the patient's seizure threshold increases during the course of ECT.³ This phenomena results in the need for effective dosing strategies to re-establish the patient's threshold.³

1.4.8.3 Stimulus Dosing Strategies

There has been a great need to develop effective dosing strategies which can be therapeutic but minimize side effects, particularly those of a cognitive nature.⁵¹ Various stimulus dosing strategies have been described. Stimulus dose titration is a method that predicts most accurately an individual patient's seizure threshold regardless of medical or other confounding factors.⁵¹

However, historically the "age rule" (as a stimulus dosing strategy) gained favor as it was a fast and simple means of estimating the patient's seizure threshold.⁵¹ The age rule states "just set to the patient's age and treat".³⁶ For example, a forty year old patient who is receiving ECT for the first time may therefore receive a dose of forty mC.⁵² The "age rule" has been the recommended dosing procedure with the Thymatron DGx TM ECT device training manual.⁵² The different initial dosing strategies were analyzed on the basis of the seizure thresholds and it was concluded that the age method seemed to be the most optimal method for bilateral ECT in patients with schizophrenia.⁵ However, whilst suitable for initial treatment, it fails to take into consideration the increase in seizure threshold throughout the course of treatment.⁵²

The half-age method was originally advocated by Petrides and Fink in 1996.⁵³ They too searched for a quick and simple method of determining stimulus dosing that would also reduce side effects.⁵³ By using the half-age method, one sets the “percent energy dial” to that of half the chronological age of the patient, or by selecting the next highest setting if “rounding up”.⁵³ Thus, for the first ECT session, in a forty year old patient for example, the ECT dose would therefore be twenty mC.⁵³ This method was proposed in order to limit cognitive side effects yet still provide a stimulus dose great enough to result in an effective seizure.⁵³

The major drawback with the age or half-age method was that uncertainty still remained in determining by how much the given “dose” exceeds the seizure threshold.⁵¹ Therefore, the determination of an effective dosing strategy was challenging at the best of times.⁵¹

In light of the seemingly conflicting differences between the half-age and age strategies, new developments for dosing strategies came to the fore, namely the stimulus dosing tables.⁵¹ By using this method the settings are read off a standardized chart, which is defined by the patient’s demographics and electrode placement.⁵¹ Although, relatively simple, it fails to consider the individual variables in threshold.⁵¹

Also in keeping with the premise of age as a predictor of seizure threshold, Beale developed a stimulus dosing strategy, which divides patients into two broad categories of either under or over fifty years of age.⁵¹ This strategy is as follows:

Under 50 years of age: start at 5%, and then increase until seizure threshold is reached: 10%, 20%, 40%.⁵¹

Greater than 50 years of age: start at 10%, then 20%, 40%, 80%.⁵¹

There is still much variability in stimulus dosing strategies amongst institutions and clinicians alike.⁵¹ Furthermore, it must be borne in mind that there is a fine line between therapeutic stimulus intensity and propensity for adverse effects.⁵¹

1.4.8.4 Course of ECT & Number of Treatments

An acute course of ECT refers to the initial ECT treatments aimed at symptom alleviation.² After a favorable response, continuation ECT may be performed in the first six months following the acute course and would be aimed at relapse prevention.² Maintenance ECT refers to ECT which follows the continuation phase, after six months of continuation treatment, and is aimed at recurrence prevention.²

It is recommended that a set number of treatments should not be determined when commencing a course of ECT due to a variety of confounding factors.⁵⁴ Rather, it is recommended that the patient be reviewed after each treatment to determine if further ECT sessions are still required.⁵⁴ If after six treatments, there fails to be a clinical response despite correct technique, then the course should be terminated and deemed unefficacious.⁵⁴ The management of patients who have shown some or even a slight improvement initially is more challenging, but ECT may continue for at least twelve bilateral treatments before terminating.⁵⁴ In general, ECT treatment continues until no further improvement is observed, termed a “plateau in response”.⁶ This may be because a patient has reached remission.⁶ If however remission has not been achieved, technical factors that may have prevented remission must be sought.⁶ It is useful to review medications and re-evaluate factors that are not addressed by ECT.⁶ These include issues such as the psychosocial environment, life stressors and chronological issues.⁶

After a successful acute course of ECT, patients may continue with pharmacotherapy as their maintenance treatment, or in some cases may require continuation and maintenance ECT.¹⁸ Continuation ECT is associated with a decreased risk of relapse.¹⁸ Although an optimal protocol for the scheduling of treatments still requires future research, it characteristically includes weekly ECT for four weeks, which then gradually decrease in frequency to once a month over the next few months.¹⁸ The criteria for performing continuation ECT includes: 1) a positive clinical response to acute ECT in patients with chronic mental illness, 2) few or no medical conditions which may pose a greater risk for the procedure or anesthetic, 3) failure of other available medication, and 4) patient consent to continue with ECT.¹⁸ There is no strict delineation between continuation and maintenance ECT.¹⁸ The frequency of treatments in maintenance ECT is largely dependent on the individual patient factors, the previous response, access to treatment

and propensity for adverse effects.¹⁸ In light of these factors, one month is the usual intermission period between treatments during maintenance ECT.¹⁸ Maintenance ECT has been deemed more effective at preventing relapse than conventional medication.¹⁸

1.4.9 Anesthetic Agents Used In ECT

The role of anesthesia in ECT is to rapidly produce a state of both unconsciousness and muscle relaxation for the extent of the stimulus and seizures.⁵⁵ The choice of the agent is therefore a balance between providing adequate anesthesia without adversely affecting the efficacy of ECT.⁵⁵ The anesthetic agents include pre-medication, the induction agents which can be inhaled or intravenous, maintenance agents which are also inhaled or intravenous, as well as the muscle relaxant. Prior to commencing ECT, a premedication maybe administered, although this is not always done routinely.⁴⁵ This consists of a muscarinic anti-cholinergic agent, namely glycopyrolate or atropine, which reduces pulmonary secretions and prevents bradycardias and asystoles.⁴⁵

The administration of ECT requires a general anesthetic and the choice of agent is paramount as anesthesia has varying effects on the seizure threshold.⁴⁵ The intensity of anesthesia should be as light as possible to reduce adverse effects.⁴⁵ Determining the dose of an anesthetic agent is dependent on numerous factors, namely patient weight, previous response, medical co-morbidities and seizure threshold.⁵⁵ There are various intravenous and gaseous agents that may be used to induce anesthesia, such as Etomidate, Ketamine and Propofol. Methohexital has been considered the gold standard and frequently the agent of choice.⁵⁶ Reasons for this include its rapid onset of action and reduced relationship with postictal arrhythmias, especially in comparison to Thiopental.⁴⁵ Unfortunately, Methohexital is not available In South Africa. In South Africa, the intravenous agents Etomidate and Ketamine are sometimes used as they have neutral effects on seizure threshold.⁴⁵ The use of Ketamine however, is less favorable due to the frequent causation of post-ictal psychosis.⁴⁵ Propofol is also sometimes used, but its use is limited by the unfavorable effects of raising the seizure threshold, pain on injection and cardiovascular depression.⁵⁵ Gaseous anesthetics include Sevoflurane, Halothane and Isoflurane, with the former being commonly used for ECT.⁵⁶ Sevoflurane is comparable to other agents, but has a reduced seizure duration compared to other agents.^{56,57} The

disadvantages include difficult venous access and cardiac depressant function especially in the elderly.^{56,57} In a previous South African study done in 2006 at Tara Hospital, the different anesthetic induction agents were analyzed in terms of efficacy and cost.⁵⁸ The results showed a favorable clinical response to Sevoflurane, although the seizure length was reduced, and there were cardiovascular considerations, as well as an increased cost factor.⁵⁸

There are also various augmentation strategies available to assist anesthetic agents so as to not affect the seizure threshold.^{55,56} This includes augmentation with caffeine, use of hyperventilation and even use of ketamine.

ECT has been stigmatized due to the previous association with musculoskeletal injuries, although this occurred without the use of muscle relaxants and has significantly reduced since the introduction of its use.⁵⁸ The aim of the muscle relaxant is to create muscle relaxation, rather than paralysis, and to prevent injury.⁴⁵ The most commonly used muscle relaxant is Succinylcholine, which works by rapidly causing depolarization in the synaptic cleft.⁴⁵ The first clinical sign of its action is muscular fasciculation, which occurs in a rostro-caudal progression.⁴⁵ Relaxation is achieved when fasciculations cease.⁴⁵

During the seizure, various parameters are monitored, namely the muscle contractions via electromyogram (EMG), as well as the ictal activity with an electroencephalogram (EEG).⁵⁵ Eye movements may also be monitored via electrooculogram (EOG), as well as cardiac activity by an electrocardiogram (ECG).⁵⁵ It is important to monitor these parameters to adequately assess the duration of a seizure and monitor for potential adverse effects.⁵⁵ Any muscular activity will be shown on the EMG, however in light of the muscle relaxation to prevent injuries during a seizure, the amount of activity may vary among patients.⁵⁵ The EEG is therefore the most reliable tool to detect the presence and duration of the seizure.⁵⁵

Anesthetists and ECT practitioners must be cognizant of both the physiological responses to ECT, as well as their impact on the effectiveness of ECT.⁵⁶ Furthermore, the effects of anesthesia on cognitive function and seizure threshold should also be considered.⁵⁹ An ideal anesthetic agent would reduce the seizure threshold, therefore reduce the required

stimulus intensity and potentially allow for a shorter course of treatment, with a lower impact on cognitive function.⁵⁹

1.4.10 Informed Consent, Ethics and the Mental Health Care Act

The ethical principles applicable to medicine are of non-maleficence, beneficence, autonomy and justice.⁶⁰ The current guidelines for ECT practice strive to maintain firstly doing no harm and secondly ensuring that there is greater benefit than risk.¹⁷ The principle of autonomy refers to the ability to provide informed consent and involves numerous parameters including voluntariness, competence, understanding of all information and meaningfully communicating a decision.⁶¹ However, it is recognized that mental illness may affect these abilities and therefore render patients incapacitated.^{61,62}

For ECT to be performed, consent is required. In cases where the patient lacks capacity, consent may be obtained from the family or next of kin. An informed consent is best taken both verbal and written for each session.⁶² Capacity to consent must be individually evaluated on each patient throughout the course of treatment as it may change.^{61,62} All efforts should be made to ensure that the patients assent is considered and their families/curators are part of the decision making process.⁶² This may be challenging at times, especially when all other treatment options have been exhausted and families are stigmatized by the use of ECT.

In an emergency situation, where there is diminished capacity to consent and the next of kin is unavailable, consent can then be obtained from the medical superintendent or head of the health establishment.⁶¹ It should be ensured that ECT is clinically warranted and that the relevant guidelines are followed.⁶¹ In other instances, where the patient has diminished capacity, informed consent must be taken from the necessary party, namely the next of kin or curator.⁶¹ The patient's capacity must be regularly assessed before each session.⁶¹

Patients, who have diminished capacity to consent to ECT, likewise may lack the capacity to consent to admission to hospital, and may thus be admitted under the MHCA 17 of 2002. Patients who pose a risk to others or themselves, but provide assent to treatment may warrant an Assisted Admission under the MHCA.⁶¹ However, a patient who has

diminished capacity to consent or assent to an admission and who is deemed a high risk, should be admitted as an Involuntary mental health care user (MHCU) under the MHCA.⁶³ It should be emphasized that the least restrictive means of an admission is always employed and guidelines are mandatory.⁶³

Regarding ECT and the principle of justice or “equality of opportunity”, this may present as an ethical dilemma which is not consistently upheld globally, thereby contributing to the inaccessibility of ECT and prolonged patient suffering in some settings.⁶⁰ The establishment of treatment guidelines may slowly improve accessibility and acceptance to its use.⁶⁰

1.4.11 Conclusion

The fear surrounding ECT stems from stigmatization by the media and other medical disciplines, lack of research and lack of standardized clinical practise.⁶³ These are some of the factors that have hindered its widespread use despite its demonstrable safety and efficacy.⁶³ There is a great need for future research to provide guidelines to which clinicians can standardize, and increase, the utilization of ECT as a treatment modality.

Although there was a recent survey published regarding the practice of ECT in South Africa, it focused on ECT utilization in both the private and public sector and information was gathered via a self-reported questionnaire.¹² The current study however differs in that it was solely based at a public sector psychiatric hospital and information was gathered retrospectively from patient records. Furthermore, the current study reviewed ECT utilization rates, clinical efficacy, technical aspects, as well as adverse effects. It is thus relevant to the field of psychiatry in South Africa and it is hoped that the findings may possibly contribute to the development and improvement of service standards of ECT delivery to a particularly vulnerable group of patients.

CHAPTER TWO

2.1 METHODOLOGY

2.1.1 Study Setting

This study was conducted at Tara Hospital, one of only two public sector hospitals in Johannesburg that currently provide ECT services. Tara Hospital is a specialized psychiatric hospital located in Hurlingham, Johannesburg. The hospital renders specialized inpatient and outpatient psychiatric services to adults, adolescents and children with serious mental illnesses. It serves as a referral hospital from Soweto to Sandton, and the patients at Tara Hospital extend across a vast spectrum of age, racial and socio-economic demographics. A myriad of psychiatric conditions are seen and treated at Tara Hospital, including psychotic, mood, anxiety and personality disorders. Tara Hospital has many different wards, which deliver a variety of services to the psychiatric population, including psychotherapy, eating disorder unit, child and adolescent wards, and neuropsychiatric services. However, patients who receive ECT are generally admitted to the biological wards at Tara Hospital, which include wards 6, 7 and 8. These 3 wards have a total capacity of 80 beds.

2.1.2 Study Design

This study was a retrospective record review of patients that received ECT at Tara Hospital over a ten year period, from the beginning of 2006 (the year following the implementation of the MHCA No.17 of 2002) to the end of 2015.

2.1.3 Study Population

The study population consisted of male and female adult patients (i.e. 18 years and older) from the biological wards at Tara Hospital (wards 6, 7 and 8) who received ECT over the ten year study period, from January 2006 to December 2015.

Patients admitted to the biological wards are diagnosed with primarily psychotic, bipolar and depressive disorders. Due to the nature and severity of the disorders, very often

these patients would have failed trials of other psychotropic medication, and ECT may be used as a “last resort” for treatment resistant cases.

ECT was available at Tara Hospital from the early 2000s, however there was an interruption of service delivery from 2009 to 2013 due to financial restraints and lack of available equipment. ECT services at Tara Hospital only recently resumed in 2014. According to the Tara ECT Register, a total of only 19 patients received ECT at Tara Hospital during the study period.

2.1.4 Data Collection

The names of the patients who received ECT during the study period were obtained from the Tara ECT Register. The files of those patients were then collected from the Records Department at Tara Hospital, and reviewed retrospectively.

The total number of patients who received ECT during the study period was determined, as well as the total number of patients admitted to the biological wards. The prevalence rate of ECT use at Tara Hospital was then calculated and expressed as a percentage of the total admissions to the biological wards during this time, and specifically during the years where ECT was available at Tara Hospital.

A Pilot Study was initially done to determine if the relevant files were available. The files were briefly analyzed to determine whether the required information was available and whether this study would be practical and feasible.

A data collection sheet was used to gather the following information for the purposes of this study: (Appendix 1).

- Socio-demographic information – This included age, gender, ethnicity, marital status and highest level of education. (Age was collected as a category rather than a specific age in order to capture all study participants, as the sample size was particularly small.)
- MHCA Status – Voluntary, Assisted or Involuntary. (In this study, data as to the informed consent process and who signed the consent forms, whether patient, next

of kin or medical superintendent, was not collected. However, MHCA status was captured as an indicator of the patients' capacity to provide informed consent.)

- DSM IV-TR Psychiatric Diagnosis – Axis I, as well as Axis II disorders
- Co-morbid medical disorders – i.e. DSM IV-TR Axis III disorders
- Indications for ECT – This was also captured, as some patients may have had additional clinical indications for ECT, not just diagnostic indications, such as treatment resistance, life threatening symptoms (acutely suicidal, or not eating or drinking), catatonic features, pregnancy, or patient preference.
- The psychiatric medication that the patient was prescribed during the course of ECT.
- Anesthetic agents and other pre-medication(s) that were used during the ECT
- Technical aspects of ECT –
 - Electrode placement: Unilateral or bilateral - bifrontal or bitemporal.
 - Minimum stimulus intensity: The minimum intensity (%) at which a therapeutic seizure occurred during the course of ECT.
 - Maximum stimulus Intensity: The maximum intensity (%) used over the course of the ECT.
 - Dosing strategy: The method that was used to predict a patient's seizure threshold and determine the initial stimulus dosing. Possible dosing strategies included stimulus dose-titration, half-age method, age method or stimulus dosing tables. The dosing strategy used for each patient may have been documented in the patient's notes. If not specifically documented, the author reviewed the patient's age and starting dose (%) to determine which strategy was used.
 - Treatment frequency: In the case of acute ECT, once, twice or thrice weekly. In the case of continuation and maintenance ECT, once a week, once fortnightly, or once a month.
 - Course of ECT: Acute, continuation or maintenance.
- Outcomes of ECT –
 - First Response: The ECT treatment number at which a positive clinical response was first observed, as reflected in the patient's clinical notes. (Whether noted subjectively by the doctor performing the ECT, or the ward doctor's patient interview and mental status examination on the day post-ECT, or objectively

with any rating scales that may have been used.)

- Plateau of Response: The ECT treatment number after which no further improvement in clinical response was noted (whether subjectively according to the doctor's notes or objectively with the use of rating scales) for at least one week and/or following the subsequent two ECT sessions. It was anticipated that this would be close to the end of the ECT course, as a plateau in response / no further response is usually an indication for the ECT course to be terminated.
- Total number of ECT sessions: The total number of ECT sessions that the patient received throughout the acute, as well as continuation and maintenance phases where applicable, of treatment.
- Clinical outcome: By the end of the ECT course, whether there was a positive outcome where the patient improved, or a clinically deterioration, or no observed clinical improvement. This may have been determined either by subjective clinical notes or objectively by rating scales.
- Adverse effects to ECT: These included anesthetic-related effects, as well as procedure-related effects, and was further divided into short and long-term adverse effects. The cognitive side-effects may have been noted either by subjective patient report and/or the doctor's clinical observations, or by the use of objective bedside cognitive tests, such as the Montreal Cognitive Assessment (MOCA) or a Folstein Mini Mental State Examination (MMSE).

2.1.5 Data Analysis

Given the limited sample size, only a descriptive analysis of the data was done. The prevalence of ECT use during 2006-2015 was calculated. All other variables were categorical and described by frequency tabulation.

Data analysis was carried out in SAS. Reference: SAS Institute Inc., SAS Software, version 9.3 for Windows, Cary, NC, USA: SAS Institute Inc. (2002-2010).

2.1.6 Ethics & Confidentiality

This study was a retrospective chart review and patients were thus not actively involved in the study. During data collection, patient names were not captured. A study number was assigned to each patient whose file was reviewed for the study, and this was recorded on the top of the data collection sheet. This ensured anonymity and patient confidentiality.

Approval to conduct the study was obtained from the University of the Witwatersrand (WITS) Human Research Ethics Committee (HREC), and the Faculty of Health Sciences Postgraduate Committee, as well as institutional approval from Tara Hospital's Research Committee and CEO. (Appendix 2 & 3).

CHAPTER THREE

3.1 RESULTS

3.1.1 Prevalence of ECT Use at Tara Hospital

The total number of patients treated with ECT over the study period was 19. As there was an interruption of ECT services during the years 2009 to 2013, the prevalence of ECT use was calculated for the 5 years during which ECT services were available at Tara Hospital, and was expressed as a percentage of the total number of patients admitted to the biological wards during those 5 years. The overall 5 year prevalence was found to be 1.3%. Prevalence rates were also calculated on an annual basis, for the sake of comparison between the pre- and post-ECT service interruption. Rates of ECT use were found to range between 0.6% - 1.8%, with lower rates occurring after the reintroduction of ECT services at Tara Hospital in 2014 and 2015. Regarding the average number of patients who received ECT per year of ECT services being available at Tara Hospital (i.e. 5 years, 2006-2008 and 2014-2015), this was found to be 3.8.

Table 3.1 - The Prevalence of ECT Use at Tara Hospital

Year	Annual Prevalence Rates of ECT Use		Average Prevalence Rate % <i>(for the years that ECT services were available)</i>
	<i>No. of ECT patients No. of patients admitted to biological wards</i>	%	
2006	5/357	1.4	1.3
2007	4/235	1.7	
2008	5/277	1.8	
2009	-	-	
2010	-	-	
2011	-	-	
2012	-	-	
2013	-	-	
2014	3/304	1	
2015	2/333	0.6	

The ECT Administration Rate (EAR) was not calculated as it would have been difficult to do, and this number would be extremely small and therefore not statistically significant.

Although 19 patients received ECT during the study period, according to the Tara ECT Register, only 17 of these patients' files could be found at the Records Department. Thus other data could not be captured for the two patients whose files were misplaced and therefore the data was unknown for 10.5% of the study sample. The following table summarizes some of the demographic and clinical data, including the reasons for ECT.

Table 3.2 - Demographic and Clinical Data for ECT Patients

Study No.	Age (years)	Sex	Psychiatric Diagnosis	Co-morbid medical disorders	Indications for ECT
1	48	F	MDD severe (OCD)	Nil	MDD: Treatment Resistant
2	61	F	MDD severe, (Alcohol use d/o)	Nil	MDD: Treatment Resistant
3	44	M	BD severe	Hypertension	BD: Treatment Resistant
4	36	F	SCZ	Hypothyroidism	SCZ: Treatment Resistant & Catatonia (Mute)
5	45	F	MDD severe	Hypertension	MDD: Treatment Resistant
6	56	M	MDD severe	Hypertension	MDD: Treatment Resistant
7	53	F	BD severe	Paget's Disease (Menopause)	BD: Treatment Resistant
8	51	F	MDD severe	(Menopause)	Catatonia (Not Eating)
9	48	F	BD severe	Nil	BD: Treatment Resistant
10	63	F	MDD severe	Hypothyroidism	MDD: Treatment Resistant
11	45	M	BD severe	Hypertension	BD: Treatment Resistant
12	U	U	U	U	U
13	U	U	U	U	U
14	55	F	MDD severe, (GAD, TTN)	Hypertension	MDD: Treatment Resistant
15	57	M	MDD severe	Nil	MDD: Treatment Resistant
16	44	F	MDD severe	Hypothyroidism	MDD: Treatment Resistant
17	58	M	MDD severe	Nil	MDD: Treatment Resistant
18	38	M	SCZ	Pagets Disease	SCZ: Treatment Resistant
19	51	M	SCZ	Hypertension	SCZ: Treatment Resistant

KEY: F= Female, M= Male, U= Unknown, MDD= Major depressive disorder, GAD= Generalized anxiety disorder, BD= Bipolar disorder type 1, SCZ= Schizophrenia, OCD= Obsessive compulsive disorder, TTN= Trichotillomania. The primary diagnosis is indicated first. Any secondary diagnosis is indicated after the primary diagnosis and given in brackets. This is applicable to psychiatric and medical disorders.

In Table 3.2 above, the three patients study numbers 17, 18 and 19 received ECT after the service interruption at Tara Hospital, whereas the other patients all received their ECT prior to the service interruption.

It would also have been useful to compare the demographic details of the study population with that of the overall the inpatient population at Tara Hospital biological wards during that period. However, this information was not captured for the purposes of this study.

3.1.2 Socio-demographic Factors

For the 17 patients whose files were reviewed, the mean age was 50 years (range 36-63 years). The gender distribution was 52.6% female and 36.8% male. The racial distribution of patients was predominantly White (68.4%), with the remainder being Black (15.8%) and Indian (5.3%).

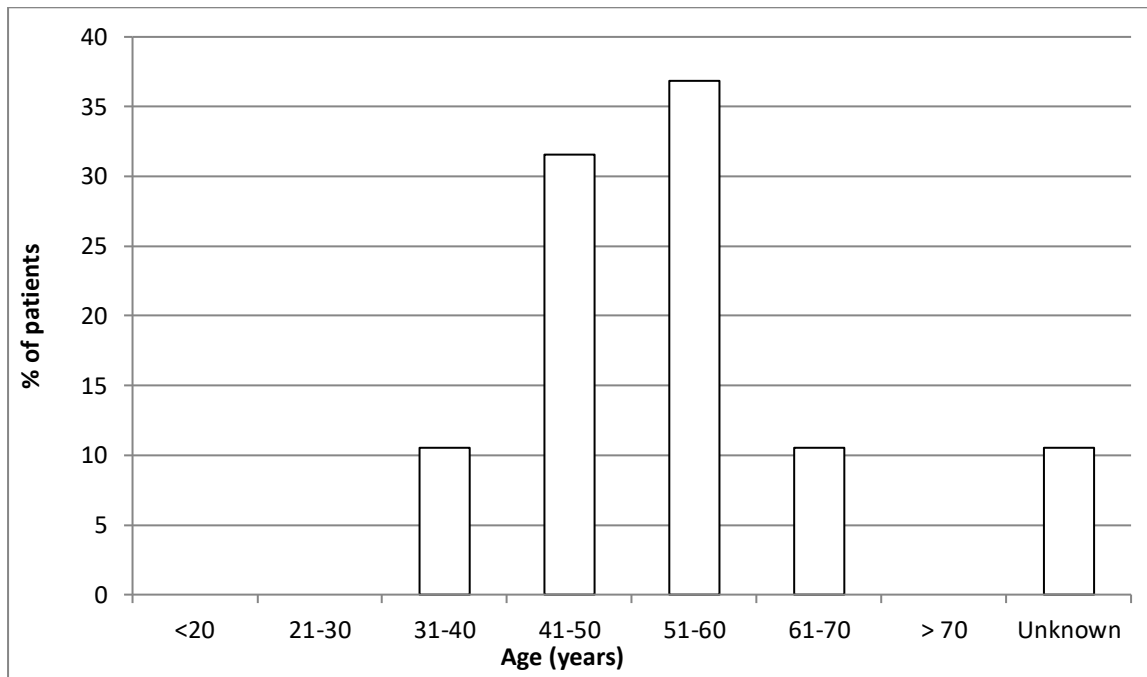


Figure 3.1 - Age Distribution of ECT Patients

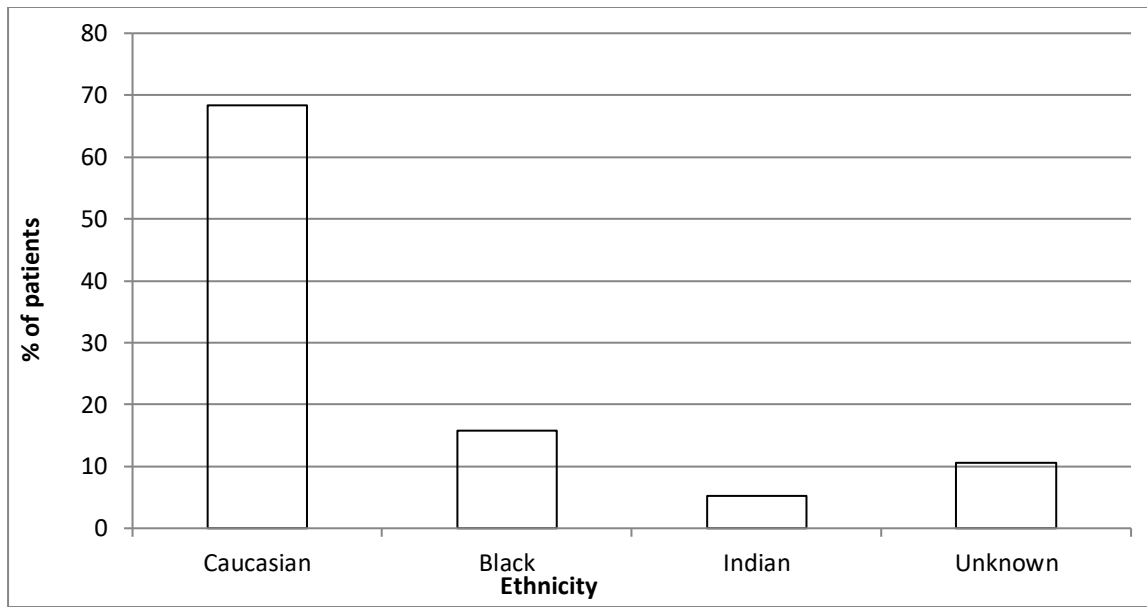


Figure 3.2 - Racial Distribution of ECT Patients

Regarding relationship status, the majority of patients were single (37%) or married/co-habiting (31.6%). The remainder were divorced (10.5%) or separated (10.5%). In terms of the highest level of education, the majority of patients (79%) had a matric qualification or higher. The minority (10.5%) of patients obtained less than a grade 12 education.

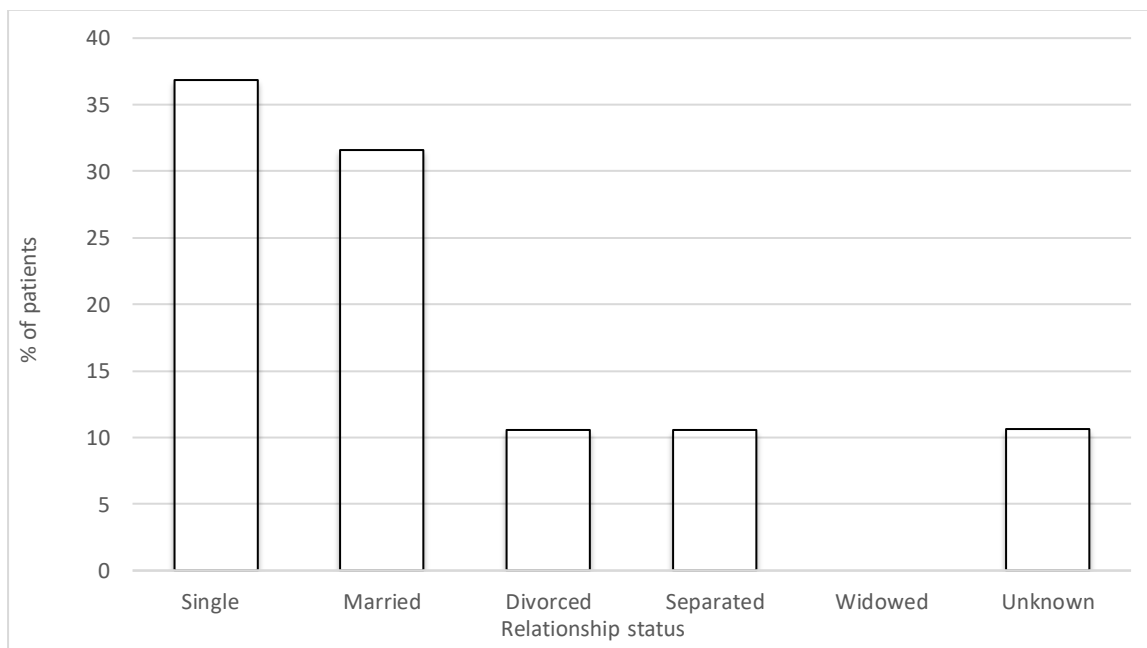


Figure 3.3 - Relationship Status of the ECT Patients

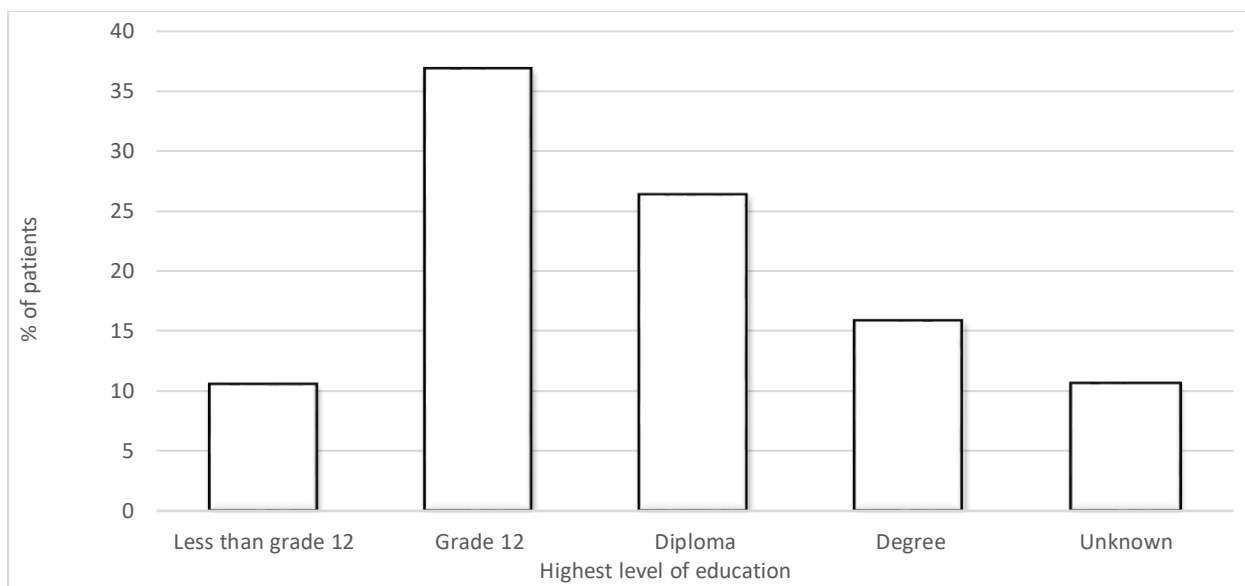


Figure 3.4 - Highest Level of Education of ECT Patients

3.1.3 The In-Patient Mental Health Care Act Status

As indicated in Figure 3.5, the majority of patients were admitted as Assisted MHCUs, followed by Involuntary MHCUs. There were no voluntary patients. All of the patients diagnosed with depressive disorders were admitted as Assisted MHCUs and more than eighty percent of the patients with schizophrenia and bipolar disorder were admitted as Involuntary MHCUs. There was one patient who was admitted as an Involuntary in-patient, and upon discharge was converted to become an Involuntary outpatient.

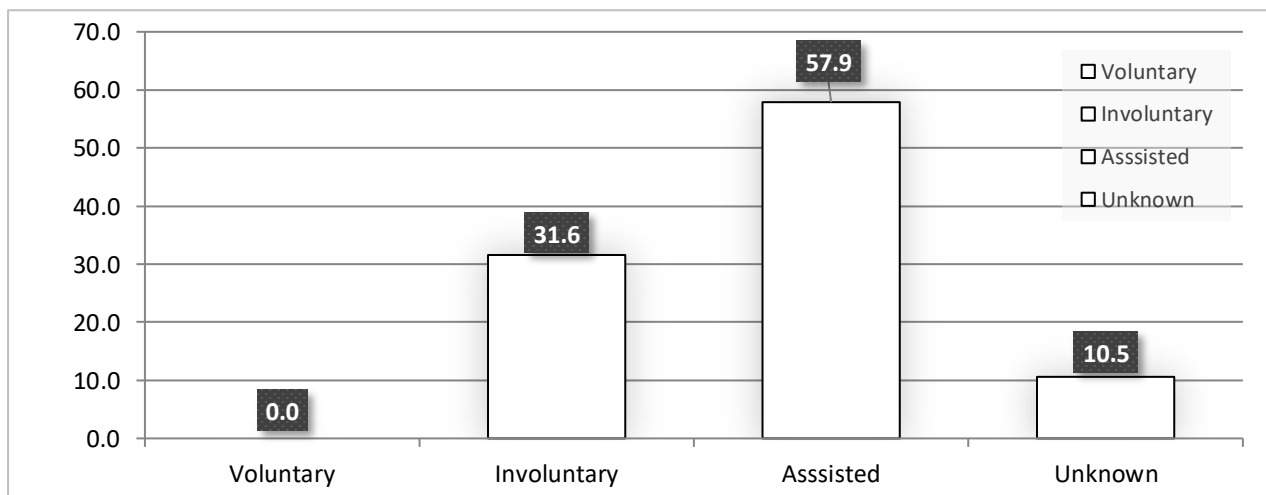


Figure 3.5 - The In-Patient Mental Health Care Act Status of ECT Patients

3.1.4 Psychiatric Diagnosis

The majority (52.6%) of the patients received a diagnosis of severe major depressive disorder (MDD), with psychotic features mood congruent. This was followed by 21.1% of cases with a diagnosis of bipolar I disorder, manic with psychotic features mood congruent and 15.8% with treatment resistant schizophrenia. Psychiatric co-morbidities were present in three patients (15.8%), with one patient having two co-morbid psychiatric diagnoses. These co-morbidities were obsessive compulsive disorder (OCD), generalized anxiety disorder (GAD), trichotillomania and alcohol use disorders at 5.3% each.

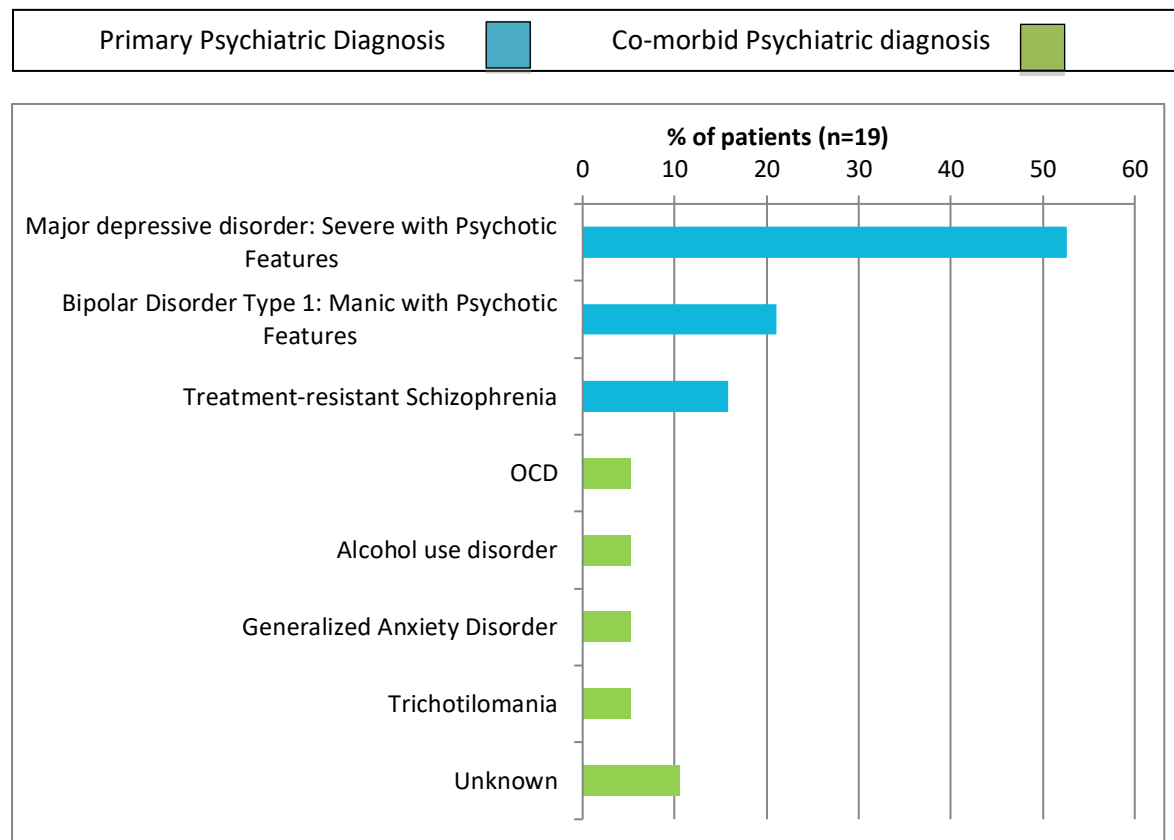


Figure 3.6 - Psychiatric Diagnosis of ECT Patients

3.1.5 Indications for ECT Use

Figure 3.7 below shows the indications for ECT use at Tara Hospital during 2006-2015. The most common primary indication for ECT was treatment resistant MDD: severe with

psychotic features (47.4%). In these cases the patients failed trials of two or more antidepressants, including an SSRI. The second most common diagnosis was treatment resistant bipolar I disorder (21.1%), which also included patients that failed adequate trials of medication for the acute phase of bipolar disorder. The third most common indication was treatment resistant schizophrenia (15.8%), which consisted of patients who failed adequate trials of antipsychotics, including atypical antipsychotics. In addition to ECT, these patients were also on clozapine. Other indications included catatonia due to severe MDD, where the patient was not eating (5.3%), and catatonia due to severe schizophrenia, where the patient was mute (5.3%).

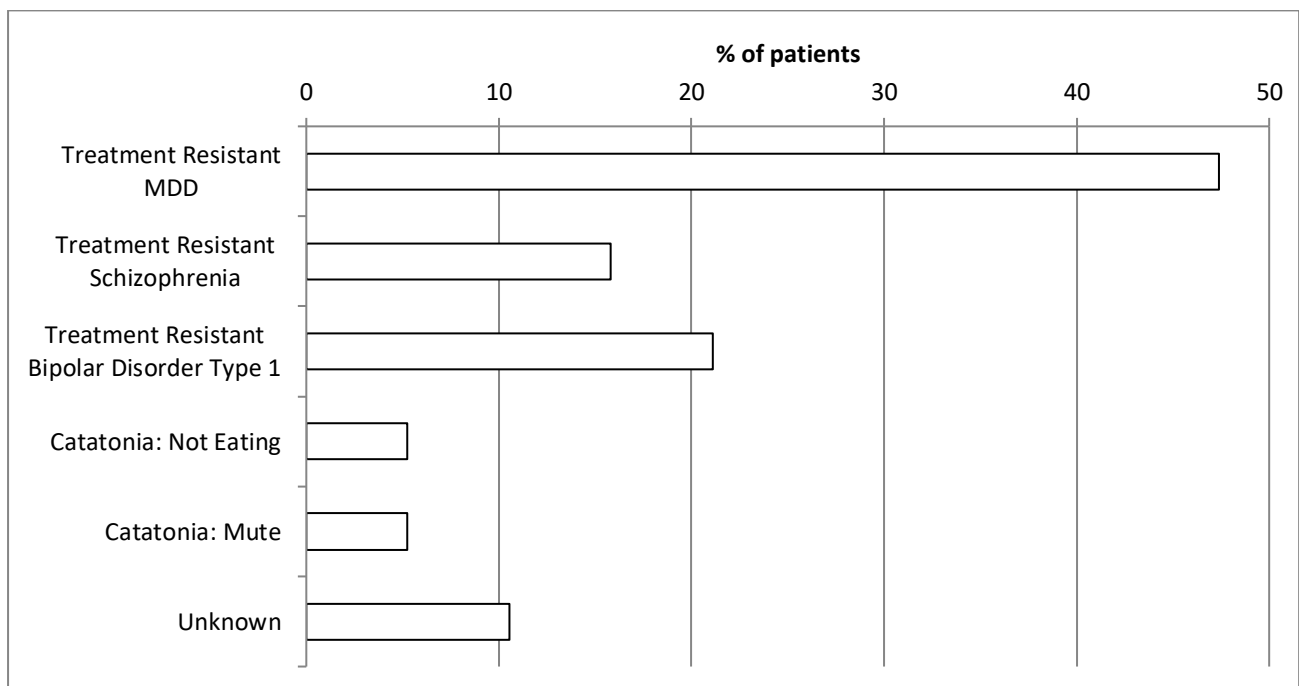


Figure 3.7 - The Indications for ECT Use

Table 3.3 - A Comparison of Socio-demographics & ECT Indications Pre & Post Service Interruption

	Prior to ECT service interruption (i.e. pre-2009)	Post ECT service interruption (i.e. post-2013)
Age (mean)	> 50 years	< 50 years
Gender	Female	Male
Indication	Severe MDD	Treatment resistant schizophrenia

Table 3.3 above is a comparison between the mean age, predominant gender and most common indications for ECT pre- and post-ECT service interruption at Tara Hospital. Pre-ECT interruption, patients (study numbers 1-16, as per Table 3.2) were mainly older than 50 years of age, mostly female and had MDD with psychotic features as the most frequent indication for ECT. The patients' post-ECT interruption (patient study numbers 17-19, in Table 3.2) were predominantly male, with treatment resistant schizophrenia being the most frequent diagnosis and indication for ECT, and their mean age was less than 50 years.

3.1.6 Medical Co-morbidities

Twelve patients in total (63.2%) had co-morbid medical conditions. The most common co-morbidity was hypertension, with six of the patients (31.6%) having hypertension as a medical co-morbidity. This was followed by hypothyroidism in 15.8% of the patients. Two patients were diagnosed with Paget's disease (10.5%) and two patients were post-menopausal (10.5%) on hormone replacement therapy (HRT).

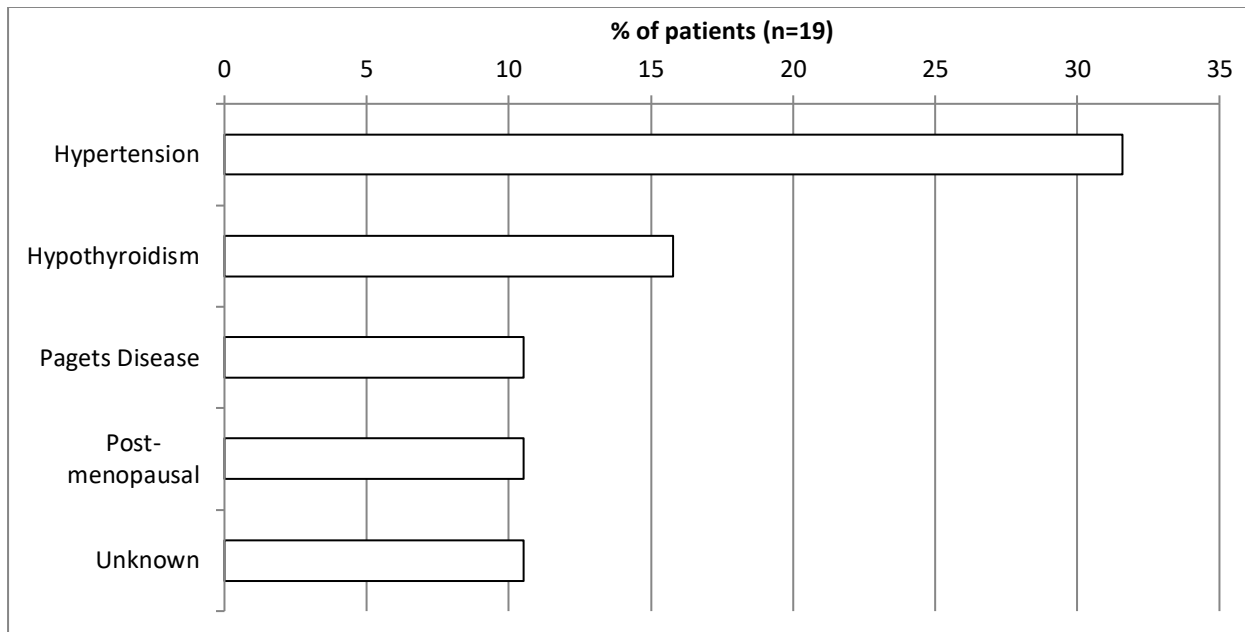


Figure 3.8 - Medical Co-morbidities of ECT Patients

3.1.7 Psychiatric Medication

As represented in the Figure 3.9 and Table 3.4 below, antipsychotic agents were used in 52.6% of the ECT patients, as were antidepressants, and mood stabilizers in 47.4% of patients.

Of the ten patients prescribed antipsychotics, four patients were on olanzapine, three on quetiapine, three on clozapine, and two on amisulpiride. All of the patients on clozapine were diagnosed with treatment resistant schizophrenia, and two of these patients were on a combination of both clozapine and amisulpiride. Those patients on olanzapine and quetiapine were diagnosed with either MDD or bipolar disorder.

All of the ten patients who were receiving antidepressant medication were diagnosed with MDD. The most common antidepressant agent used was venlafaxine (in five patients), followed by fluoxetine (three patients), mianserin (one patient) and bupropion (one patient). Most of the patients with MDD had their antidepressant medication augmented with another agent, either Lithium (in four patients) or an antipsychotic (also four patients), with only two of the patients being on antidepressant monotherapy.

Mood stabilizers were prescribed in nine patients, with the most common agent being lithium in seven patients. Of the patients on lithium, three had bipolar disorder and four had treatment resistant MDD. Sodium valproate CR was used in two patients, one with bipolar disorder and one with treatment resistant schizophrenia. In the file of one of these patient's it was noted that the valproate morning dose was omitted prior to the ECT sessions, and only given later after ECT. This was not specifically noted in the files of any of the other patients on anticonvulsant mood stabilizer medication. Two patients were receiving lamotrigine, both of whom had bipolar disorder and in both cases lamotrigine was being used in combination with another mood stabilizer. The medication combinations for the four patients with bipolar disorder were a single mood stabilizer with an antipsychotic in two patients, two mood stabilizers used together in one of the patients, and two mood stabilizers combined with a single antipsychotic in another patient.

Benzodiazepines were used in nine of the patients 47.4%, but intermittently and not throughout the course of ECT. Of these patients, two were catatonic, and diagnoses included MDD (three patients), bipolar disorder (two patients) and schizophrenia (two patients).

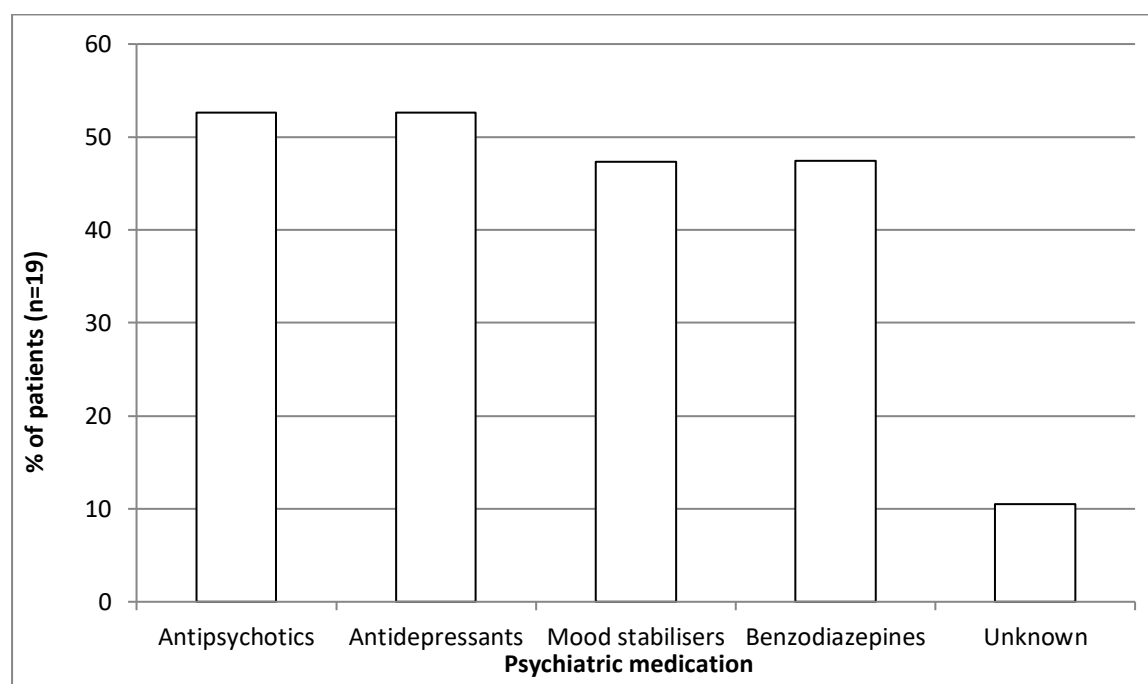


Figure 3.9 - Psychiatric Medication

3.1.8 Anesthetic Agents

This was calculated as the rates of anesthetic agents used for the total number of ECT sessions, as most patients used more than one agent during their individual course of ECT. It was not clearly documented in both the clinical and anesthetic notes if these agents were used during solely induction and/or maintenance. Although, in the case of a single agent being documented for a single ECT session, it is likely that that agent was used for both induction and maintenance purposes. Sevoflurane was the most commonly used agent (52.8%). Other agents included: thiopental sodium (13.3%), propofol (12.9%), etomidate (11.3%) and ketamine (9.7%). Intravenous anesthetic agents were used in 47.2% of the ECT sessions, in comparison to 52.8% for inhaled agents. It was not clearly documented if this was used exclusively as induction or maintenance as cited above. Overall, the use of a the same, single anaesthetic agent throughout the ECT course was found in only four patients, whereas in twelve of the patients two different anaesthetic agents were used during their ECT course, and in one patient four different anaesthetic agents were used. (Refer to Table 3.4 below.) Thus the majority of patients did not receive the same anesthetic agent throughout the course of ECT. This variability, in addition to the small sample size, made it challenging to assess for any potentials associations between anesthetic agents used and the response to ECT.

The muscle relaxant was succinylcholine (suxamethonium) in 100% of cases. Premedication, specifically glycopyrrolate, was used in four cases (21.1%). There was no documentation of the use of any pharmacological augmentation strategies.

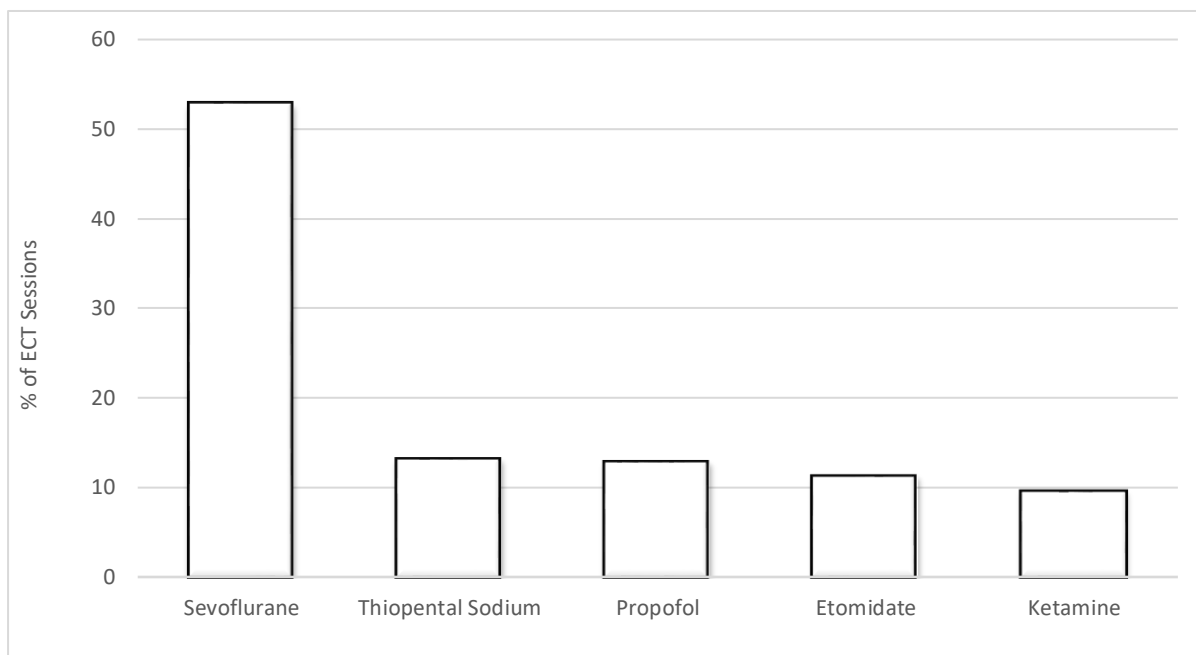


Figure 3.10 – The Anesthetic Agents Used Throughout the Course of ECT

3.1.9 The Technical Aspects of ECT

In Figure 3.10, the 17 patients whose files were reviewed, the dosing strategy was not clearly documented. This was therefore inferred based on the patients age and starting dose in the file and it was found that stimulus dose titration was used for all patients. The electrode placement was bitemporal in all of the ECT cases. The mean minimum and maximum stimulus intensities were 32.6% (range 10-65%) and 78.5% (range 15-175%) respectively. The mean first clinical response was 3 sessions (range 1-11). The mean plateau in response occurred after 7 sessions (range 1-15). The mean total number of sessions was 14 sessions (range 1-52). Of 17 of the ECT patients whose files could be found, all started with an acute course of ECT. This was either twice or thrice weekly depending on staff availability and severity of illness. Four patients (21.1%) went on to receive continuation and then maintenance ECT, and this was then performed in all four, as an outpatient basis.

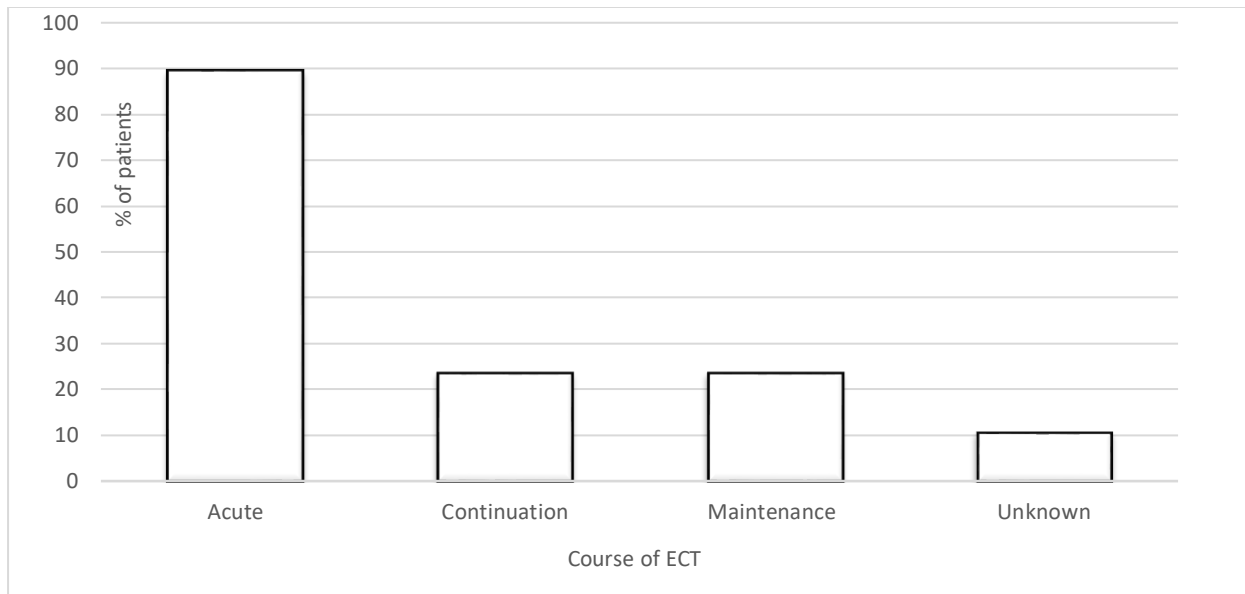


Figure 3.11 - Course of ECT

3.1.10 Outcome of the ECT: Clinical Response

The majority of patients (79%) improved clinically. There was one patient (5.3%), study number 3, that did not respond after eight sessions of ECT. Another patient (5.3%), study number 4, deteriorated after one session and was subsequently transferred to Sterkfontein Hospital. The outcome was unknown for 10.5% of patients as their files were misplaced.

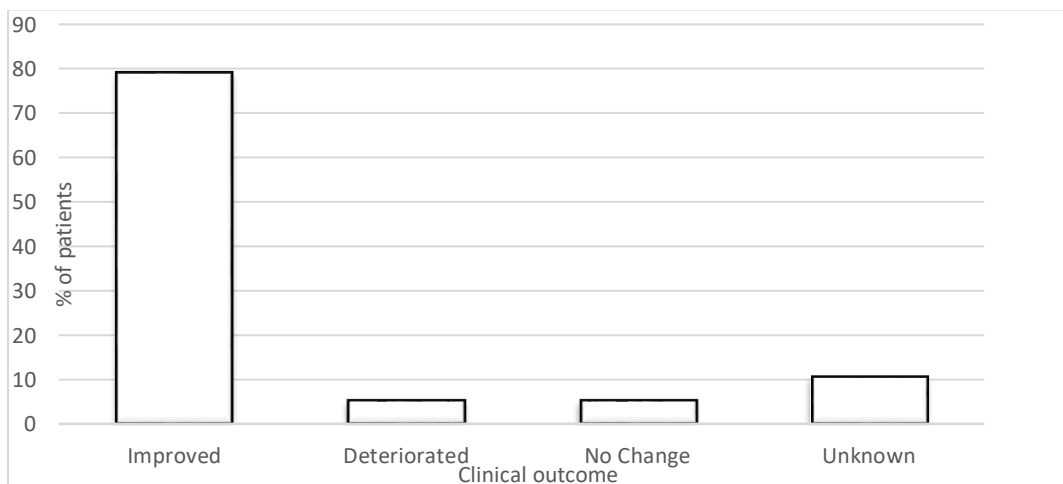


Figure 3.12 - The Clinical Outcome of ECT

3.1.11 Adverse Effects

3.1.11.1 ECT-Related Adverse Effects

Adverse effects to the ECT were documented in 8 of the patients. Six of the patients (31.6%) experienced short-term cognitive effects. These were described in the notes as post-ictal confusion or delirium and resolved spontaneously within the seventy-two hours post ECT session. There was one patient (5.3%) that complained of a headache post-ECT. This responded to Paracetamol and subsided within two days post ECT session. Two patients (10.5%) experienced status-epilepticus, with seizures lasting about five minutes each. In both cases, the seizures ceased following the administration of intravenous Diazepam. One of these patients subsequently received further ECT with no other adverse effects, whereas the other patient who had status epilepticus did not receive any further ECT. Hypomagnesaemia, an electrolyte imbalance, was considered as contributing factor to the status epilepticus in one of the patients. Only one patient (5.3%) experienced more than one ECT-related adverse effect. There were no patients documented to have experienced nausea or vomiting following ECT, or any mechanical injuries.

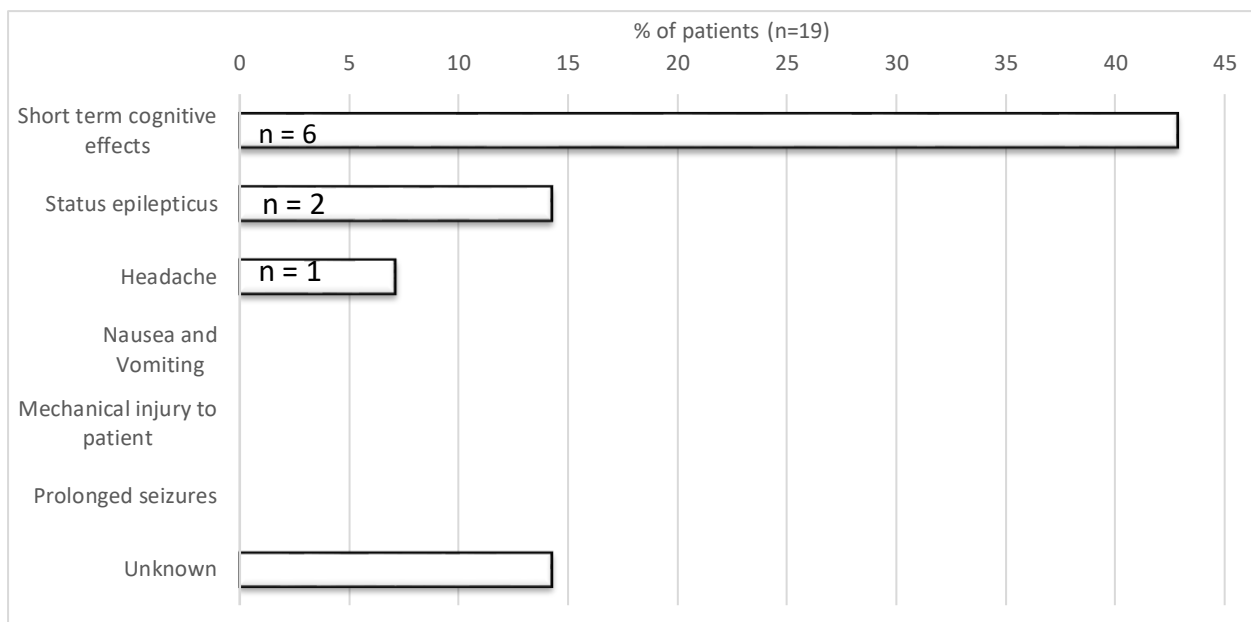


Figure 3.13 - The Adverse Effects of ECT

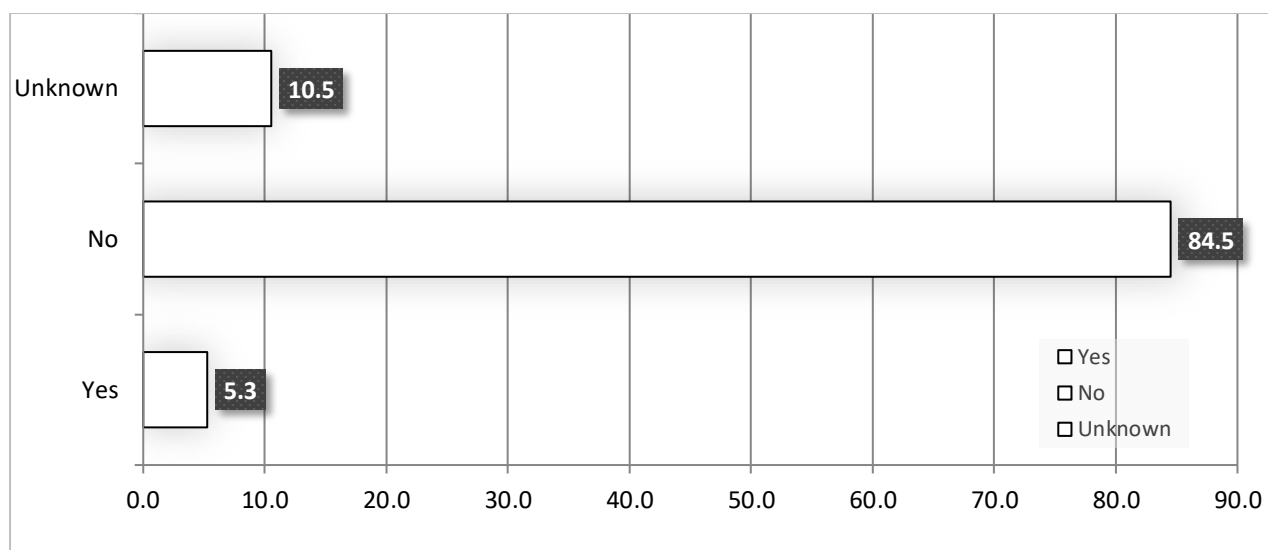


Figure 3.14 - Anesthetic-Related Adverse Effects

3.1.11.2 Anesthetic-Related Adverse Effects

There was no documentation of any anesthetic related adverse effects in 84.5% of patients. It was recorded that an aspiration possibly occurred in one patient, as it was noted that his saturation levels dropped during the ECT session. His saturation levels returned to normal after manually bagging him and his Chest X-Ray was noted be normal post-ECT. He was also clinically stable in the ward thereafter.

Table: 3.4 ECT Details

Study no	Primary diagnosis / Indication / Psychiatric treatment	Electrode placement	Anaesthetic Agent(s)	Dosing Strategy	Min. & Max. Stimulus Intensities	ECT Course	ECT no: Response / Plateau / Total	Outcome	Adverse Effects
1	MDD / TR / Ven, Quet	BT	Sev, Prop	DT	40/ 80	A	3/ 6/ 12	Imp	Nil
2	MDD / TR / Ven, Quet, (BZD)	BT	Thio	DT	40/55	A	1/3/8	Imp	Nil
3	BD / TR / Lith, Olanz, (BZD)	BT	Sev, Thio	DT	40/40	A	-/-/8	NR	Cog; SE
4	SCZ / TR, Catatonia / Cloz, Ami, (BZD)	BT	Prop, Sev	DT	40/40	A	1/1/1	Det	SE
5	MDD / TR / Mian, (BZD)	BT	Thio, Ket	DT	40/40	A	3/5/10	Imp	Cog
6	MDD / TR / Bupr, Olanz	BT	Sev, Thio	DT	40/60	A	2/8/12	Imp	Nil
7	BD / TR / Lith, Lamot, Quet, (BZD)	BT	Sev, Prop, Ket, Etom	DT	25/175	A,C,M	3/10/52	Imp	HA
8	MDD / Catatonia, Not eating / Ven, Olanz, (BZD)	BT	Sev, Thio	DT	25/70	A	4/8/14	Imp	Cog
9	BD / TR / Lith, Olanz, (BZD)	BT	Sev	DT	40/80	A	1/5/9	Imp	Nil
10	MDD / TR / Fluox, Lith	BT	Sev, Etom	DT	40/160	A,C,M	11/15/28	Imp	Nil
11	BD / TR / Valp, Lamot	BT	Sev, Thio	DT	35/65	A	2/8/10	Imp	Nil
12	U	U	U	U	U	U	U	U	U
13	U	U	U	U	U	U	U	U	U
14	MDD / TR / Fluox, Lith	BT	Sev, Prop	DT	15/75	A	2/9/15	Imp	Cog
15	MDD / TR Ven	BT	Sev, Etom	DT	65/80	A,C,M	3/12/20	Imp	Cog
16	MDD / TR / Lith, Ven	BT	Thio	DT	25/100	A	2/6/10	Imp	Nil
17	MDD / TR / Fluox, Lith	BT	Sev, Prop	DT	20/100	A,C,M	6/10/19	Imp	Cog Asp
18	SCZ / TR / Cloz, Ami, Valp, (BZD)	BT	Thio, Etom	DT	15/15	A	3/5/14	Imp	Nil
19	SCZ / TR / Cloz, (BZD)	BT	Thio	DT	10/100	A	1/2/5	Imp	Nil

KEY: U= Unknown, MDD= Major depressive disorder, GAD= Generalized anxiety disorder, BD= Bipolar disorder type 1, SCZ= Schizophrenia, OCD=Obsessive compulsive disorder, TTN= Trichotillomania, TR= Treatment resistant, Ami= Amisulpiride, Bupr= Bupropion, BZD= Benzodiazepines, Cloz= Clozapine, Fluox= Fluoxetine, Lamot= Lamotrigine, Lith= Lithium Carbonate, Mian= Mianserin, Olanz= Olanzapine,

Quet= Quetiapine, Valp= Valproate, Ven= Venlafaxine, BT= Bitemporal, Sev= Sevoflurane, Thio= Thiopental sodium, Prop= Propofol, Ket= Ketamine, Etom= Etomidate, DT= Dose titration, A= Acute, C= Continuation, M= Maintenance, Imp= Improved, Det= Deteriorated., NR= No response., Cog= short-term cognitive, HA= Headache, SE= Status epilepticus, Asp= Aspiration. Words in brackets indicate medication that was transiently discontinued throughout course of ECT.

CHAPTER FOUR

4.1 DISCUSSION

As previously stated in the literature review, there is a lack of information reviewing ECT practice in South Africa, with the last retrospective study of ECT prevalence rates conducted at a local psychiatric hospital in the Eastern Cape about 25 years ago.⁸ However more recently, a similar South African based study was published in December 2015 by Benson-Martin, titled “A Survey of the Practice of Electroconvulsive Therapy in South Africa”.¹² It must be noted that although this study and the Benson-Martin study are similar, in that they both describe ECT practice in SA, there are some important differences.¹² The former study obtained its results from self-report from ECT practitioners, as opposed to this study, which was a review of patient records. This study also evaluated ECT outcomes, namely ECT procedure- and anesthetic-related adverse effects, which were not reviewed in the Benson-Martin study.¹² Furthermore, Tara Hospital was not one of the sites evaluated in the Benson-Martin study, as that study was conducted in 2011/2012 and included only active ECT units, whereas Tara Hospital was not providing ECT services during those years.¹²

4.1.1 Prevalence of ECT Use at Tara Hospital

The EAR prevalence rate could not be calculated for this study, since the patients at Tara Hospital are referred from various geographical areas all across Gauteng. It would therefore have been difficult to define the geographical area, as well as population numbers in those areas for the EAR prevalence rate.¹⁴ ECT is also performed in the both private and public sectors hospitals within the catchment area of Tara Hospital with further makes the calculation of prevalence rates challenging as the EAR would need to include the ECT patients from Tara Hospital in addition to the ECT patients from other sites.

Therefore, for the purposes of this study, the prevalence rate of ECT use was calculated for Tara Hospital as a percentage of the number of patients that received ECT divided by the number of total admissions to the biological wards at Tara Hospital.

The ECT rates at Tara Hospital are difficult to compare with other studies in Africa and South Africa as the prevalence rates in this study are calculated as a percentage of annual admissions rather than as the EAR.¹⁴ The author has calculated the Tara annual ECT rates as 3.8 patients per year, in comparison to the Benson-Martin Study which was 25 patients in public in 8 hospitals for 2011-2012 which then works out to 3.1 patients per year.¹² These rates are relatively similar and may be useful for comparing annual ECT rates in public hospitals. It was noted in the Benson-Martin study that more patients received ECT as a treatment modality in the private sector than the public sector.¹² The reasons for this are perhaps that there is a greater need for a faster recovery due to medical aid funds in the private setting. The clinicians' preference also influences the choice on utilization of ECT.

4.1.2 Socio-Demographic Factors

The majority of patients in this study were white females, aged between 44-63 years and had treatment resistant depression as their indication for receiving ECT. Depression is more prevalent in females aged at 35-45 years of age.²⁹ Furthermore, the Sequenced Treatment Alternatives to Relieve Depression (STAR*D) Study supports the use of ECT in the algorithm for treatment resistant depression.⁵⁷

Regarding the relationship status, just less than a third of the patients in this study were married or co-habiting. Most patients were single, divorced or separated, which was not an unexpected finding since severe mental illness affects inter-personal relationships.² As a result, patients with severe mental illness may struggle to maintain intimate relationships, particularly during periods of relapse.²

In terms of the highest level of education, the majority of patients (79%) had a matric qualification or higher. This finding suggests that the majority of patients had a good pre-morbid level of functioning prior to the onset of their illness. This can be true particularly in depressive and bipolar disorders, where there is a relatively later onset of illness, as opposed to schizophrenia, which has an onset of 15-25 years in males and 20-30 years in females.²⁹ It may also suggest that these patients may have been more likely to be able to access specialized psychiatric care.

4.1.3 Mental Health Care Status

All patients in this study for whom files could be found, were inpatients, admitted to Tara Hospital, at the time of starting their ECT. The majority (57.9%) were admitted as Assisted MHCUs and just less than a third (31.6%) were Involuntary MHCUs. None of the patients were admitted as Voluntary MHCUs. ECT frequently involves the treatment of patients with severe mental illness, as was reflected in the diagnosis of the ECT patients at Tara Hospital. This, together with the finding of all patients being admitted under the MHCA, suggests that many, if not all, of these patients would have lacked the capacity for informed consent, due to their mental illness. The majority of the study patients with depressive disorders were admitted as Assisted MHCUs, as a least restrictive means of admission, implying that they lacked capacity but were willing to receive treatment, and thus to provide assent to ECT.²⁴ This is in contrast to the patients with treatment resistant schizophrenia, who were mostly all Involuntary MHCUs. Although this study did not capture data related to the consenting process and who signed the ECT consent forms, it may be presumed that in these patients ECT consent may most likely have been obtained from the next of kin, rather than the patients themselves.

The capacity to provide informed consent provides much debate when a patient is to receive ECT. If there is diminished capacity, it is advised that efforts should still be sought to achieve the patient's assent.²⁴ However, this can be challenging, particularly in unwell patients. In the interim, consent from the next of kin or medical superintendent may be necessary.²⁴ In this study however, it was largely uncertain as to whether all the patients were able to provide assent to the procedure, as this was not always cleared documented. It may therefore be a topic of interest, for future prospective studies, to determine patients' assent to ECT.

The patients in this study that received continuation and maintenance ECT did so as Involuntary outpatients. Involuntary care implies a lack of capacity as well as refusal of treatment, yet if these patients came willingly to the hospital for their outpatient ECT, this would suggest that they assented to continued ECT treatment, rather than refused.

4.1.4 Psychiatric Diagnosis

The main psychiatric diagnosis associated with ECT in this sample was major depressive disorder, severe with psychotic features mood congruent (52.6%). Other diagnoses included bipolar I disorder, manic with psychotic features mood congruent (21.1%) and treatment resistant schizophrenia (21.1%).

Less common associated co-morbidities included generalized anxiety disorder (5.3%), trichotillomania (5.3%), alcohol use disorder (5.3%) and obsessive compulsive disorder (5.3%). Although these disorders were not the primary indications for ECT in this study, they are frequent co-morbidities in patients with depressive and bipolar disorders and contribute to the overall severity. Substance use disorders are frequent co-morbidities associated with psychiatric disorders.¹⁶

The most common substances in our clinical setting include alcohol, cannabis, and amphetamine use disorders, as well as over the counter medications.¹⁶ However, in this study it was documented that only one patient (5.3%) had an alcohol use disorder, and none of the patients had a diagnosis of any other substance use disorder. One would expect that substance use disorders, be higher in patients with severe mental illness.⁶⁶ There is a bidirectional relationship between mental illness and substance use, as many substances, may cause mental illness or perpetuate it, and many patients may self-medicate on substances in an effort to treat their symptoms.⁶⁶ The rate of alcohol use disorder in this study is relatively low in comparison to the SACENDU rates, which report that alcohol as the most common substance of use in South Africa, particularly for severe psychiatric disorders.⁶⁶ It is suspected that rate may have been higher, but possibly patients were too ill at the time of admission to report their substance use histories. Patient unreliability may also have contributed to the low reported use of alcohol, including minimization and rationalization of their substance use. Unfortunately, the diagnoses of two patients were not known due to misplacement of their files.

4.1.5 Indications for ECT Use

The psychiatric diagnosis, as well as the indications for ECT, were captured in this study because it was uncertain to what extent the diagnostic indications in comparison to the

clinical indications may have been used for ECT. Clinical indications for ECT may include, not eating/drinking in a catatonic patient, acutely suicidal patients, treatment resistance disorders, pregnancy or patient preference.² In most instances in this study the indications did conform to diagnoses, with the most common indication also being treatment resistant MDD (in 47.4% of cases).

ECT is generally reserved for treatment resistant psychiatric conditions, such as depressive, bipolar and related and schizophrenic disorders.² This is reflective of the indications for ECT in this study.

Another finding from this study was that there was a shift in the indication for ECT pre and post the interruption of ECT services at Tara Hospital. Prior to the interruption of services the primary indication was treatment resistant major depressive disorder (MDD), severe with psychotic features, mood congruent. This is in contrast to the post-interruption of services where the primary indication was treatment resistant schizophrenia. The reasons for this could not be determined based on the findings of this study, however various speculations may be made. It may have been due, for example, to a general change in the clinical profile of patients admitted to Tara Hospital pre and post ECT interruption, or a change in the treatment goals in schizophrenia and mood disorders, especially in light of increasing research surrounding the efficacy of ECT.^{15,16}

4.1.6 Psychiatric Medications

The most common medications used were antipsychotics and antidepressants, in 52.6% of patients for both categories of medications. This is in keeping with the diagnostic findings of this study, whereby the majority of patients had psychotic features (MDD with psychotic features, bipolar manic with psychotic features, and schizophrenia) and were thus often on antipsychotics, and almost half of the patients who had MDD, and were thus on antidepressants.

Mood stabilizers were prescribed for 47.4% of the patients, however in this study only 21.1% of patients were diagnosed with bipolar disorder. Mood stabilizers were also used in patients with other diagnoses besides bipolar disorder. Four of the ten patients with treatment resistant depression were also prescribed Lithium, in addition to their

antidepressant medication, as supported by the NICE guidelines for the management of treatment resistant depression.¹⁵ There was also one patient with treatment resistant schizophrenia who was on clozapine and the valproate. It may have been that the valproate was used as augmentation to clozapine due to the patients' treatment resistance.¹⁵ Regarding the patients on anticonvulsant mood stabilizers, these were continued throughout the course of ECT. However in one patient's file it was noted that the morning valproate dose was omitted prior to ECT, and only administered after the procedure.

Lithium carbonate use was continued throughout the course of ECT in all the patients who were prescribed this medication, although the literature reaches no consensus surrounding its continuation during the course of ECT.²¹ Concerns of lithium carbonate contributing to a delirium post-ECT, as well as potentiation of the effects of suxamethonium, have been described.²¹ However, reported measures that may be taken to minimize these potential risks include reducing lithium levels, use of lower ECT stimulus intensity, as well as careful monitoring.²¹ Almost half (47.4%) of the patients were prescribed benzodiazepines. There could have been several possible reasons for this, perhaps to control agitation, anxiety, or to treat insomnia. The indication was not always documented. These were prescribed prior to the onset of ECT and initially for regular daily use. However, once ECT began, the benzodiazepines were given intermittently. They were omitted the evening before and morning of the ECT procedure. This may have been because benzodiazepines raise the seizure threshold, and could thus have made it difficult to obtain a therapeutic seizure. It was also noted that the benzodiazepines were prescribed early in the course of ECT and as the patient's clinical state improved, the benzodiazepines were weaned.

4.1.7 Medical Comorbidities

Almost two thirds (63.2%) of the patients had a comorbid medical condition, which demonstrates that ECT can be used in patients with medical comorbidities. The most common medical comorbidity was hypertension (31.6%) which was found in some study patients above the age of forty-four years. This may have contributed, as a perpetuating factor, to the severity of their psychiatric illness. In these patients, their hypertension was

controlled prior to ECT and none of the patients who received ECT were noted to be medically unstable or their medical conditions uncontrolled.

Hypothyroidism (15.8%) was another medical comorbidity in the study population. It is known that a bi-directional relationship exists between hypothyroidism and mood disorders, with hypothyroidism occurring in some patients with the use of lithium carbonate in mood disorders, as well as hypothyroidism being a potential cause of mood and psychotic disorders.² Two of the three patients with hypothyroidism were diagnosed with MDD, and they were also on lithium carbonate. It was unclear from the notes as to etiology of hypothyroidism or if it was thought to be lithium-induced. It was also unclear as to whether the depressive disorder and/or the introduction of lithium preceded the onset of hypothyroidism.

There were no pregnant patients that received ECT in this study, although the APA guidelines do support the use of ECT during pregnancy.²

In addition to the primary psychiatric diagnosis, 14 patients (73.7%) had either a comorbid medical or comorbid (i.e. secondary) psychiatric diagnosis, or both. The APA Guidelines suggest that the greater the medical and psychiatric comorbidity, the more challenging to treat.² Since patients who receive ECT are generally those who have been more difficult to treat and have more severe psychopathology, the finding of high rates of comorbidity was thus probably not unexpected.

It would have been useful to have assessed the relationship between the medical comorbidities and the response to ECT, or if these patients were particularly vulnerable to adverse effects, however it was not possible to determine if any significant relationship existed in this regard due to the small sample size.

4.1.8 Anesthetic Agents

The pre-medication was glycopyrrolate, which was recorded as being used in four patients. It was not clearly documented as to the indication for its use in some patients and not in others. Although, the literature does indicate that pre-medication reduces pulmonary

secretions and cardiac arrhythmias.⁴⁵ It would have been useful to correlate if these patients were at risk for cardiac or pulmonary complications.

Most patients (68.4%) were not given the same anaesthetic agent at each of their ECT sessions, and most (63.2%) also changed between inhaled and intravenous agents throughout the course of ECT, so it was challenging to track this consistently and determine whether a particular agent was better tolerated and associated with less adverse effects and response to ECT. Also, the reasons for changing between agents was not clearly documented and perhaps confounded by the differing anesthetists and their individual preferences. As a result of the different anesthetic agents used during an individual patient's course of ECT, it was challenging to identify a particular pattern.

It is recommended that if an anesthetic agent is well-tolerated and not affecting the seizure threshold, then it should be continued throughout the course of ECT for each individual patient.⁵⁵ Therefore, it would have been useful to have known the reason for changes in the anaesthetic agents in the patients in this study. However, unfortunately the reasons did not reflect in the patients' files.

The research does advocate the use of inhaled agents for uncooperative patients, and the use of intravenous anesthetic agents for non-aggressive patients.^{2,38} However, it seemed that this principle was not always applied at Tara Hospital, although not always well documented.

It was noted that in 52.8% of the ECT sessions the inhaled anesthetic agent, sevoflurane, was used. This finding was unexpected, as results from Dr Segal's study, done at Tara Hospital and published in 2006, concluded that sevoflurane should not be routinely used as an ECT induction agent due to the association with cardiovascular complications, a shorter duration of seizure, as well as an increased financial burden for the hospital.⁵⁸

It was found that intravenous agents were used in 47.2% of the ECT sessions, and these included thiopental sodium (13.3%), followed closely by propofol (12.9%), then etomidate (11.3%) and the least used was ketamine (9.7%). This finding may have been expected as, in the literature, thiopental sodium is preferred to propofol, due to fast onset of action, lesser incidence of side effects, as well as lower cost.^{55,56} Propofol, in comparison to

etomidate, has been shown to be associated with a shorter seizure duration, however it has the advantage of less adverse effects, particularly reduced nausea and vomiting.^{38,40} Other disadvantages of propofol include painful injection, cardiovascular effects and anaphylactic reactions.^{38,40,42}

Etomidate was one of the least used agents in this study. The reason for this could not be determined. However, a risk of adrenal suppression with repeated etomidate administration has been described and it whether this may have influenced the anaesthetists choice of anaesthetic agents for the ECT patients is a possibility. However this association has been reported in Intensive Care Unit patients (ICU) rather than psychiatric patients.⁶⁷ The medical profile between psychiatric and intensive care patients is vastly different. Indeed, the ICU patients have greater medical co-morbidities, which could account for the adrenal suppression. Furthermore, in the literature, adrenal suppression has not been noted in psychiatric patients receiving etomidate anesthesia for ECT.^{67,68} The literature demonstrates that etomidate results in a lower seizure threshold and therefore a more favorable seizure outcome with regards to ECT.⁶⁸

Ketamine was the least commonly used anaesthetic agent. This result was not unexpected, as ketamine can induce psychotic symptoms, as well as a switch from depression to mania in bipolar patients, and would thus probably not be the most suitable agent for psychiatric patients undergoing ECT.⁵⁵ In these cases, according to the notes, it appeared that ketamine was used as a primary anesthetic agent, not for the purposes of ECT augmentation.

Regarding ECT augmentation, there was also no documentation of any other augmentation strategies, such as caffeine, being used in any of the ECT cases in this study. Likewise there was no documentation regarding hyperventilation in any of the patients' ECT notes. However, hyperventilation has been shown to have a proconvulsant effect with regards to ECT and is commonly practiced by anaesthetists routinely.⁵⁶ It is therefore possible that hyperventilation may have been performed in some cases, but it was not documented in the notes.

The muscle relaxant used in this study was found to be succinylcholine (suxamethonium) in all cases, which is in keeping with the literature, as it has the most evidence based practise.³⁹

4.1.9 The Technical Aspects of the ECT

4.1.9.1 Electrode Placement

Bitemporal ECT was used in all cases. There could be various possibilities for this. Firstly, it could be the routine preferred practice at Tara Hospital and thus doctors are most familiar with this electrode placement as opposed to other placements. Furthermore, it could be indicative of the severity of the cases, as ECT was reserved for treatment resistant cases and therefore bitemporal electrode placement may have been most appropriate.¹⁷ Bitemporal ECT was also used in the acute phase of treatment, as well as continuation and maintenance. The literature however supports the use of unilateral electrode placement in the continuation and maintenance phase of ECT in order to reduce cognitive side effects.⁴³

4.1.9.2 Dosing Strategy

The dosing strategy was determined by the author to be stimulus dose titration in all cases. Perhaps this was due to clinician preference at Tara Hospital and ensured a means of delivering an effective dose above the seizure threshold. The literature advocates stimulus dose titration as the most conservative method of dose titration because by it starts at a lower stimulus in comparison to the age or half-age methods.^{52,53} Therefore, enabling determination of the seizure threshold more accurately, and being more aware of exceeding the threshold which may then minimize cognitive side effects.^{52,53}

4.1.9.3 Stimulus Intensity

The mean minimum and maximum stimulus intensities were 32.6% (range 10-65%) and 78.5% (range 15-175%) respectively. One of the patients in this study (study number 7) was noted to have the largest difference in minimum and maximum stimulus intensities (25% and 175% respectively). This patient was also the only patient in which four different

anaesthetic agents were used over the course of the ECT. (Most other patients had two different anaesthetic agents used, with a few having had the same anaesthetic agent throughout.) These factors could suggest that there may have been difficulty achieving adequate seizures this patient, and thus the stimulus intensities were increased considerably over the course of ECT, and anaesthetic agents were changed in the hopes of minimizing the effects on seizure threshold. However, the anaesthetic agents may also have been frequently changed due to other reasons. The large difference in minimum and maximum stimulus intensities in this patient may also have suggested, that this patient was more severely unwell and/or difficult to treat and/or treatment resistant. This patient showed a first response after the 3rd ECT session, but a plateau in response only occurred after the 10th session, whereas the mean plateau in response in this study population occurred after 7 sessions. This patient also went on to receive continuation and maintenance ECT, and received fifty-two ECT sessions in total, which could also explain the very high maximum stimulus intensity, due to increasing seizure threshold which has been reported to occur after repeated ECT sessions. In terms of medication, this patient was on three regular medications (two mood stabilizers, one of which was the anticonvulsant agent lamotrigine, and an antipsychotic), as well as intermittent use of benzodiazepines. Thus it is possible that medications may also have contributed to the increased seizure threshold and necessitated increases in stimulus intensity over the course of ECT. Regarding adverse effects, this was also the only patient where a headache was noted.

However, due to the small sample size, it was not possible to meaningfully assess for any potential associations between minimum and maximum stimulus intensities and other parameters, such as patient factors, medications, anaesthetic agents used, clinical outcomes and adverse effects, total number of ECT sessions, as well as after how many sessions the first response and also the plateau in response occurred.

4.1.9.4 Course of ECT

All of the patients, for whom records were available, started with an acute course of ECT. This was either twice or thrice weekly depending on staff availability and severity of illness. Thereafter, 21.1% of the patients continued to receive continuation and then

maintenance ECT. This was performed as an outpatient. The indications for these patients were mood disorders. Three patients had treatment resistant depression and the fourth patient had treatment resistant bipolar. This is in keeping with the literature.¹⁷

4.1.10 Outcome of the ECT

4.1.10.1 First Response and Plateau of Response

The first response mean number of sessions was 3. The mean number of sessions at which there was a plateau in response was 7, which is largely in keeping with ECT guidelines and standard documented practise.^{2,14} The mean total number of sessions was 14. These findings are consistent with the literature, which supports that a first clinical response can be seen as early as the second ECT session, and that most patients receive an acute course of ECT for 8-12 sessions. Furthermore, if no response is seen after six sessions, it is recommended that ECT be discontinued.^{2,15} Based on the guidelines, it could also be expected that generally the total number sessions, in an acute course of ECT, would not greatly exceed the number of sessions after which a plateau in response occurred, as this would indicate that no further improvement has been observed and this could then be an indication to terminate the ECT course. However, of the thirteen patients in this study who received only an acute course of ECT, ten patients went on to receive more than two subsequent sessions of ECT before it was discontinued. However, due to the retrospective nature of this study, possible inadequacies in record keeping / insufficient clinical details in the files, and the lack of rating scales being used, it was difficult to draw any conclusions from these findings.

4.1.10.2 The Final Clinical Response

The majority of patients (79%) were noted to have had a positive clinical response by the end of their ECT course. Two of the patients (10.5%) did not show any clinical response to ECT or deteriorated, and for the remaining (10.5%) patients, their response was listed as unknown, as their files were unable to be located. In this study, of the fourteen patients with mood disorders, thirteen (92.9%) improved following ECT, whereas two of the three patients with schizophrenia were noted to have improved. This is in keeping with the literature, which reports that the ECT response rate for mood disorders is eighty to ninety

percent and that the response rate is better for mood disorders rather than for psychotic disorders.¹⁷

The response to ECT was captured, based on the notes in the patients' files, where this had been determined clinically, by the treating team. Rating scales were not used to objectively assess response, the extent of the response, or to assist in detecting smaller improvements, which may not have been as easily observed based on clinical impressions alone. Furthermore, the distinction between remission and response was therefore also not clear in this study due to the lack of use of rating scales.

The rating scales which have been used in other ECT studies include the Hamilton Rating Scale for Depression (HAM-D) for patients with depression, and in the case of bipolar disorder, the Young Mania Rating Scale (YMRS) which can monitor symptoms of the manic episode.^{26,27} The Bush-Francis Catatonia Rating Scale (BFCRS) is an example of a rating scale that has also been used in catatonic patients.^{2,17} In patients with schizophrenia, the Brief Psychiatric Rating Scale (BPRS), is often used. According to the literature, ECT with psychotropics improves patient outcomes, as noted by improvements on the BPRS, and specifically with the findings of less behavioral symptoms, particularly aggression, as well as less positive symptoms.^{2,17} Regarding the patients with schizophrenia in this study, although rating scales were not used, it was subjectively noted in their files that there was some alleviation of their behavioral symptoms clinically, as well as some improvement or softening of their positive symptoms.

In this study, there were two patients that either deteriorated or did not respond to ECT. The patient study number 3, who was captured as having not responded to ECT, had not shown any response or improvement after eight sessions of ECT, and ECT was then abandoned. The maximum stimulus intensity that this patient received was 40%, and it is unknown if this patient may have improved if treated with a higher stimulus intensity. However, this patient also experienced adverse effects (discussed below), and it is unknown if this may have been a factor which limited further increases in the stimulus intensity in this patient. Regarding the patient study number 4, who was captured as having deteriorated after ECT, she experienced status epilepticus after the first session and according to the documentation it was then decided to terminate further ECT and

continue with pharmacological management. Two days later, this patient was transferred to Sterkfontein Hospital (SFH), as she had become increasingly challenging behaviorally, and required further involuntary care, treatment and rehabilitation in a more secure psychiatric facility. ECT services were not available at SFH and it is therefore unknown as to whether or not this patient may have ultimately responded if she had been given an adequate trial of ECT. This patient had treatment resistant schizophrenia, with catatonic features.

4.1.11 Adverse Effects

4.1.11.1 ECT-Related Adverse Effects

The adverse effects were noted clinically in the patients' notes. The most common adverse effects were short-term cognitive effects in 31.6% of cases. This was noted in all cases as a subjective finding according to the patients' complaints. It was documented that the patient reported confusion or difficulty remembering recent daily events. The use of objective bedside testing, namely a MOCA or MMSE was performed after these complaints, but this was not always consistently documented throughout the patient's course of ECT. Furthermore, a baseline MMSE or MOCA screening was performed on only a third (36.8%) of the patients, and as such it was difficult to compare findings before and during the course of ECT. In those patients who did have a MOCA or MMSE done after complaints of cognitive side effects following ECT, the time after which the cognitive testing was done varied among patients. Out of the six patients that reported short-term cognitive effects, one patient was tested shortly after the ECT session. Four were tested later in the course of the day and one patient was tested the following day. Therefore, it was generally not possible to objectively determine the extent of these adverse effects, and whether they improved and to what degree. However, from the clinical notes, it did appear that these cognitive side effects resolved with time, as the subjective reports by patients did not persist throughout and after the course of ECT. It was also not possible to determine the specific areas of cognitive functioning that may have been affected in these patients, although in the literature, the greatest areas of deficits have been found in attention, but this has been found to be acute and generally resolves after a few days.

Later and perhaps more persistent changes occur in semantic memory and autobiographical memory.³⁸

Regarding cognition, one must also be cognizant of prescribed medications which may also contribute to cognitive changes, namely benzodiazepines, lithium carbonate and even sodium valproate.³⁸ In this study, three of the six patients who experienced short-term cognitive effects were on lithium carbonate. However, there were four other study patients on lithium and also two patients on valproate who did not experience short-term cognitive effects. Three of the patients also received benzodiazepines intermittently. All of the patients who reported cognitive side effects were diagnosed with a mood disorder (one with bipolar disorder and five with MDD). Regarding the technical aspects of the ECT, those who reported cognitive side effects did not appear to differ in terms of their maximum stimulus intensities (with the mean maximum stimulus intensity being 67.5% for those who reported cognitive side effects, as opposed to 78.5% for all of the study patients. However, the study sample was too small to report any significant associations with regards to cognitive effects and other patient, medication, or ECT-related factors. The development of cognitive adverse effects has been reported in the literature to be multi-factorial, and includes genetic predisposition, baseline cognition, medication, as well as ECT related parameters.⁴¹

One patient in this study was documented to have experienced a headache following only one of the ECT sessions. This resolved after paracetamol was given, and it was not documented that she experienced any further headaches post-ECT in subsequent sessions. Headaches may occur in about half of patients after ECT, followed in frequency by gastro-intestinal symptoms, namely nausea, which has been reported in about 25% of patients. Gastro-intestinal symptoms are reported to occur in about 25% of patients post-ECT.³ In light of these relatively common symptoms post-ECT and it is uncertain if other patients in this study experienced similar symptoms without documentation in their clinical notes.

There were two patients who experienced status epilepticus, which lasted about five minutes each. In both of these patients, the seizures ceased with the administration of intravenous diazepam. According to guidelines, the first line management of status

epilepticus includes the use of benzodiazepines, and if that fails, phenytoin, phenobarbitone, sodium valproate, as well as levetiracetam are other recommended options.⁶⁹

The patient study number 3, who experienced status epilepticus, was found to have hypomagnesemia. Seizures may occur in patients electrolyte disorders namely, sodium disorders, hypocalcemia, and hypomagnesemia.⁷⁰ In such instances, the seizures are usually generalized tonic-clonic, although less commonly partial seizures may occur.⁷⁰ Rapidly evolving electrolyte disturbances are more likely to cause seizures than those developing more gradually.⁷⁰ This patient's serum magnesium level was then corrected following the ECT session. After correction of the patient's electrolyte disturbance, he was re-challenged with ECT, and received four subsequent ECT sessions with no further episodes of status epilepticus or prolonged seizures. The anesthetic agents used in this patient, were sevoflurane and thiopental sodium. The other patient who experienced status epilepticus however, did not receive any further ECT and was therefore captured, for the purposes of this study, as having deteriorated. This had occurred during the first ECT session, and the patient had been given thiopental sodium and ketamine as the anaesthetic agents, and was on clozapine and amisulpiride. Possible reasons for the development of status epilepticus were not noted in this patients's file. The patient was then transferred to SFH for future involuntary psychiatric care.

Regarding possible contributing risk factors to status epilepticus, both patients had medical co-morbidities, namely hypertension and hypothyroidism, although it was noted that these were controlled prior to ECT. Uncontrolled hypertension however poses a cardiovascular risk and may predispose to a cerebrovascular event and be associated with seizures and even status epilepticus.⁶⁹ Hypothyroidism contributes to electrolyte and metabolic disturbances which may also contribute to development of seizures and status epilepticus.⁷⁰ This risk may be increased in patients with co-existing organic brain disease.⁵⁴ It was not documented whether these patients had a CT brain or other neuro-imaging prior to ECT, or if they were later investigated for underlying brain pathology.

In terms of the anesthetic factors, both of the patients had received sevoflurane on those two occasions. Although the inhaled anesthetic agents may be used in the treatment of

refractory status epilepticus, this pertains to isoflurane and desflurane.^{55,56} With regards to sevoflurane, it was noted that this inhaled agent consistently produced epileptiform discharges on the EEG when used as anesthesia in healthy patients.⁷¹ Sevoflurane was the most commonly used anesthetic agent in this study and there were no other patients that experienced prolonged seizures or status epilepticus. It would have perhaps been expected that etomidate would be associated with prolonged seizures and status epilepticus, as it decreases the seizure threshold.^{55,56} However, this was not noted in this study.

In ECT the objective is to cause a therapeutic seizure and this is done in a controlled environment where there is access to treatments to abort prolonged seizures or status epilepticus.¹⁷ Status epilepticus is noted to be rare in ECT. Status epilepticus is also not a contraindication for further ECT.²⁰ In fact, ECT can be used to treat prolonged seizures and ECT can also be used to treat unstable or intractable epilepsy as it raises the seizure threshold.²⁰ Nonetheless, status epilepticus is a serious condition, and potential complications of this include pulmonary edema, cardiac arrhythmias, encephalopathy, focal neurological deficits and even cardiovascular collapse.¹⁷

These cases of two patients experienced status epilepticus in this study, illustrate that the decision, not only to start, but also to continue ECT, is a clinical decision which is most likely based on multiple clinical factors.

4.1.11.2 Anesthetic-Related Adverse Effects

ECT is a brief procedure, without prolonged time under anesthesia. Thus frequent anesthetic-related adverse effects are not expected.³ However, anesthetic-related side effects which are described may include cardiovascular effects, namely arrhythmias and myocardial infarcts, as well as pulmonary complications namely laryngospasm and aspirations. Only one patient in this study was documented to have possibly experienced an anesthetic-related adverse effect. This patient, according to the notes, was thought to have possibly aspirated, based on transient low oxygen saturations. However the chest x-ray, which was done after that ECT session, was normal and clinically he had no evidence of pneumonia. The other possible reasons for low transient saturation could

have included incorrect mechanical ventilation, transient poor contact of saturation monitor, transient alveolar hypoventilation, laryngospasm or incorrect readings.^{55,56} Unfortunately there was no documentation in this particular patient's notes as to what may have been responsible for his low saturation levels, if it was not an aspiration.

4.2 STUDY LIMITATIONS

4.2.1 Small sample size

The small sample size of nineteen patients only allowed for a descriptive analysis to be performed. From this small sample, a further two files could not be found within the Tara Hospital Records Department. Although the study period spanned a ten year period, another limitation was the break in ECT service from 2009-2013. Effectively, this meant that 19 patients received ECT over five years (2006-2008 & 2014-2015). This is an average of 3.8 patients annually, at a specialized psychiatric hospital. ECT is reserved for the most severely ill psychiatric patients, and thus only for a minority of patients. In light of this, small numbers were therefore probably also to be expected. However, the literature review also demonstrated a lack of data about ECT in South African public sector specialized psychiatric hospitals, such as Tara Hospital. This rendered the study clinically relevant.

4.2.2 Missing patient files

Two patient files could not be located, which represented 10.5% of the total sample. Therefore this impacted considerably on an already small sample size of 19 patients.

4.2.3 Retrospective study and inadequate record keeping

As with any retrospective study, inadequate and incomplete record keeping was a potential limitation. It was possible that some information may not have been documented or may not have been accurate, such as information regarding change in the patients' MHCA status, omission of certain medications (namely benzodiazepines), adverse effects, as well as choice for use of certain anesthetic agents

4.2.4 Lack of Objectivity

It was noted that clinicians failed to use rating scales to assess the severity of symptoms and clinical response to ECT. As a result it was not possible to objectively determine the extent of the response or to distinguish between response and full remission of symptoms. The determination of response to ECT in this study therefore relied on subjective clinical reports. It was also unclear as to whether or not the doctors consistently enquired about all adverse effects, or if the adverse effects were not present. Utilization of objective rating scales may have assisted in this regard. The above holds true for monitoring of cognitive side effects, in some patients cognitive tests, such as the MMSE/MOCA were done, but not regularly or consistently, and it was therefore also not possible to get objective data in this regard.

4.2.5 Informed Consent

Obtaining consent for ECT is an important aspect of an audit of ECT service.^{61,62} In this study data was captured regarding the patients' MHCA status, which provided some indication regarding capacity and willingness to receive treatment. However, data was not captured regarding the ECT informed consent forms, whether capacity to consent changed during the course of ECT and if this was reflected by who provided the consent for ECT, as well as whether those patients who were unable to provide informed consent, gave their assent to the procedure. This could have been considered a limitation of this study. Informed consent for ECT and consenting procedures could therefore be another potential area of further research.

Other aspects which were not covered in this study included a review of ECT documentation, such as the MHCA Form 47.

CHAPTER FIVE

5.1 CONCLUSION

The aims and objectives of this study were to describe the practice of ECT at a public sector psychiatric hospital in Gauteng. The indications for ECT, as well as the technical aspects of ECT, namely the electrode placement, dosing strategy and course of ECT are in keeping with the local and international guidelines. There were however areas which could be improvement upon, such as, adequate record keeping of psychiatric medications, use of rating scales as objective measures of response, enquiry about adverse effects, as well as monitoring of these adverse effects.

It was difficult to determine the prevalence rate of ECT, as the EAR could not be calculated. However, the author did attempt to calculate the annual ECT rates to inpatients admissions and compare this with the Benson-Martin Study. Both studies displayed low rates of ECT usage, which were consistent in the literature about public sector hospitals.¹² The findings also suggest that ECT is being under-utilized in the public sector in comparison to the private sector.¹²

It is hoped that this study will increase the advocacy for the use of ECT in the public sector, as the majority of study patients responded favorably. The future ECT usage at Tara Hospital may be expected to rise as more doctors gain momentum in prescribing, performing and practicing ECT.

5.2 RECOMMENDATIONS

Even though this was a very small study and it was only done at one site, some meaningful recommendations can still be made.

5.2.1 Record-Keeping

There is a need to improve record-keeping, particularly pertaining to the indications for ECT, the clinical outcome, indications for the use of particular anesthetic agents as well as documentation of all adverse effects experienced and not experienced following each

ECT session. The use of medication or a change in medication should also be documented with pertinent motivations.

5.2.2 Rating Scales and Cognitive Tests

The use of rating scales is strongly recommended for patients undergoing ECT at Tara Hospital. This will increase objectivity and assist with assessing clinical improvement. The rating scales that may be useful for monitoring depressive and manic symptoms include the HAM-D and the YMRS respectively.^{2,17} The Brief Psychiatric Rating Scale (BPRS) is favored for its ability to encompass a variety of symptoms and time efficiency in clinical practice.^{2,17} For those patients with catatonia, the BPRS may be used.^{2,17}

The use of cognitive tests or screening tools would also assist in objectively detecting adverse effects, with particular reference to cognitive impairment. Useful tools, which are recommended in this assessment, are the Montreal Cognitive Assessment (MOCA) and the Mini Mental State Examination (MMSE).³⁸ It is fundamental to do baseline assessments prior to the commencement of ECT and then continue testing the components at intervals throughout the course of ECT and at the end of the course.

Another brief screening test for presence of cognitive impairment is the “time to re-orientation” test performed thirty minutes post-ECT session.⁴⁰ This ten item orientation questionnaire screens for retrograde amnesia and is brief and easy to administer after ECT.⁴⁰ Additional tests consists of Attention can be assessed by Serial 7’s, the spelling of the word “WORLD” or Lexical Fluency.³⁸ Whereas, changes in declarative memory can be assessed by standardized questions related to personal history, namely mother’s maiden name, country of birth, current president etc.³⁸ Immediate, visual and verbal memory can be assessed by determining registration and recall.³⁸

5.2.3 Tara Hospital ECT Policy and Guidelines

Tara Hospital currently does have an ECT policy called “Operational Guidelines for Nursing and Clinical”, which deals with the operational matters surrounding the use of ECT. However, it could be improved upon to be bear more detail about the guidelines regarding the actual practice of ECT. This could include guidelines regarding obtaining

consent for ECT, and the prescription of ECT, specifically technical aspects such as electrode placement, frequency of treatment, dosing strategy and dose adjustments, monitoring during the course of ECT, methods to measure seizure activity and determine “adequacy” of seizure, number of treatments and discontinuation of ECT. Guidelines regarding anesthesia for ECT, and the rationale for the particular use of anesthetic agent, as well as guidance regarding augmenting strategies would also be useful. ECT and co-prescribed medications could also be addressed in the guidelines, such as effects on seizure threshold, which medications to continue or discontinue during the course of ECT, and which medications should preferably be given in the morning before the ECT session, and which to be given after ECT. Guidance regarding the monitoring for and management of adverse effects, including missed seizures, termination of prolonged seizures and tardive seizures could also be included. ECT in special groups, such as children and adolescents, the elderly and pregnant patients should also be addressed, as well as continuation and maintenance ECT, and outpatient or day-case ECT. The ECT policy could also mandate the regular training of ECT practitioners, as well as ongoing monitoring of ECT services through regular audits. The use of some sort of “ECT checklist” should also be considered as this could assist in ensuring that all the relevant information is obtained and documented with each ECT session.

5.2.4 ECT Checklist

The suggested ECT policy could also recommend that a checklist is used to assist in ECT prescription. The use of a standardized ECT checklist may enable better tracking of response to ECT, monitoring of adverse effects, as well as overall ECT efficacy. The components could include the indications for ECT, the use of augmentation strategies and the assessment of seizure adequacy. This could prove meaningful in standardizing the use of ECT at the specific site and aid with consistency. It should also include guidelines in special patient groups, for example pregnant patients and adolescents. The use of a standardized ECT checklist may also assist for future research purposes, by ensuring more consistent availability of data in patient records. Appendix 4 is an example of an ECT checklist, created and suggested by the author, that could be used for patients undergoing ECT to ensure that information is recorded.

5.2.5 Ethical and Legal Considerations

Patients receiving ECT should be regularly assessed for an improvement in their capacity to provide informed consent. It is important that the least restrictive means of an admission under the Mental Healthcare Act must be employed. It is also imperative that this is assessed throughout the course of ECT and captured on the ECT Checklist.

5.2.6 Future Research Recommendations

Future research is pivotal in discovering more about the benefits of ECT, as well as guidelines for improvement. In light of the demonstrated efficacy of ECT in this study, an increase its use should be advocated. It may be predicted that, as ECT is efficacious in conjunction with psychotropics, the prevalence of ECT use may increase at Tara Hospital. It would be useful to further determine the effect of ECT on the length of hospital stay at Tara Hospital, as well as its cost-effectiveness. It would also be meaningful to perform prospective ECT practice studies within the Gauteng public sector to compare and contrast rates of use, indications, outcomes and technical aspects.

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APPENDIX 1: DATA COLLECTION SHEET

STUDY NUMBER: _____

TARA FILE NUMBER	
ADMISSION DATE	
DISCHARGE DATE	

1. SOCIO-DEMOGRAPHICS

1.1. AGE (YRS)

A	B	C	D	E	F	G
<20	21-30	31-40	41-50	51-60	61-70	>70

1.2. GENDER

A	B
Male	Female

1.3. ETHNICITY

A	B	C	D	E
Caucasian	Indian	Black	Coloured	Other

1.4. MARITAL STATUS

A	B	C	D	E	F
Single	Married	Divorced	Separated	Widowed	Unknown

1.5. HIGHEST LEVEL OF EDUCATION

A	B	C	D	E
Less than Grade 12	Grade 12	Diploma	Degree	Unknown

2. MHCU STATUS

A	B	C	D
Voluntary	Involuntary	Assisted	Unknown

3. DSM IV-TR PSYCHIATRIC DIAGNOSIS

3.1. AXIS I DIAGNOSIS

3.2. AXIS II DIAGNOSIS

3.3. COMORBID MEDICAL DISORDERS (AXIS III DIAGNOSIS)

4. INDICATIONS FOR ECT

4.1. MOOD DISORDERS- DEPRESSION

A	Treatment resistant / failed other medication trials	
B	Severe without psychotic features	
C	Severe with psychotic features	
D	Severe with melancholic features	
E	Severe with catatonic features	
F	Severe with postpartum onset	
G	Life-threatening symptoms- acutely suicidal	
H	Life-threatening symptoms- not eating or drinking	
I	Other	
J	Not documented	
K	Diagnosis not applicable	

4.2. MOOD DISORDERS- BIPOLAR MANIA

A	Not responding to medication / failed medication trials	
B	Severe without psychotic features	
C	Severe with psychotic features	
D	Severe with catatonic features	
E	Severe with postpartum onset	
F	Life-threatening symptoms- extreme agitation, physical exhaustion	
G	Life-threatening symptoms- not eating or drinking	
H	Other	
I	Not documented	
J	Diagnosis not applicable	

4.3. SCHIZOPHRENIA

A	Failed medication trials, not including clozapine	
B	Failed medication trials, including clozapine	
C	Acute exacerbation of positive psychotic symptoms	
D	Catatonia	
E	Affective symptoms	
F	Other	
G	Not documented	
H	Diagnosis not applicable	

4.4. CATATONIA

A	Associated with a psychiatric disorder	
B	Associated with a medical / neurological disorder	
C	After a failed trial of Lorazepam	
D	Other	
E	Diagnosis not applicable	

4.5. PREGNANCY

A	Yes	
B	No	
C	Unknown	

4.6. PATIENT PREFERENCE

A	Yes	
B	No	
C	Unknown	

4.7. OTHER DISORDERS

A	Yes	
B	No	
C	Unknown	

5. PSYCHIATRIC MEDICATION

6. ANAESTHETIC AND OTHER MEDICATION USED DURING ECT

6.1. PREMEDICATION

A	Yes	
B	No	
C	Not documented	

6.2. ANAESTHETIC AGENT

A	Inhaled Agent	
B	Intravenous Agent	
C	Other	

6.3 NAME OF ANAESTHETIC AGENT

--

6.4 MUSCLE RELAXANT

A	Yes	
B	No	
C	Not documented	

6.5 TYPE OF MUSCLE RELAXANT

--

7. TECHNICAL ASPECTS

7.1. ELECTRODE PLACEMENT

A	Unilateral	
B	Bitemporal	
C	Bifrontal	
D	Other	

7.2. MINIMUM STIMULUS INTENSITY (%)

--

7.3. MAXIMUM STIMULUS INTENSITY (%)

--

7.4. DOSING STRATEGY

A	Stimulus Dose Titration	
B	Half- Age Method	
C	Age Method	
D	Stimulus Dosing Tables	

7.5. TREATMENT FREQUENCY (WKLY)

A	Once	
B	Twice	
C	Thrice	
D	Other	
E	Not documented	

7.6. COURSE OF ECT

A	Acute	
B	Continuation	
C	Maintenance	
D	Unknown	

8. OUTCOMES OF ECT

8.1 FIRST RESPONSE

Treatment Number	
-------------------------	--

8.2 PLATEAU OF RESPONSE

Treatment Number	
-------------------------	--

8.3 TOTAL NUMBER OF ECT SESSIONS

--

8.4 CLINICAL OUTCOME

A	Improved	
B	Deteriorated	
C	No Change	
D	Not Documented	

8.5 ADVERSE EFFECTS TO ECT

A	Short Term Cognitive Effects	
C	Anaesthetic Related Effects	
D	Other Effects	
E	No Adverse Effects Noted	
F	Not Documented	

APPENDIX 2:

HUMAN RESEARCH ETHICS COMMITTEE CLEARANCE CERTIFICATE


UNIVERSITY OF THE WESTERN CAPE
JOHANNESBURG

R14/49 Dr Carmel Ramiah

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M150521

NAME: Dr Carmel Ramiah
(Principal Investigator)

DEPARTMENT: Psychiatry
Tara H Moross Hospital, Hurlingham

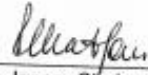
PROJECT TITLE: A Retrospective Record Review of Electroconvulsive Therapy (ECT) at a Specialist Psychiatric Hospital in Johannesburg

DATE CONSIDERED: 29 May 2015

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Dr B. Marais

APPROVED BY: 
Professor P Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 22/06/2015

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.**

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX 3:

TARA HOSPITAL RESEARCH COMMITTEE PERMISSION LETTER



To: Dr Otieno
CEO Tara Hospital

15 July 2015

Dear Dr Otieno

Re: Approval Request to conduct Research

I hereby request permission for the following researcher, Dr Ramiah to conduct research at Tara. The title of her research is, "A retrospective record review of electroconvulsive therapy (ECT) at a specialised psychiatric hospital in Johannesburg".

The study is towards her MMed(Psych) at the University of Witwatersrand.

Attached is the proposal. She already has Ethics Approval from the Wits Ethics Committee.

Yours sincerely

A handwritten signature in black ink, appearing to be "Jawahara Chandra".

Dr Jawahara Chandra

Chairperson - Tara research Committee

Date: 21/7/2015

Recommended/Not Recommended

A handwritten signature in black ink, appearing to be "Thebe Madigoe".

Dr Thebe Madigoe

Clinical Head

Date: 29/7/15

Approved/Not Approved

A handwritten signature in black ink, appearing to be "Florence Otieno".

Dr Florence Otieno

CEO

Date: 5/8/15

Must also register
and comply with
the Provincial
Research Committee
Requirements

APPENDIX 4: SUGGESTED ECT CHECKLIST

ECT CHECKLIST – TO BE COMPLETED AFTER EACH ECT SESSION

Name & Hospital Number			<u>Age</u>	
Referral Source	Government	Private	Other	
MHCA status		Capacity to consent	<u>Reasons For Capacity</u>	
Change of status	Date:	Capacity to consent	<u>Reasons For Change</u>	
Psychiatric Diagnosis				
Indications for ECT				
Consent form in file	Consent from patient	Consent from family	<u>Consent from Other</u>	
Medications				
Medical Co-morbidities		Controlled	Uncontrolled	
ECT Session Number				
ECT Course	Acute	Continuation	Maintenance	
Clinical Response noted since previous session?	Yes, improved	No response	Deteriorated	
Rating Scale Used, baseline & most recent score (with dates)				

Electrode Placement	Unilateral	Bilateral bitemporal	Bilateral bifrontal
Stimulus Intensity			
Seizure Duration	Clinical seizure	EEG	EMG
Post-ictal Suppression Index			
Premedication		ECT Augmentation (hyperventilation / caffeine / other)	
Anaesthetic Induction Agent used		Inhaled	Intravenous
If Anaesthetic Agent changed since previous ECT session, reason for change			
Muscle Relaxant used		Anticholinergic agent used	
Anaesthetic Adverse Effects			
ECT Adverse Effects after last ECT session	Cognitive Effects Acute: Delirium Chronic Changes	Management	Baseline MOCA/ MMSE score & date MOCA/MMSE score since last ECT
	Headache	Management	
	Status Epilepticus	Management	
	Mechanical Injury	Management	
	Nausea/Vomiting	Management	
	Other	Management	
If ECT is to be discontinued, reasons for discontinuation			