MOH/P/PAK/460.21(GU)

GUIDELINE ON
ELECTROCONVULSIVE THERAPY
FOR MINISTRY OF HEALTH
Basis, Practicality & Policies

MEDICAL DEVELOPMENT DIVISION
MINISTRY OF HEALTY MALAYSIA

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Ministry of Health Malaysia

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This guideline was developed by the Medical Services Unit, Medical Services Development Section of the Medical Development Division, Ministry of Health Malaysia and the Drafting Committee for the Guideline on Electroconvulsive Therapy

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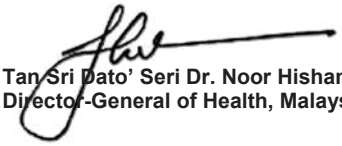
FOREWORD BY DIRECTOR-GENERAL OF HEALTH, MALAYSIA

ECT is an essential physical therapy to treat and manage psychiatric illnesses or medical patients with psychiatric symptoms. The Guideline on Electroconvulsive Therapy (ECT) is a testimony of a concentrated effort by the neuropsychiatry and anaesthesiology fraternities. From its humble edition as the Hospital Kuala Lumpur Handbook ECT published in 2014 to its current form, this document has served as the foundation to drive the professionals in providing excellent ECT services to the patients.

The guideline addresses the fundamental principles with up-to date practicality, to administer ECT effectively and safely while maintaining a high-level standard of care to the patients. Truly, to execute a skill-based procedure such as ECT, a systematic protocol will need to be in place as well as ensuring the practitioners are privileged and qualified for the procedure.

Patient safety is an integral component of clinical governance and as such, we as the professional provider are responsible to ensure the highest quality of such ECT service is monitored. With the development guideline, it is hoped that the ECT service in the country will be delivered effectively and safely while maintaining a high-level standard of care to the patients.

I would like to extend my heartiest congratulations to the committee members for their commitment and dedication in seeing through the completion of this guideline over these six months despite challenges from the ongoing COVID-19 pandemic. As the guideline provides the necessary basis, practicality, and policies, let us extend better ECT services to our patients with advances in practice modifications.



Tan Sri Dato' Seri Dr. Noor Hisham bin Abdullah
Director-General of Health, Malaysia

FOREWORD BY HEAD OF PSYCHIATRY & MENTAL HEALTH SERVICES

Electroconvulsive Therapy (ECT) is a sophisticated and ever-evolving procedure unique to psychiatry. Malaysia has been among the countries that are committed in delivering and expanding its ECT service as it is an effective evidence-based modality to treat a wide range of psychiatric disorders. To date, all the states throughout the nation have had their ECT services established, and we foresee that the service will expand further in the near future.

Therefore, the development of the Guideline on Electroconvulsive Therapy is timely to ensure that the use of ECT in Malaysia is standardized to provide the best quality of patient care. Apart from emphasizing proper documentation, the guideline also highlights the need of ECT practitioners to be properly credentialed and privileged in line with the requirement by the National Specialist Register of the Malaysian Medical Council. A national registry on ECT for quality assurance and research can then be implement to monitor the delivery of the services in the country. With research, clinical practice and service delivery of ECT can be improved further as well.

Malaysia practises modified ECT in which anaesthetic team is an integral part of the team to ensure the administration of ECT is safe and successful. By that, collaboration with the anaesthetists in establishing this guideline deserves an applause. It is my utmost hope that this guideline will assist the psychiatrists, anaesthetists, medical officers, assistant medical officers and nurses in handling the ECT procedure in a safer and more effective manner.

Finally, I would like to extend my heartiest appreciation to all the development group team members and committee members for their preparation of the Guideline on Electroconvulsive Therapy. May we continue to seek up-to-date knowledge and practise better innovative techniques for our ECT patients.

Dr. Salina bt Abdul Aziz
Head of Psychiatry & Mental Health Services,
Ministry of Health

FOREWORD BY HEAD OF SERVICE FOR ANAESTHESIA & INTENSIVE CARE

I would like to congratulate the Electroconvulsive Therapy (ECT) Committee and Dr Kenny Ong as the chairman of this committee for coming out with Guideline on ECT which is much needed, excellent and a timely initiative.

This guideline contains the overall information on ECT for better understanding and provide confidence to those providing ECT services. Despite its short procedure, some potential adverse effects may still occur during ECT. It is still a safe and effective treatment modality for certain psychiatric problems. The benefits of ECT outweigh the risks involved in doing the procedure.

Anaesthesia for ECT should be provided by personnel trained in providing general anaesthesia for this procedure and at remote site where appropriate resuscitation equipment and drugs are immediately available. This guideline covers the important aspects in providing a safe anaesthesia technique starting from the pre-procedure assessment to the post-procedure management. Finally, this guideline provides the essential standard of care practice for Electroconvulsive Therapy in the country.

Thank You.

Dr. Melor bin Mohd Yusof
Head of Service for Anaesthesia and Intensive Care
(2018 – August 2021)

INTRODUCTION

Electroconvulsive Therapy or ECT, is a form of physical therapy that delivers electrical charges to the brain in a controlled manner and of relatively brief duration to treat certain psychiatric illnesses. Since the mid-1980s, ECT has been modified with evidence-based innovations in techniques and advances in clinical application, from the induction of procedure with general anaesthesia and muscle relaxants, more precise use of electrode positioning, individualised delivery of stimulus dose, electroencephalographic monitoring of seizure, to the modern ECT machine models with safety features.

The use of ECT has been governed by local legislation and policies to ensure proper administration of the procedure and regulatory monitoring of the service delivery while recognising and protecting the rights of the patients. ECT is therefore safe and effective with minimal adverse effects, rendering it as the first line of treatment for certain conditions rather than treatment of last resort.

The principal three-fold objectives of this guideline are:

i. to standardise the practice of ECT in Malaysia in accordance with the principles of safeguarding high standards of patient care management and ensuring continual provision of high-quality services on ECT. Such administration of ECT requires consistency among the ECT service providers in any ECT sites, to not only prevent patients from being subjected to unnecessary undesirable effects but also to promote optimal therapeutic outcomes for the patients.
ii. to provide proper documentation on ECT procedure, competency assessment and service monitoring. Documents should be standardised in all hospitals to communicate the same information and practice on ECT.
iii. to be operationalised as the framework for training purposes in each local department or hospital for credentialing and privileging and Continuing Professional Development activity.

The sections in this guideline provide an understanding of the fundamental basis in ECT (on what should be known about ECT and its related issues), the practical aspects on its implementation (on what needs to be done before, during and after each ECT treatment), and policies and procedures related to ECT practice (on how to ensure a safe work process and maintain the quality of patient's care). A subsection on management of ECT during COVID-19 pandemic is incorporated as well to address the current ongoing challenges in administrating ECT for patients with COVID-19 infections.

SECTION 1 : BASIS IN ELECTROCONVULSIVE THERAPY

1.1 Indications

Selection of patients for Electroconvulsive Therapy (ECT) is of utmost importance to ensure that the treatment is effective and the risk is kept minimal. Treating practitioners should have a good understanding of the indications for ECT and its potential contraindications before deciding on ECT. Factors to consider when prescribing ECT for the individual patients include:[1, 2]

- Diagnosis
- Severity of symptoms
- Urgency of response needed
- Potential vulnerability to cognitive and physical adverse effects
- Previous good response to ECT
- Co-existing medical conditions
- Concurrent use of medical and/or psychiatric medications

➢ ECT for major psychiatric illnesses:[1, 3, 4]

- Depressive disorder i.e. major depressive disorder
  - with or without psychotic features
  - with melancholic features
  - with peripartum onset
- Bipolar disorder, in
  - manic episode
  - major depressive episode
  - mixed episode
- Psychotic disorders i.e.
  - schizophrenia in acute phase or with treatment-resistant and predominantly disorganized features
  - schizoaffective disorder
  - puerperal psychosis

➢ ECT for other conditions:

- Catatonia
  - A thorough medical and neurological work-up is to be performed prior to initiating ECT to identify any reversible medical conditions.[5]
  - In malignant catatonia, as it is a life-threatening condition, ECT should be administered early.[6]
- Neuroleptic malignant syndrome (NMS)
  - Antipsychotics should be discontinued and autonomic stability is to be achieved before initiating ECT[7,8](refer subsection 1.5.4 on Medically Compromised Group for NMS).
- Repetitive self-injurious behaviour or challenging behaviour in autism[9, 10]
  - ECT has shown a decrease in self-injury, elimination of catatonic symptoms, acquisition or recovery of functional life skills, and return to baseline functioning.
  - Maintenance ECT is often required to sustain improved clinical status.[10]
- Challenging behaviour and mood disorder in intellectual disability[11]
  - Evidence mainly derived from case reports and case series involving those with co-morbid unipolar and bipolar depression.
- Agitation and aggression in patients with dementia[12-14]
  - ECT has shown to decrease agitation, reduce psychotropic polypharmacy and improve global functioning level (refer subsection 1.5.4 on Medically Compromised Group for Dementia or Major Neurocognitive Disorders).
- Parkinson's disease (PD) with motor signs (i.e. tremor, bradykinesia, rigidity) not responding to medications,[15] with refractory psychosis, major depression or catatonic stupor[16]
  - May need to consider adjusting dose of antiparkinsonian agent during ECT course, to prevent possibility of treatment-emergent dyskinesia or psychosis[5](refer subsection 1.5.4 on Medically Compromised Group for PD).

➢ **ECT as first-line treatment**

ECT is prescribed as the first-line treatment (primary use) prior to a trial of psychotropic medication in such situations:[3, 4]

1. Rapid and definitive response is required due to severity of the psychiatric or medical illness especially in cases with high suicidal risk or severe psychomotor retardation with associated problems e.g. poor oral intake
2. Risks of other alternative treatments outweigh risks of ECT
3. Previous good response to ECT in particular treatment-resistant depression
4. Patients who prefer ECT as their choice of treatment

➢ **ECT as second-line treatment**

ECT is prescribed as a second-line treatment (secondary use) in one of the following:[3]

1. Treatment-resistant cases especially depression
2. Cases with severe adverse effects with or intolerant of medications
3. Deterioration of the psychiatric or medical condition and the need for rapid, definitive response e.g. severe or prolonged mania with persistent or life-threatening symptoms

Key Points

- ❖ Patient selection for ECT is necessary to ensure that the treatment is effective with minimal risk involved.
- ❖ ECT should be considered as the first-line treatment, unless otherwise contraindicated, in condition that needs a rapid and definitive clinical response such as those with high suicidal risk or severe psychomotor retardation with poor oral intake.
- ❖ ECT should be considered as a second-line treatment for cases with treatment resistance or treatment intolerance or deteriorating psychiatric or medical illnesses.

1.2 Electrophysiology in ECT

- Phases of ECT-EEG recording include recruitment, polyspike, polyspike with slow-wave complexes, termination and immediate post-ictal[17] (refer Figure 1.2(i) on Phases in a sample of ECT-EEG recording, with explanation in Table 1.2(i) on Phases of ECT-EEG recording with corresponding motor and EEG responses).

- When seizure is adequately induced, the amplitude, morphology and duration of each of these phases may differ inter-individually as well as intra-individually.

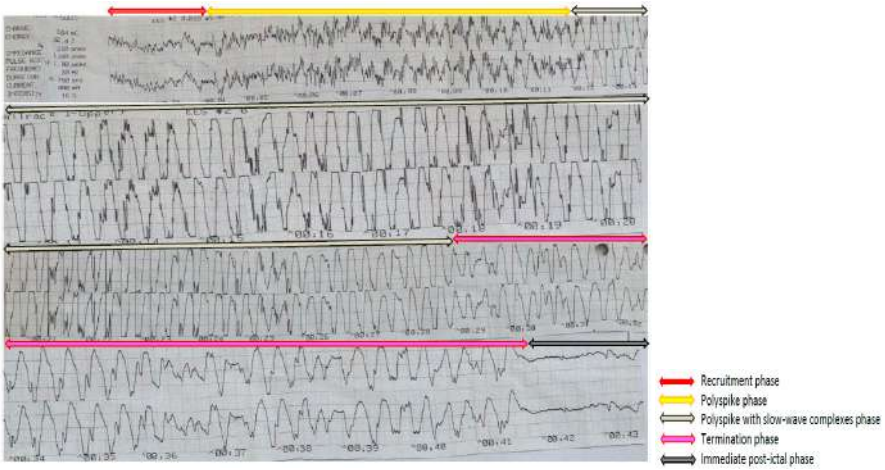


Figure 1.2(i): Phases in a sample of ECT-EEG recording

Table 1.2(i): Phases of ECT-EEG recording with corresponding motor and EEG responses [with reference to Figure 1.2(i)]

ECT-EEG recording phases	Motor response	EEG response
Recruitment	--	Initial low amplitude and fast frequency activity Figure 1.2(i): Recruitment phase is observed up to 0.042s
Polyspike	Tonic muscle contraction	High amplitude, fast frequency spike and polyspike (hypersynchronous) activity Figure 1.2(i): Polyspike waveform from 0.042 to 0.12s
Polyspike with slow-wave complexes	Clonic muscle contraction	High amplitude polyspike and slow-wave complexes Figure 1.2(i): Polyspike with slow-wave complexes from 0.12 to 0.29s
Termination	--	Progressive change in slow-wave amplitude and/or frequency i.e. variable amplitudes become slower and more disorganised Figure 1.2(i): Termination phase from 0.29 to 0.42s
Immediate post-ictal	--	Bioelectric suppression following seizure termination Figure 1.2(i): Seizure terminates around 0.42s with the start of immediate post-ictal silence

1.2.1 Physiological changes during ECT

Physiological changes post-stimulation, mainly involve the cardiovascular response and central nervous system.

i. Cardiovascular response

- Cardiovascular effect is secondary to activation of the autonomic nervous system:
  - A two-phase response is typically identified i.e.
    - an initial brief period of parasympathetic vagal outflow manifested by transient hypotension and bradycardia (rarely, an overly increased vagal stimulation can cause asystole) that corresponds to tonic muscle contraction,
    - followed by a more dominant sympathetic surge with hypertension and tachycardia that corresponds to clonic muscle contraction.[18, 19]
  - Specific timing of the autonomic changes is unclear as variation occurs between individuals.
- Post-seizure:
  - Gradual return to baseline haemodynamic function.
  - A third phase of parasympathetic discharge may occur following termination of seizure.[20]

ii. Central Nervous System

- In ECT, it is postulated that post-stimulation causes the brain autoregulatory mechanism to function ineffectively resulting in an increase in cerebral blood flow with higher rate of oxygen consumption.[21]
- Furthermore, the rapidly increasing systemic blood pressure may have transiently overwhelmed the cerebral autoregulation.[21]

iii. Other physiologic effect

- Transient substantial increase in intraocular pressure post-ECT is well documented in early literatures.[22, 23]

- However, the magnitude was not of clinical concern to most patients except in those with severe ophthalmic diseases e.g. narrow-angled or closed-angle glaucoma[24] (refer subsection 1.5.4 on Medically Compromised Group).

Key Points

- ❖ Generally, when seizure is adequately induced, 5 distinctive phases are recognised on the ECT-EEG recording i.e. recruitment, polyspike, polyspike with slow-wave complexes, termination and immediate post-ictal.
- ❖ Following ECT stimulation, physiological changes involve activation of the autonomic nervous system with cardiovascular response i.e. initial brief parasympathetic phase with hypotension and bradycardia (corresponds to tonic muscle contraction), followed by a more dominant sympathetic surge with hypertension and tachycardia (corresponds to clonic muscle contraction) that gradually return to baseline.
- ❖ Following ECT stimulation, increase in cerebral blood flow with higher rate of oxygen consumption may occur; increase in intraocular pressure was not of clinical concern except for patients with severe ophthalmic diseases.

1.3 Adverse Events

ECT is one of the physical therapies with a low risk for severe complications and is considered one of the safest medical procedures under general anaesthesia.[25] According to a systematic review and meta-analysis, death caused by ECT is extremely rare with a mortality rate during ECT estimated to be 2.1 per 100,000 treatments.[26]

The common adverse effects of ECT include:

1.3.1 During ECT procedure

i. Oral (lips, tongue, gum and dental) injuries

- Injuries occur during the delivery of electrical charges in ECT due to clenching of the jaw from direct stimulation of the muscles of mastication.[27]
- Always insert bite block and ensure it is placed correctly.

ii. Prolonged seizure

- Defined by duration of a seizure i.e. longer than 3 minutes by motor or ictal manifestation[2] or more strictly, longer than 2 minutes based on ECT-EEG recording.[28]
- Prolonged seizure may be associated with pre-stimulus hyperventilation or use of drugs which may reduce seizure threshold (refer Table 2.2(i) on Determinants of Seizure Threshold).[29]
- Should be terminated with intravenous benzodiazepine or propofol.[29, 30]

iii. Cardiovascular effects

- Immediately post-stimulus, due to parasympathetic surge, sinus bradycardia, hypotension and asystole may occur.
  - Bradycardia may be reversed with the release of catecholamines during seizure. Thus, sub-threshold seizure is to be avoided in patients with cardiac disease.
  - Post-stimulus asystole appears to be associated with co-morbid unstable cardiac disease, elderly, hypoxia, sub-threshold seizure and bilateral electrode placement.[1, 31, 32]
- During seizure, due to increase in sympathetic activity, tachycardia, hypertension and arrhythmia may occur e.g. ectopic beats, bigeminy, supraventricular tachycardia and prolonged QTc that are mostly transient with spontaneous resolution.[19]

- Anaesthetic induction agents used during ECT may also affect cardiovascular stability[33] (refer subsection 2.3 on Practical Aspects of Anaesthesia).
- During seizure termination, parasympathetic activity with bradycardia or asystole may recur.[34]
- Immediately post-seizure, heart rate and blood pressure may return to pre-ECT readings and ECG reverts to pre-ECT state in 30 minutes.[35]

1.3.2 Post-ECT procedure

i. Somatic effects

- Post-ECT headache, myalgia, nausea and vomiting are often mild.[36, 37]
  - Post-ECT headache is likely due to contracture of the temporalis and masseter muscles during seizure.
  - Myalgia is related to the use of muscle relaxants and muscle fasciculations during seizure.[38]
  - Nausea and vomiting may occur secondary to headache or due to the adverse effect of anaesthesia.[39]
- Headache and myalgia can be treated with regular analgesics (e.g. acetaminophen).[40]
- Nausea and vomiting can be treated with regular antiemetics (e.g. metoclopramide).

ii. Cognitive effects[25]

- Factors that may increase the risk of cognitive effects in ECT include:
  - application of bilateral electrode placement
  - use of sine-wave stimuli
  - use of stimuli with wider pulse width
  - high electrical charge relative to seizure threshold
  - closely spaced treatment interval
  - increasing number of treatment sessions
  - administration of concomitant drugs e.g. high lithium levels
  - advancing age
  - pre-existing cognitive impairment or neurological disorder e.g. stroke
- Studies were of mixed results on the effect of ECT on non-memory domains of cognitive function e.g. attention, speed of information processing, executive function and general intellect.
- Cognitive effects may include post-ictal disorientation, post-ictal delirium, anterograde and retrograde memory dysfunctions and subjective memory loss.

a. Post-ictal disorientation[25]

- Transient period that occurs immediately post-ictal, from few minutes to few hours and often with amnesia for the period.
- Correlate with retrograde memory impairment i.e. duration is highly correlated with the extent and persistence of retrograde amnesia post-ECT.
- Treatment involves reassurance and avoid cognitive demands.

b. Post-ictal delirium

- Severity and duration of post-ictal delirium may vary depending on the age (i.e. more severe and prolonged in the elderly), prescribed concomitant medication (e.g. sedative antipsychotics, anxiolytics and lithium), type and dosage of anaesthetic agents given during the ECT procedure and presence of prolonged seizure during the ECT procedure.[41]
- Patient may become restless, aggressive or agitated.
- Depending on severity of post-ictal delirium, treatment involves supportive management with reassurance or use of intravenous benzodiazepine or intramuscular antipsychotic drugs.
- EEG monitoring should be resumed to identify any subclinical seizure activity.

c. Anterograde memory dysfunction

- Anterograde memory dysfunction i.e. impairment in new learning such as verbal learning is one the most consistent cognitive side effect.[42]
- Recovery may occur after a variable time ranging from days to months with unlikely long-term effect.

d. Retrograde memory dysfunction[43]

- Retrograde memory i.e. recall of previously learnt information prior to ECT commencement may be impaired in the autobiographical and impersonal memory domains.
- The deficits improve substantially with time, though slower than anterograde memory dysfunction, and may result in residual difficulties with patchy memory traces.

e. Subjective memory loss

- Some patients may continue to complain of subjective memory issues for years after ECT although objective neuropsychological testing shows no evidence of long-term memory problems in retaining new information.[11, 44]
- Reasons postulated for memory loss may include:[45-48]
  - residual symptomatology or co-morbid brain disease
  - medication or substance use
  - sensitization to normal forgetting
  - conversion symptoms or secondary gain
  - deep-rooted negative expectation of ECT
  - neurobiological effect not detected by current neuropsychological testing

iii. Hypomania or mania 'switch'

- A 'switch' from depression to hypomania or mania may occur in patients suffering from bipolar depression.
- Case reports have suggested that ECT may be continued as it has mood stabilising properties.
- Other options include to withhold ECT and observe for spontaneous remission and subsequently continue, or abort ECT and start a mood stabiliser[49] e.g. lamotrigine, sodium valproate or carbamazepine.[25]

Key Points

- ECT is a low-risk procedure for severe complications under general anaesthesia.
- Adverse events during ECT procedure may include in particular oral injuries, prolonged seizure and cardiovascular effects.
- Post-ECT procedure may results in somatic effects (i.e. headache, myalgia, nausea and vomiting), cognitive effects (i.e. post-ictal disorientation, post-ictal delirium, anterograde and retrograde memory dysfunctions as well as subjective memory loss), and hypomania or mania 'switch' in bipolar depression cases.

1.4 Pharmacotherapy in ECT

Research studies in the past few decades have demonstrated the complex interaction between ECT and the concomitant prescription of psychotropics, non-psychotropics and anaesthetic agents. A large proportion of these studies is based only on theoretical considerations and most of the evidences are derived from case reports or case series. The administration of these concurrent medication may potentially confound the effects of drug-drug interactions or effects on ECT. Therefore, clinicians' clinical judgement is required and essential in managing ECT cases in particular those with complex pharmacotherapy.

Medication should be reviewed before commencing ECT, during the ECT course and post-ECT recovery period. Cautions should be considered on the effects of medications on seizure threshold (ST), seizure duration (SD) and therapeutic effectiveness of ECT, neurophysiological effects of ECT especially cardiovascular risks and post-ECT cognitive sequelae.

1.4.1 Concomitant use of psychotropics

Table 1.4(i) summarises the concomitant use of psychotropics in ECT and effects on ECT, potential interaction with anaesthetic drugs and recommendations.

Table 1.4(i): Concomitant use of psychotropics, effects on ECT, interaction with anaesthetic drugs and recommendations

Concomitant Psychotropics	Effects on ECT	Interaction with anaesthetic drugs	Additional information	Recommendations
Antidepressant				
Selective serotonin reuptake inhibitor (SSRI)	May increase ST theoretically.[50] No [51, 52] or minimal effect on SD.[53, 54]	Sertraline may reduce metabolism of propofol.[55]	Serotonin syndrome has been reported when SSRI combined with ECT.[56, 57]	Generally safe with ECT.[58]
Tricyclic antidepressant (TCA)	Reduced ST with higher dose of TCA.[59, 60] May increase SD.[53]	Amitriptyline can decrease the metabolism of propofol.[55] Propofol may decrease the metabolism of clomipramine.[61] Propofol may increase the CNS depressant effect of imipramine.[62] Exaggerated response to indirect sympathomimetic drugs e.g. ephedrine may cause hypertensive crises.[63]	TCAs do not increase risk of prolonged post-ECT confusion despite having high anti-cholinergic effects.[64]	Generally safe with ECT at recommended therapeutic dose with potential better clinical efficacy.[52, 65]
Venlafaxine	No [51] or minimal effect [53, 66] on ST and SD at standard dose.	N/A	May cause serotonin syndrome [11] and other cardiovascular adverse effects e.g. ventricular tachycardia especially in combination with both lithium and ECT.[11]	If indicated, keep dose <300mg/day or possibly <200mg/day to reduce risk of potential cardiovascular adverse effects.[11, 67, 68]

Duloxetine	N/A	Minor risk of orthostatic hypotension and syncope if combined with propofol.[69]	Weak association between duloxetine and ventricular tachycardia when combined with lithium during ECT.[70]	No recommendation
Mirtazapine	May minimally increase SD.[65]	Propofol may increase mirtazapine's CNS depressant effect.[71]	N/A	Use can be continued as it may enhance the therapeutic effect of ECT.[72]
Agomelatine	No study on its effect on ST or SD.	May potentiate the CNS depressant effect of inhalational or intravenous anaesthetic drugs (as well as benzodiazepines).[73]	Not known to be pro-convulsive in patient with epilepsy.[53]	No recommendation
Monoamine oxidase inhibitor (MAOI) e.g. Moclobemide	No study on its effect on ST or SD.	Combined use with propofol and etomidate is safe during ECT.[50] Although Moclobemide, a reversible inhibitor of monoamine oxidase A (RIMA), has lesser interaction with anaesthetic drugs (e.g. ephedrine) to cause hypertensive crisis, [73] its occurrence is still possible. Combined use with pethidine may cause serotonin syndrome.[73]	Not known to be pro-convulsive in patients with epilepsy.[74]	Recommend to stop MAOI 24 hours before anaesthesia if it is not effective.[50, 73] MAOI may be continued if it is effective. Switching to Moclobemide may be considered if interaction between MAOI and anaesthesia is a concern.[50]
Antipsychotic				
Antipsychotic	Chlorpromazine and clozapine may increase SD; others, no obvious effect.[53]	Combined use of clozapine/olanzapine/ quetiapine and propofol may increase the CNS depressant effect.[62]	No significant increase in QTc when combined with ECT.[11]	Continue use with ECT as combination may produce synergistic therapeutic effects.[77]

		Minor risk of hypotension with risperidone-propofol combination.[75]	Clozapine is not associated with post-ECT cognitive impairment e.g. delirium.[64, 76]	
Benzodiazepine				
Benzodiazepine (BDZ)	BDZ may theoretically increase ST but the evidence is not robust.[50, 53] Decrease SD.[78, 79] May affect the efficacy of unilateral ECT [80, 81] but not bilateral ECT.[78, 82, 83]	Synergistic interaction between midazolam and propofol.[84]	May increase cognitive side effects when combined with ECT.[50]	BDZ should be avoided or used at reduced doses during ECT.[53] If BDZ use could not be discontinued or unavoidable, may consider:[50, 53, 85] • Convert to BDZ with shorter half-life e.g. lorazepam • Use higher stimulus dose or bilateral ECT • Use flumazenil to temporarily reverse its effect before ECT • Use of substitutes e.g. zolpidem
Mood Stabiliser				
Lithium	No effect on SD.[11]	Higher serum lithium level is associated with longer duration of post-ECT recovery due to the synergistic reaction with succinylcholine.[86, 87]	Risks of post-ECT confusion, delirium[88] and serotonin syndrome[89, 90] especially in elderly.	If no clear indication of lithium use, to discontinue at least 48 hours before ECT; longer washout period is required for high or toxic lithium level.[53, 91] Recommend to maintain lithium level at lower therapeutic end and ensure hydration prior to and during ECT.[11, 86]
Others	May increase ST.[50, 92, 93]	Interaction between propofol and valproate may delay recovery.[97, 98]	Use of mood stabiliser as an anticonvulsant in epilepsy cases should be continued as	Discontinue if possible before the start of an acute ECT course. Alternatively, halve the

	May reduce SD especially in unilateral ECT but not bilateral ECT.[94] However, lamotrigine was not shown to reduce SD.[95, 96]	CBZ may prolong effect of succinylcholine.[99, 100]	risk of unmodified seizures may outweigh risk of higher stimulus doses. As higher stimulus doses may be needed, increased rates of confusion are possible. Consultation with the neurologist or physician is required prior to ECT initiation (refer subsection 1.5.4 on Medically Compromised Group for Epilepsy). No significant adverse effect if ECT combined with lamotrigine,[95, 96] gabapentin[99, 100] or topiramate.[101]	dose and then withdraw over a 1-week period prior to ECT. Recommence at the end of ECT course.[2]
Other Psychotropics				
Acetyl-cholinesterase inhibitor for dementia e.g. donepezil & rivastigmine	Theoretically may decrease ST and increase SD due to its cholinomimetic effect[102] but no documented evidence.	Theoretical complex interaction with muscle relaxant e.g. succinylcholine may result in prolonged apnoea, muscle paralysis and cardiac arrhythmia.[103, 104] However, no concrete evidence.	N/A	Safe to continue use in ECT.[105]
Psycho-stimulant: Methylphenidate	No[51] effect on ECT-induced seizure though theoretically may potentiate seizure activity.[100]	N/A	N/A	No recommendation[50]

Abbreviations: ECT, Electroconvulsive Therapy; ST, seizure threshold; SD, seizure duration; SSRI, Selective serotonin reuptake inhibitor; TCA, tricyclic antidepressant; MAOI, Monoamine oxidase inhibitor; BDZ, benzodiazepine; CBZ, carbamazepine; CNS, central nervous system; N/A, not available.

1.4.2 Concomitant use of non-psychotropics

Generally, non-psychotropics that are necessary to optimise medical conditions should be given before ECT as these medications may have a protective effect to the physiological changes induced by ECT. However, caution should be taken on any potential negative effects. Table 1.4(ii) summarises the concomitant use of non-psychotropics in ECT, effects on ECT, effects of ECT on medical conditions and recommendations.

Table 1.4(ii): Concomitant use of non-psychotropics, effects on ECT, effects of ECT on medical conditions and recommendations

Concomitant non-psychotropics	Effects on ECT	Effects of ECT on medical conditions	Additional information	Recommendations
Antihypertensive	Beta blocker and calcium channel antagonist may increase ST (very weak evidence).[106] Esmolol may reduce SD.[107]	ECT may increase risk of hypertension during sympathetic phase if routine dose of anti-hypertensive is not served.[85]	Risk of urinary incontinence during ECT and electrolytes imbalance (e.g. Mg^{2+} and K^{+}) especially those on long-term treatment of diuretics.[108] Concurrent use of beta blocker may be associated with post-stimulus asystole (weak evidence).[32]	Administer antihypertensive (except diuretic) 2 hours prior to ECT with sips of water.[50] Administer diuretic post-ECT.[85, 108]
Theophylline	Reduce ST.[109] Increase SD[110-112] with risk of status epilepticus.[111]	Patients with COPD or asthma are susceptible to hypoxia due to acute exacerbation from bronchial spasm during parasympathetic phase of ECT.[113]	Risk of asthmatic exacerbation post-ECT if discontinued.[85]	If possible, taper off and substitute with another bronchodilator.[50, 108, 114] Alternatively, administer theophylline at lowest effective dose.[50] Consultation with respiratory physician is required prior to ECT initiation (refer subsection 1.5.4 on Medically Compromised Group for Chronic obstructive pulmonary disease (COPD) and Asthma).
Anti-gastric medication	N/A	ECT may worsen GERD via vagal nerve stimulation[115] and potential aspiration.[85]	N/A	Antacids or PPI can be safely administered pre-ECT.[108, 115]

Anti-diabetic agent	N/A	ECT may cause hyperglycaemia in diabetic patients but insignificant to result in hyperglycaemic crises.[116]	Risk of hypoglycaemia as patient fasted from the night before ECT.	Perform pre- and post-ECT glucose monitoring.[50, 117] Withhold OHA the morning before ECT as patient fasted from the night before ECT.[108] For insulin dependent diabetic patients, ECT should be done early in the morning;[117] consider to delay the usual morning insulin till after ECT and before breakfast.
Warfarin	N/A	ECT does not increase risk of intracranial haemorrhage; safe for patients on long-term warfarin.[108, 118]	N/A	Continue if no contraindication and maintain INR $\leq$ 3.5.[114, 118] Decision to withhold on case-by-case basis[108] thus consultation with physician is required prior to ECT initiation.
Anti-glaucoma	N/A	ECT does not worsen glaucoma[109] though theoretically ECT may increase intraocular pressure.	Caution is required on the use of long-acting anti-cholinesterase drops e.g. echothiophate due to risk of prolonged succinylcholine-induced apnoea from irreversible cholinesterase inhibition.[119]	Although cases reported successful use of ECT,[120, 121] it is recommended to administer anti-glaucoma drops prior to each ECT session.[109] Consultation with ophthalmologist is required prior to ECT initiation (refer subsection 1.5.4 on Medically Compromised Group for Glaucoma).

Abbreviations: ECT, Electroconvulsive Therapy; ST, seizure threshold; SD, seizure duration; COPD, Chronic obstructive pulmonary disease; GERD, Gastroesophageal reflux disease; PPI, proton pump inhibitor; OHA, oral hypoglycaemic agent; INR, international normalised ratio; N/A, not available.

Key Points

- Most of the studies on ECT and concomitant use of medications are based on theoretical ground and evidence are largely derived from case studies or case reports.
- SSRI and TCA are generally safe to be used throughout the course of ECT.
- Synergistic therapeutic effects are observed with ECT-antipsychotic combination.
- Benzodiazepine and mood stabiliser potentially reduce the seizure duration.
- Benzodiazepine should be avoided or used at reduced doses during ECT.
- Lithium combined with ECT may increase risks of confusion and delirium especially in elderly; recommend to maintain lithium level at lower therapeutic end and ensure hydration prior to and during ECT.
- For other mood stabilisers, discontinue if possible before the start of an acute ECT course; alternatively, halve the dose and then withdraw over a 1-week period prior to ECT; recommence at the end of ECT course.
- Evidence on the effects of acetylcholinesterase inhibitor or methylphenidate on ECT is scarce.
- Generally, antihypertensive (except diuretic) and anti-gastric medication can be given pre-ECT; theophylline and oral hypoglycaemic agents are to be withheld pre-ECT, and to continue warfarin if no contraindication.

1.5 Special Populations

Special populations to be considered for ECT include the children and adolescents, the pregnant women, the elderly and the medically compromised group.

1.5.1 Children and Adolescents

Recent studies have demonstrated that ECT is effective in managing mood disorders and psychotic disorders in children and adolescents[122] with few and relatively benign adverse effects.[123] A systematic review showed no absolute contraindication for ECT and fears regarding cognitive dysfunction have not been reproduced in studies on this group of population.[124]

Eligibility for ECT should meet these 3 criteria:

a. Diagnosis: Severe persistent major depression, mania with or without psychotic features, schizoaffective disorder, schizophrenia and those with suicidal risk. ECT can be considered for the treatment of catatonia,[125] neuroleptic malignant syndrome[126] and autism spectrum disorder with repetitive self-injurious behaviour.[127]

b. Severity of symptoms: Symptoms must be severe, persistent and significantly disabling including life threatening symptoms e.g. refusal to eat or drink, severe suicidality, uncontrollable mania and florid psychosis.[126]

c. Lack of treatment response: Failure to respond to at least 2 adequate trials of psychotropics along with other appropriate treatment modalities. ECT may be considered to be administered earlier if (i) adequate psychotropics trial is not possible, (ii) gross incapacitation which unable the adolescent to take medications or (iii) waiting for the medication response may endanger the life of the adolescent.[126]

<u>Pre-ECT preparation</u>[128]

1. Second independent evaluation by a non-treating psychiatrist is needed to ensure that ECT is the best option for the patient.
2. When ECT is considered, discussion and education must be done with the parents or guardian by the psychiatrist in-charge (and the treating paediatrician) with the presence of the patient (for adolescent).
3. Written informed consent optimally to be obtained from both parents or guardian; in a situation when only one parent is available to provide written consent, the other parent should provide at least a verbal consent and these must be documented properly.
4. Pre-ECT assessment should be done thoroughly, which includes a full psychiatric evaluation, use of target symptoms rating scale and a full physical examination.

5. Before ECT is initiated, a baseline cognitive assessment must be performed (which is then repeated at treatment termination, and between 3 and 6 months post-ECT).
6. Pregnancy test must be conducted for all female patients.
7. Unilateral ECT should be considered first, unless the illness severity is indicative for bilateral ECT.

During ECT procedure

1. ECT should be administered with the lowest stimulus dose and up-titrated according to the patient's response.
2. Close monitoring of the vital signs, airway patency and seizure duration should always be performed during the ECT procedure.

Post-ECT recovery

1. Post-ECT procedures are to be followed the same as in adults.
2. Immediately after the treatment, patient should be properly monitored in the recovery area.
3. Post-ECT adverse events should always be monitored for:
    a. tardive seizures (or late-onset seizures that may occur after the treatment session or full recovery from anaesthesia for 24 to 48 hours)
    b. post-ictal confusion or agitation, or signs of cerebral hypoxia and cardiovascular complication due to inadequate oxygenation from a prolonged seizure
    c. headache, nausea, vomiting and muscle aches
    d. impairment of memory and new learning
4. In the event of emergence of any ECT-related adverse effects, subsequent ECT sessions should be resumed only after assessment of treatment risks and benefits.
5. After a successful ECT course, the patient should be put on an appropriate therapeutic regime, tailored to the presenting illness in order to maintain treatment response.

Key Points

- ECT is effective in managing mood disorders and psychotic disorders in children and adolescents with few and relatively benign adverse effects.
- Pre-ECT preparation after evaluation by a non-treating psychiatrist includes to obtain written informed consent from both parents or guardian after discussion and education on ECT by the psychiatrist in-charge (and the treating paediatrician) with the presence of the patient (for adolescent), and to perform a full psychiatric assessment with the use of target symptoms rating scale, a baseline cognitive assessment and a full physical examination as well as pregnancy test for all female patients.
- During ECT procedure, administer unilateral ECT with the lowest stimulus dose.
- Post-ECT procedures are to be followed the same as in adults.

1.5.2 Pregnant Women

Psychiatric disorders accounted for about 15 to 29% of pregnant women that if left untreated may cause detrimental health consequences to the mother and fetus.[129] ECT is considered to be highly effective and safe in treating pregnant women with depressive disorders or bipolar disorder in a mixed, depressive or manic phase.[130-132]

Pre-ECT preparation

1. ECT should be administered in a hospital with obstetrics services to manage any potential obstetrics emergencies.
2. Obstetric consultation and external fetal heart monitoring are highly recommended prior to commencing ECT.
3. If the patient is at high risk of preterm labor or other complications, ECT treatment sessions should be conducted in a labor operating theatre or labor room with anaesthetic administration facilities.[133]
4. Adequate hydration such as with normal saline may be necessary 12 hours prior to the procedure to reduce the risk of reduced placental perfusion, preterm labor or premature contraction.[129, 134]
5. Gastric acidic content can be reduced by giving antacids such as sodium citrate 15 to 20 minutes prior to administering general anaesthesia.[129]

During ECT procedure

1. The obstetric team should be present in the treatment area to monitor for any possible complications.
2. Maternal heart rate, blood pressure, electrocardiogram (ECG) and pulse oximetry measurement (SpO_2) should be monitored throughout the procedure.[129]
3. External fetal heart monitoring with at least a fetoscope is needed prior to the administration of general anaesthesia, after general anaesthesia induction (before the delivery of electrical charge) and after complete resolution of ictal activity is shown on the ECT-EEG recording.
4. For a patient in third trimester, the right hip should be elevated to prevent aorto-caval compression by the gravid uterus, and airway protected with an endotracheal tube to prevent aspiration pneumonitis during general anaesthesia.[135]
5. If fetal heart rate decreases, consider elevating the hip further or increasing oxygen level.[129]
6. Avoid excessive hyperventilation prior to ECT to prevent respiratory alkalosis which may lead to fetal hypoxia.
7. Stimulation of uterine contraction and induction of labor may occur as a result of oxytocin release due to ECT-induced seizure.[134]
8. Prolonged seizure duration may cause fetal hypoxia. Thus, any seizure duration longer than 120 seconds should be aborted.[136, 137]
9. The type of anaesthetic agents to be used during ECT is determined by the anaesthetist in-charge based on clinical judgement and preferences.
10. Other effects which may occur during ECT include fetal arrhythmia, abdominal pain, vaginal bleeding, placental abruption and threatened abortion though the evidence for these is lacking to establish a definite cause-and-effect relationship.[135, 138]

Post-ECT recovery

1. Patient should be re-examined by the obstetric team immediately post-ECT for any maternal and fetal complications e.g. preterm uterine contractions, vaginal bleeding, nausea, vomiting and headache, or fetal bradycardia. Any complications should be resolved prior to continuing with subsequent ECT session.
2. Monitor for signs and symptoms of aspiration pneumonia post-ECT.

Key Points

- ECT is highly effective and safe in treating pregnant women with depressive disorders or bipolar disorder in a mixed, depressive or manic phase.
- ECT should be administered in a hospital with obstetrics services to manage any potential obstetrics emergencies; obstetric consultation and external fetal heart monitoring are highly recommended prior to ECT, and the obstetric team should be present in the treatment area to monitor for any possible complications.
- Pre-ECT hydration for 12 hours may be required with administration of antacids 15 to 20 minutes prior to general anaesthesia.
- During ECT procedure, external fetal heart monitoring is needed; for a patient in third trimester, the right hip should be elevated to prevent aorto-caval compression and airway protected with an endotracheal tube; avoid excessive hyperventilation and prolonged seizure.
- Immediately post-ECT, obstetric team should re-examine patient for maternal and fetal complications.

1.5.3 Elderly

Most of the literature on ECT in elderly focused on depressive disorder:

- Depressed patients over 60 years old who had ECT achieved more rapid remission rate than the group receiving medication solely.[139]
- Elderly when compared to young patients, demonstrated superior efficacy of ECT on rapidity of response and remission rates.[105, 140]

There are limited research studies that reported the efficacy of ECT in elderly with bipolar disorder,[141, 142] catatonic schizophrenia,[143] affective symptoms or agitation in major neurocognitive disorders[14, 144, 145] and agitation in neurodegenerative disorders such as multisystem atrophy.[146]

Early ECT intervention should be considered for the elderly even those advanced in age, after weighing the risks and benefits of ECT when compared to pharmacotherapy alone.[11]

Pre-ECT preparation

1. Review is required on the patient's co-existing medical or neurocognitive disorder and concurrent medication e.g. those with anticholinergic property such as benzhexol that may precipitate or worsen the cognitive side effect.[147]
2. Perform physical examination, cognitive assessment, relevant blood investigations (at least Full Blood Count and Renal Profile), ECG and chest X-ray.
3. Medical consultation may be required for stabilization of medical illness.
4. Unilateral ECT is preferred over bilateral ECT as it confers less cognitive adverse effect though may be of less efficacy.[148]

During ECT procedure

1. Close monitoring of vital signs and ECG as elderly patient is at higher risk of arrhythmia, tachycardia, bradycardia, hypertension, hypotension and stroke.
2. Sympathetic surge during seizure causes an increase in myocardial oxygen consumption and higher risk of myocardial infarction. If myocardial infarction is suspected, serum troponin level which is unlikely influenced by seizure is to be measured rather than creatine kinase (CK).[149]

Post-ECT recovery

1. Elderly patient is vulnerable to cognitive adverse effects i.e. confusion, delirium and amnesia post-ECT procedure though the effects are transient or reversible in both non-demented[148, 150] and demented elderly population.[151]
2. Risk of fall is directly proportionate to the number of ECT sessions and those with Parkinson's disease.[152] As the fall itself is associated with higher morbidity and mortality,[153, 154] risk of fall should be assessed properly post-ECT.

Key Points

- Early ECT intervention should be considered for the elderly even those advanced in age, after weighing the risks and benefits of ECT.
- The most robust evidence focused on efficacy of ECT in depression in elderly.
- Pre-ECT review on co-existing medical or neurocognitive disorder and concurrent medication is required with physical examination, cognitive assessment, ECG, chest X-ray, blood investigation and medical consultation if indicated.
- During ECT procedure, administer unilateral ECT as it confers less cognitive adverse effect, with close monitoring of vital signs and ECG in view of higher risk of cardiovascular instability.
- Post-ECT, cognitive adverse effects and risk of fall should be assessed properly.

1.5.4 Medically Compromised Group

ECT is often necessary to treat severe psychiatric disorders in patients with medical co-morbidities. However, before administering ECT to these patients, factors that may need to be considered include whether ECT is therapeutic for such patients, whether ECT may cause the medical condition to worsen or any significant side effects, and whether any modification of ECT technique is required to reduce the risk of adverse clinical outcomes. Although the available published data consists mostly of case reports and case series, appropriate precautionary measures and monitoring during and after ECT can be adopted. A consultation with other disciplines is often required before a final decision is made on administering ECT.

i. Cardiovascular diseases
Generally, patients with cardiovascular diseases are at higher risk of arrhythmia, myocardial infarction, myocardial rupture and cerebral aneurysm rupture due to sympathetic and parasympathetic activation during the ECT session.[11, 109, 155]

Hypertension	• Sympathetic surge during the ECT session may often cause transient increase in blood pressure and rarely may require intervention with parenteral antihypertensive agent.[156] • Thus, to avoid hypertensive crises during ECT, it is necessary to ensure an optimal blood pressure control prior to ECT.[109]
Arrhythmia	• Cases reported incidences of supraventricular tachycardia,[157] atrial fibrillation,[158] asystole,[31, 159] bradycardia[159] and tachycardia.[18] • Post-stimulus asystole appears to be associated with co-morbid unstable cardiac disease, hypoxia, elderly, sub-threshold seizure and bilateral electrode placement.[1, 31, 32] • However, asystole and bradycardia are transient and rare, and mostly not requiring intervention and premedication. • Recommendation for intervention were exclusive to those with previous episode of asystole during ECT,[32] by administering intravenous atropine or glycopyrrolate prior to ECT and use of unilateral electrode placement.[1]
Myocardial infarction (MI)	• The American College of Cardiology (ACC) / American Heart Association (AHA) guidelines recommended that a non-cardiac surgical procedure (including ECT) is reasonable to be performed after 60 days of MI.[11, 160] • Routine pre-ECT investigation to determine area of MI is of no benefit and not recommended, despite larger area of previous MI may have higher association with perioperative MI.[160] • A multidisciplinary approach by the psychiatrist, cardiologist and anaesthetist should be conducted to weigh the risks and benefits of whether to proceed with an urgent ECT.
Cerebral aneurysm rupture	• Although cerebral aneurysm may theoretically rupture during ECT due to sympathetic surge,[109] evidence is non-robust[161] and it is recommended as a precaution to attain optimal control of pre-ECT blood pressure.[11, 109] • However, a multidisciplinary approach by the psychiatrist, neurosurgeon and anaesthetist is required to determine the risks and benefits.

Cardiac implantable electronic device (CIED)	• CIED includes cardiac pacemaker and automatic implantable cardioverter defibrillator (AICD).
	• Consultation with the cardiologist on CIED is required prior to ECT[162] as all cardiac implants should undergo a comprehensive interrogation before the procedure i.e.
	  ○ in pacemaker-dependent patients, CIED may require programming to asynchronous activity to avoid myopotential inhibition of the device,
	  ○ AICD functions should be disabled during ECT procedure; however, ventricular arrhythmias can occur secondary to the hemodynamic effects of ECT, and
	  ○ CIED-dependent patients may require a temporary pacing system to preserve cardiac rate and rhythm during ECT.

ii. Neurological disorders	
ECT may treat or reduce the neuropsychiatric manifestations that present as part of the neurological disorder. Neurological disorders may also exacerbate or cause a relapse of a pre-existing psychiatric disorder.	
Stroke	• Sympathetic and parasympathetic surge during the ECT session theoretically increase the risk of stroke even in those without prior history of stroke.[11]

	• Studies demonstrated effectiveness of ECT for post-stroke depression[163, 164] and less robust in other psychiatric symptoms post-stroke. • Although full resolution of an acute stroke may take up to 3 months, no major risk of re-infarction or re-bleeding for ECT cases administered after 4 weeks post-stroke either ischemic or haemorrhagic stroke.[11, 109]
Intracranial space-occupying lesion	• Earlier cases reported that intracranial space-occupying lesion with pre-existing increased intracranial pressure was considered an absolute contraindication due to the theoretical risk of coning during ECT.[165] • However, recent reports support the safe administration of ECT in cases with a small size, slow-growing intracranial tumour or cyst without mass effect or perilesional oedema.[130, 165] • The use of steroid, antihypertensive, diuretic or hyperventilation prior to ECT may reduce the risk of coning.[166] • A multidisciplinary approach by the psychiatrist, neurosurgeon and anaesthetist is required to determine the risks and benefits.
Parkinson's disease (PD)	• ECT was effective as an adjunct for depression, motor symptoms and psychosis in PD patients.[11, 167] • However, adverse effects may include deteriorating cognition, transient confusion or delirium[168] and tardive dyskinesia due to postulated ECT effect on increased dopaminergic activity in the nigrostriatal pathway, that indirectly reduced the acetylcholine activity. • May need to consider adjusting dose of antiparkinsonian agent during ECT course, to prevent possibility of treatment-emergent dyskinesia or psychosis.[5] • Consultation with neurologist or physician is required pre-ECT. • Right unilateral ECT is recommended to minimize the risk of delirium and cognitive impairment.[168]
Dementia (Major Neurocognitive Disorders)	• ECT is administered to treat major depression (with significant remission post-ECT)[151] or psychosis in patients with dementia[11] as well as behavioural disturbance or agitation in severe, treatment-refractory dementia cases.[12] • ECT may reduce psychotropic polypharmacy and improve global functioning level.[12-14] • Adverse effects may include post-ECT agitation and mild confusion, and transient delirium, though no robust evidence on long-term cognitive risk.[151] • Recommend to use unilateral ECT to minimize the risk of delirium and cognitive impairment.[109]
Epilepsy	• ECT increases seizure threshold and may thus improve epilepsy control and reduce antiepileptic doses.[109] • Case reports demonstrated success of ECT use in epilepsy patients with depressive disorder[169] and psychotic disorder[170] and those with treatment-resistant epilepsy.[171] • Consultation with the neurologist or physician is required if antiepileptic drug adjustment is needed in epilepsy patients.[109]
Multiple sclerosis (MS)	• ECT is indicated for depression, mania, psychosis and catatonia associated with MS.[11, 172] • Data on ECT effect in cases of active MS with neurological deterioration was inadequate and inconclusive.[173] • However, it is recommended to avoid succinylcholine due to risk of exaggerated hyperkalaemic response that may result in cardiac arrest. Rocuronium (with sugammadex) can be used as the alternative muscle relaxant.[174]

iii. Metabolic / Endocrine disorders	
Possible devastating complications during ECT may occur in cases with endocrine disorders. Therefore, it is mandatory to identify and treat the underlying endocrine disorders prior to commencement of ECT.	
Electrolyte imbalance	● Hyperkalaemia ○ Hyperkalaemia can cause cardiac arrhythmia e.g. ventricular tachycardia, which can be accentuated further by the sympathetic surge during ECT.[109] ○ Succinylcholine can cause transient hyperkalaemia but clinically insignificant to cause side effects unless in a pre-existing hyperkalaemia state.[175] ● Hypokalaemia ○ Hypokalaemia can cause cardiac arrhythmia, paralysis and apnoea which may further accentuate during the parasympathetic outflow.[109] ● Hyponatremia ○ May be due to Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH) secondary to antipsychotics or water intoxication[109] resulting in reduced seizure threshold, prolonged seizure and post-ECT delirium.[176] ● Hypernatremia ○ Patients with catatonia and severe depression commonly present with dehydration and are likely to develop hypernatremia as a direct consequence of fluid depletion. Both dehydration and hypernatremia need to be corrected prior to ECT[109] due to effect of increased seizure threshold.[177]
Hyperthyroidism	● Theoretically, ECT may trigger thyroid storm in untreated hyperthyroidism.[166] ● However, literature is very scarce with no recent study likely because cases with substantial hyperthyroid state were excluded from any ECT procedure.
Diabetes mellitus	● ECT may cause hyperglycaemia in diabetic patients but insignificant to result in hyperglycaemic crises.[116] ● Ensuring an optimal glycaemic control prior to ECT is crucial to prevent hyperglycaemic crises.
Addison's disease	● Patients with Addison's disease are at risk of Addisonian crisis with ECT. ● Although scanty case reports did not document any Addisonian crisis, prophylaxis hydrocortisone was administered prior to each ECT session (consultation with the endocrinologist or physician is required).[178, 179]
iv. Renal diseases	
Pre-ECT tests on renal function may detect any abnormality and necessary correction is then made prior to administering ECT.	
Renal dialysis	● Evidence is scarce with limited case reports. However, ECT may be a challenge as:[180] ○ Fluctuating volume loads and metabolic acidosis may increase risk of cardiovascular events ○ Hypertension may lead to hypertensive crises during ECT sympathetic surge (thus, recommend to ensure optimal hypertensive control prior to ECT)

	○ Hyperparathyroidism with osteodystrophy may increase risk of fracture (modified ECT with adequate administration of muscle relaxant may reduce the risk of fracture) ○ Hyperkalaemia may occur and cause cardiac arrhythmia ● Generally, ECT is recommended on the day after haemodialysis to reduce risk of hyperkalaemic complications (consultation with the nephrologist or physician is required).[109]
v. Pulmonary diseases	
Consultation with the respiratory physician is required for stabilization of the underlying respiratory disorders prior to commencement of ECT. For patients who smoke, smoking should be ceased at least 24 hours prior to ECT. Nicotine replacement therapy may be offered if the service is available.[166]	
Chronic obstructive pulmonary disease (COPD) and Asthma	● As bronchial spasm may occur in response to parasympathetic outflow during ECT, these patients with either COPD or asthma are susceptible to hypoxia due to acute exacerbation.[113] ● Risk can be reduced by optimising the pre-existing COPD and asthma condition with bronchodilators and adequate pre-oxygenation prior to each ECT session.[109] ● Theophylline use can increase seizure duration with risk of status epilepticus. Thus, it is recommended to reduce the dose to lowest effective dose or taper off and change to another bronchodilator if ECT is commenced (consultation with the respiratory physician is required).[50, 109]
Obstructive Sleep Apnoea (OSA)	● No evidence of direct effect of ECT on OSA and vice versa.[181] ● However, patients with OSA shall be referred to and properly assessed by the anaesthetist prior to ECT due to possible adverse anaesthetic issues e.g. collapsed upper airway, diminished lung reserve and difficult intubation.[181]
vi. Ophthalmic disorders	
Consultation with the ophthalmologist is required prior to commencement of ECT.	
Glaucoma	● ECT may further increase intraocular pressure in glaucoma cases via parasympathetic outflow from ECT and administration of succinylcholine.[109, 166] ● Although cases reported successful use of ECT,[120, 121] it is recommended to administer anti-glaucoma drops prior to each ECT session.[109] ● However, caution is required on the use of long-acting anticholinesterase drops e.g. echothiophate due to risk of prolonged succinylcholine-induced apnoea from irreversible cholinesterase inhibition.[119]
vii. Implants	
The placement of stimulus electrodes may need to be adjusted to safely administer ECT in patients with implants.	
Deep brain stimulation (DBS)	● Cases of DBS-implanted patients treated with ECT showed no damage to the DBS devices nor any neurological damage[182] despite concerns of theoretical risks of DBS generator damage, inappropriate triggering of the device, neuronal damage due to device overheating and seizure-induced electrode displacement during ECT.[183, 184]

	• Apart from deactivating the DBS stimulator, it is also advisable to place the stimulus electrodes as farthest as possible from the DBS device and the scalp defect resulted from the insertion of DBS.[182] • Consultation with the neuropsychiatrist and neurologist is required.
Cochlear implant (CI)	• Scarce cases reported no damage to the CI during ECT.[185-187] • Apart from deactivating the CI device, it is also advisable to place the stimulus electrodes as farthest as possible from the CI device. • Consultation with the otologist is required.
Skull defect with or without metal implant	• As metal is a good electrical conductor, there is a theoretical concern that it may alter the strength and focality of current and subsequent seizure.[109] • The metal implant may be surgically implanted, or non-surgically implanted e.g. *susuk* or charm needles and gunshot metallic particles. • Cases reported benefit from ECT,[188, 189] with the electrodes placed at equidistant or farthest site from the metal implant or skull defect to reduce risk of damage.[190] A CT brain may be necessary to map the implant or defect location.[109]
viii. Others	
Neuroleptic Malignant Syndrome (NMS)	• NMS is an uncommon life-threatening condition associated with dopamine disequilibrium due to administration of drugs with dopamine antagonist property, rapid dose adjustment of either dopamine antagonists or dopaminergic drugs, and abrupt cessation of dopaminergic or anticholinergic drugs.[53] • Although ECT may be therapeutic for NMS, theoretical risk of developing malignant hyperthermia (MH) may occur based on possible common pathophysiology. • Recommend to avoid use of anaesthetic agents that may trigger MH i.e. succinylcholine and halogenated volatile anaesthesia.[191] • Antipsychotic should be discontinued and autonomic stability is to be achieved before initiating ECT.[7,8]
Morbid obesity	• Although ECT can be successfully administered in obese population,[192] anaesthetic risks e.g. complicated airway and gastric acid aspiration[193] warrant proper pre-ECT anaesthetic assessment to identify those at risk so that preventive measures can be undertaken to minimize any potential risk. • Recommend to increase functional residual capacity and oxygen reserve to prevent life-threatening desaturation during induction, and provide gastric acid prophylaxis with safe anaesthetic technique to minimise risk of aspiration.[194]

Key Points

- For cases with medical co-morbidities, ECT is often necessary after considering its therapeutic effectiveness, effects on the medical condition, emergence of any possible side effects and any ECT technique modification required to reduce the risk of adverse clinical outcomes.
- A consultation with other disciplines is often required before a final decision is made on administering ECT.
- Generally, patients with cardiovascular diseases are at higher risk of arrhythmia, myocardial infarction, myocardial rupture and cerebral aneurysm rupture due to sympathetic and parasympathetic activation during the ECT session; all cardiac implants should undergo a comprehensive interrogation before the procedure with cardiology consultation.
- ECT may treat or reduce the neuropsychiatric manifestations that present as part of the neurological disorder such as stroke, Parkinson's disease and multiple sclerosis.
- Possible devastating complications during ECT may occur in cases with endocrine disorders; therefore, it is mandatory to identify and treat the underlying endocrine disorders prior to commencement of ECT.
- Pre-ECT tests on renal function may detect any abnormality and necessary correction is then made prior to administering ECT; ECT is recommended on the day after haemodialysis.
- Consultation with respiratory physician is required for stabilization of the underlying respiratory disorders prior to ECT initiation; smoking should be ceased at least 24 hours prior to ECT.
- Consultation with ophthalmologist for ophthalmic disorders is required prior to ECT commencement.
- It is advisable to place the stimulus electrodes as farthest as possible from the DBS device, cochlear implant, metal implant or skull defect.
- Recommend to avoid use of anaesthetic agents that may trigger malignant hyperthermia i.e. succinylcholine and halogenated volatile anaesthesia in patients with Neuroleptic Malignant Syndrome; antipsychotic should be discontinued and autonomic stability is to be achieved before initiating ECT.
- For morbid obesity cases, it is recommended to increase functional residual capacity and oxygen reserve to prevent life-threatening desaturation during induction, and provide gastric acid prophylaxis with safe anaesthetic technique to minimise risk of aspiration.

2.1 Placement of ECT Electrodes

For ECT, there are two types of electrodes in use, namely the recording (or monitoring) electrodes and stimulus (or treatment) electrodes.

2.1.1 Placement of recording electrodes

The recording electrodes provide a visual tracing of the seizure elicited by ECT and the characteristics of the seizure activity. High ECT-induced seizure activity is generally recorded in frontopolar areas whereas the mastoid regions are often electrophysiologically inactive, thus making it an ideal point of reference[11]. For this reason, frontopolar-to-mastoid recording electrode placement is preferred for seizure monitoring as shown in Figure 2.1(i) and 2.1(ii).

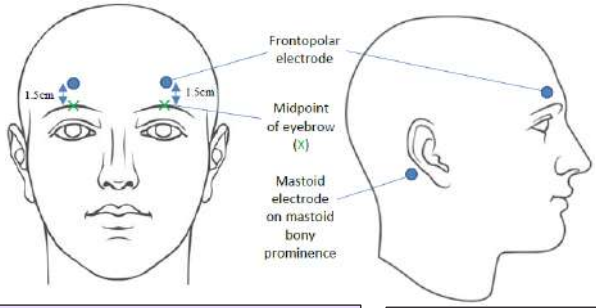


Figure 2.1(i): Placement of recording electrodes (anterior face view)

- 2 recording electrodes on each side of the head i.e. left and right frontopolar-to-mastoid electrodes.
- Centre of frontopolar electrode is positioned about 1.5cm above the midpoint (X) of eyebrow.

Figure 2.1(ii): Placement of recording electrodes (right lateral face view)

- Mastoid electrode is placed on the mastoid bony prominence.

2.1.2 Placement of stimulus electrodes

There are two types of stimulus electrode placements i.e. bilateral and unilateral electrodes. The extent to which practitioners use unilateral or bilateral ECT varies considerably. Some use unilateral or bilateral ECT exclusively. The differences between the types of stimulus electrode placements are described in Figures 2.1(iii) to 2.1(vii) and Table 2.1(i).

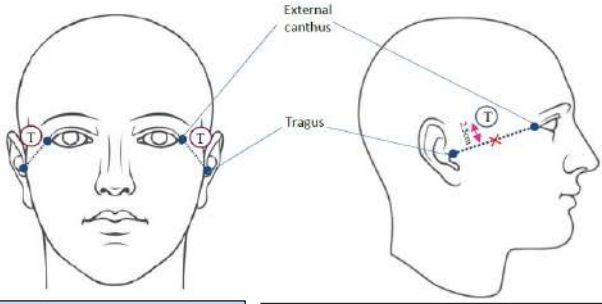


Figure 2.1(iii): Placement of bitemporal stimulus electrodes (anterior face view)

- Stimulus electrodes for bitemporal placement are represented by Ⓣ.

Figure 2.1(iv): Placement of bitemporal stimulus electrodes (right lateral face view)

- Centre of temporal stimulus electrode Ⓣ is about 2.5cm (1 inch) above the midpoint (X) of the line connecting external canthus and auditory tragus, on each side of the head.

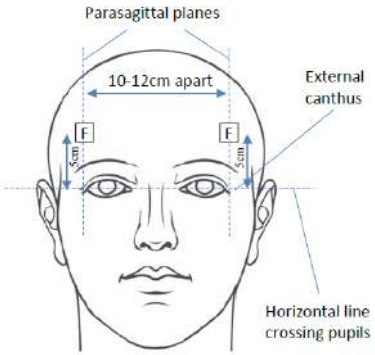


Figure 2.1(v): Placement of bifrontal stimulus electrodes (anterior face view)

- Stimulus electrodes for bifrontal placement are represented by F.
- First, identify the parasagittal planes (perpendicular to the horizontal line crossing the pupils).
- Centre of each stimulus electrode F is then placed 4 to 5cm above the external canthus of each eye in the parasagittal planes; both electrodes positioned symmetrically on the forehead (separated by at least 10 to 12cm).
- Recording electrodes are then placed medially.

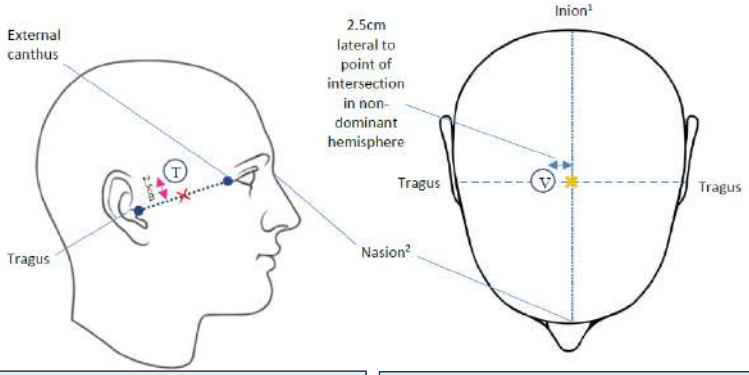


Figure 2.1(vi): d'Elia or temporo-parietal electrode placement for right unilateral ECT (right lateral face view: temporal stimulus electrode)

- Stimulus electrode for right temporal placement is represented by Ⓣ.
- Centre of temporal stimulus electrode Ⓣ is about 2.5cm (1 inch) above the midpoint (X) of the line connecting external canthus and auditory tragus, on right side of the head [same as Figure 2.1(iv)].
- Counterforce from left side of the head is needed to maintain good contact between head and right temporal stimulus electrode.

Figure 2.1(vii): d'Elia or temporo-parietal electrode placement for right unilateral ECT (vertex view with face downward: vertex stimulus electrode)

- Vertex stimulus electrode is represented by Ⓥ.
- Identify the first line connecting the two auditory tragi and the second line connecting the nasion[2] and inion[1], then determine the point of intersection (X) of these two lines.
- Centre of vertex stimulus electrode is positioned about 2.5cm lateral to the point of intersection (X) in the non-dominant hemisphere.

[1]Inion is the midline external occipital protuberance at the base of skull.
[2]Nasion is the midline bony depression between medial canthi where the frontal and two nasal bones join at just below glabella.

d' Elia electrode placement is preferred for right unilateral ECT as it:[195, 196]

(i) maximises the inter-electrode distance so that adequate electrical current is propagated to elicit seizure activity,

(ii) permits a relatively high current density across the primary motor cortex with its projections to the subcortical regions to produce a well-generalised seizure, and

(iii) provides a relatively low impedance path through the skull via the sagittal suture, for more electrical current to enter the brain.

Table 2.1(i): Differences between bilateral and unilateral electrode placements

	Electrode Placement		
	Bilateral (BL)		Unilateral (UL)
	Bitemporal (BT)	Bifrontal (BF)	
Electrode position[109]	Refer Figure 2.1(iii) and 2.1(iv)	Refer Figure 2.1(v)	Refer Figure 2.1(vi) and 2.1(vii)
Corresponding cerebral lobes	Temporal lobes	Frontal lobes	Non-dominant temporal and parietal lobes
Indications[11]	Rapid response is clinically required (e.g. actively suicidal patient or catatonic patient who refuses to eat) Past preferential response to BL ECT Patient's preference for this modality	Potential cardiac safety benefits, particularly for patients with ischaemic heart disease or cardiac arrhythmia with:[159] • very low incidences of transient periods of asystole during ECT stimulus • less severe episodes of bradycardia	For cognitive advantages, particularly in patients who are more susceptible to profound confusional states i.e. • elderly • patients with dementia • patients who developed significant confusion during previous courses of ECT
When to consider switching electrode placement[197-199]	Switch to right UL from BL when cognitive side effects worsen, particularly in cases of sustained delirium Some evidence showed switching from BL to UL ECT may be indicated if ST cannot be achieved by BL electrode placement as the ST for UL ECT is often lower		Switch from right UL to left UL electrode placement or vice versa is recommended only if there is severe post-ictal dysphasia, memory impairment or prolonged confusion Switch from UL to BL if patients fail to respond or response is excessively slow
ECT efficacy[200-204]	Similar	Similar	Similar (at high dose) • Right UL and left UL have same efficacy
Cognitive side effects[203, 204]	Most cognitive side effects compared to BF and UL ECT	More cognitive side effects than UL but less compared to BT ECT	Least cognitive side effects compared to BT and BF ECT (for patients with left cerebral dominance for speech, verbal memory is generally more impaired with left UL than right UL electrode placement)
Somatic side effects e.g. muscle pain, headache, nausea[205]	Similar	Similar	Similar (with higher dose)

Abbreviations: ECT, Electroconvulsive Therapy; ST, seizure threshold.

2.1.3 Stimulus electrode placement and impedance[11]

- Proper placement of stimulus electrodes is important to prevent high impedance or resistance to the electrical current.
- Impedance is the resistance to electrical current due to presence of the skull, soft tissues and skin.
- In ECT, there are two forms of impedance:
  - Dynamic impedance: resistance during the stimulus current (relating to the change that occurs during the passage of the electrical current).
    - typical dynamic impedance is around 220Ω (ranges from 120 to 350Ω)
  - Static impedance: resistance during the self-test procedure (reflecting the baseline resistance state).
    - typical static impedance is approximately 350 to 2000Ω
- Table 2.1(ii) shows the causes of impedance variation with regards to stimulus electrode placement.

Table 2.1(ii): Causes of impedance variation[11, 130]

High impedance	Low impedance
• Poor contact of stimulus electrodes with skin • Poor scalp preparation • Faulty cables	• Stimulus electrodes are in close proximity to one another • Low impedance pathway (e.g. sweat or conducting hair gel) • Presence of a skull defect (refer subsection 1.5.4 on Medically Compromised Group for Skull defect with or without metal implant)

Key Points

- ❖ Frontopolar-to-mastoid recording electrode placement is preferred for ECT-induced seizure monitoring.
- ❖ Stimulus electrode placement may either be bilateral i.e. bitemporal or bifrontal, or unilateral with preference for d'Elia placement.
- ❖ Bitemporal ECT is administered when rapid response is clinically required, in patients with previous response to BL ECT or patient's preference; bifrontal for those with ischaemic heart disease or cardiac arrhythmia due to its potential cardiac safety profile.
- ❖ Unilateral ECT provides cognitive advantages in patients who are more susceptible to profound confusional states; its efficacy comparable to that of bilateral at high doses with least cognitive side effects.
- ❖ Proper placement of stimulus electrodes is important to prevent high impedance or resistance to the electrical current.

2.2 Stimulus Dose Strategy

There are many methods in deciding stimulus dosing. Titration dose method as described by Sackeim[206, 207] is the most acceptable and recommended method. Determining the stimulus dose via full, half or 80% of age of patient is not recommended in this guideline.

This subsection on stimulus dose strategy covers in a sequential manner of conceptual comprehension, i.e. first on the explanation of key concepts of seizure threshold (ST) and stimulus dose, then ECT-EEG interpretation (with NEARS criteria) and artefacts' recognition, followed by application of titration dose method. In addition, this subsection incorporates a brief explanation on key stimulus parameters and concepts on stimulus dose change between different electrode placements and between different models of ECT machine.

2.2.1 Key concepts

- The effectiveness and adverse effects associated with ECT depends fundamentally on the ST and stimulus dose given.
- ST:
  - Definition: The lowest electrical charge or stimulus dose that is required to elicit seizure activity, as seen on the electroencephalogram or EEG (i.e. slow wave activity) and / or visible motor movement[1]
- Table 2.2(i) shows the determinants of ST[106, 130, 208-211]

Table 2.2(i): Determinants of Seizure Threshold

Determinants		Raises ST	Lowers ST
Age		Older	Younger
Gender		Male	Female
Brain disease		Diffuse, non-irritative e.g. dementia	Irritative e.g. meningitis, encephalitis
Medication (refer subsection 1.4 on Pharmaco-therapy in ECT)	**Psychotropics**	Benzodiazepines Anticonvulsants High dose propofol	Benzodiazepine or alcohol withdrawal state Tricyclic antidepressants Clozapine Chlorpromazine Methohexital Etomidate Ketamine
	Non-psychotropics	Beta blocker Calcium channel antagonist	Theophylline
Treatment session interval		Short	Long
Electrode placement		BT or BF	UL
Impedance (refer subsection 2.1.3 on Stimulus electrode placement and impedance)		High	Low
Waveform		Sine wave	Rectangular wave
Stimulus parameter (refer subsection 2.2.4 on Stimulus Parameters)	**Pulse width**	Brief	Ultra-brief
	Pulse frequency	Higher	Lower
	Stimulus duration	Shorter	Longer
Miscellaneous		Dehydration Hypoxia Hypercarbia from inadequate ventilation	Hyponatraemia Hypocalcaemia Hypomagnesemia Pre-stimulus hyperventilation

Abbreviations: ST, seizure threshold; BT, Bitemporal; BF, Bifrontal; UL, Unilateral.

- Table 2.2(ii) defines the 3 types of stimulus dose.

Table 2.2(ii): Stimulus Dose Types

Types	Definition	Comments
Threshold stimulus dose	Lowest dose at which seizure is induced i.e. ST	Although this is the dose that induces a seizure, it is therapeutically inadequate
Supra-threshold stimulus dose	Dose that is higher than threshold stimulus dose	This is the treatment dose i.e. 1.5 to 2 x higher for BL [212] or 5 to 6 x higher for UL electrode placement[207, 213] (refer subsection 2.2.3 on Titration dose method)
Sub-threshold stimulus dose	Dose that induces sub-convulsive or inadequate seizure	Re-titration of sub-threshold stimulus dose is required to achieve adequate seizure due to increased ST with ongoing ECT treatment

Abbreviations: ST, seizure threshold; BL, Bilateral; UL, Unilateral; ECT, Electroconvulsive Therapy.

2.2.2 ECT-EEG interpretation

(i) ECT-EEG quality: markers of seizure adequacy

- In order to establish the ST and administer the required supra-threshold stimulus dose, the adequacy of the ECT-EEG tracing needs to be determined first.
- NEURON ECT-EEG Algorithmic Rating Scale or NEARS is a step-by-step approach to ECT-EEG or ictal EEG visual pattern recognition on seizure adequacy from a two-channel EEG recording after administration of a stimulus dose during the ECT procedure.
- Prior to utilising NEARS operational criteria, first ensure that the calibration of the ECT-EEG tracing is set at 0.020mV/mm or 200uV/cm depending on ECT machine models.
- All ECT-EEG tracings are to be recorded via the bifrontopolar-to-mastoid electrode placement.

- The sequential visual analysis of the ictal EEG is based on 5 indices as follows:
    - Recruitment: recruitment phase occurs immediately post-stimulus, with low amplitude and high frequency waveform and a duration of not more than 5 seconds prior to the appearance of hypersynchronous polyspike phase.
    - Amplitude: bilateral EEG amplitude of at least 1.5cm (15mm or 3 boxes) in height from the peak to the trough of the amplitude in slow-wave complexes, with a total duration of at least 10 seconds.
    - Symmetry: interhemispheric symmetry in the ictal EEG (at least 50% of the time) from the start of recruitment phase to the end of slow-wave phase.
    - Duration: EEG seizure duration (SD) of at least 15 seconds i.e. from the start of recruitment phase to the end of termination phase.
    - Degree of post-ictal suppression: abrupt termination endpoint or abrupt flattening of EEG immediately post-seizure termination, as measured by the automated Adequacy of at least 50% or Post-ictal Suppression Index (PSI) of at least 80% (the use of Adequacy or PSI depends on ECT machine models).

- After assessing the ictal EEG indices, interpretation of NEARS is based on the overall seizure adequacy of the total 5 indices. Seizure induced by ECT is categorized as adequate, equivocal or inadequate depending on the number of indices i.e.
    - 4 or 5 out of the total 5 indices are adequate markers of ictal EEG quality,
    - 3 out of total 5 indices are equivocal, and
    - no index or only 1 index or 2 indices out of total 5 indices is/are indicative of inadequately induced seizure.

- Examples of tracings with NEARS interpretation are shown in Figure 2.2(i), Figure 2.2(ii) and Figure 2.2(iii).

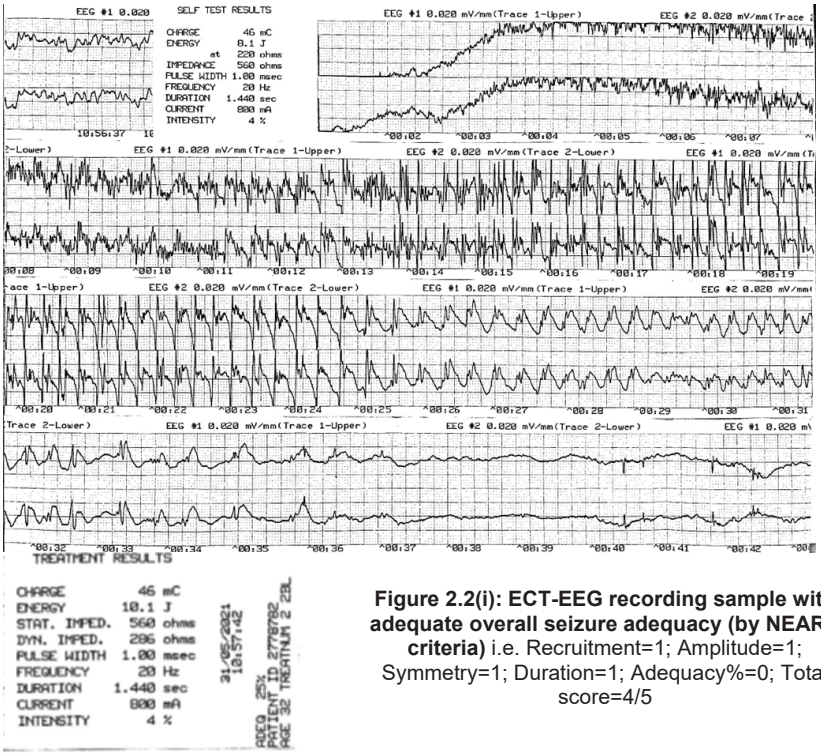


Figure 2.2(i): ECT-EEG recording sample with adequate overall seizure adequacy (by NEARS criteria) i.e. Recruitment=1; Amplitude=1; Symmetry=1; Duration=1; Adequacy%=0; Total score=4/5

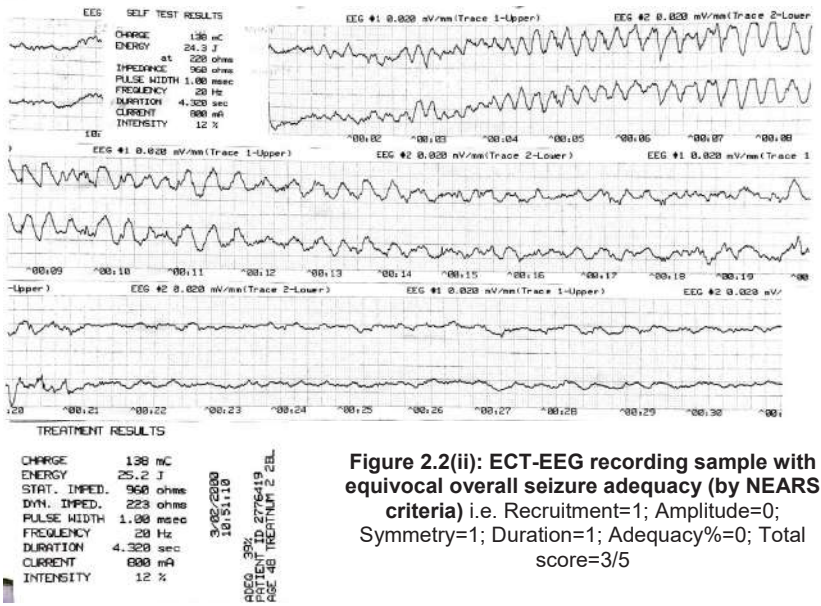


Figure 2.2(ii): ECT-EEG recording sample with equivocal overall seizure adequacy (by NEARS criteria) i.e. Recruitment=1; Amplitude=0; Symmetry=1; Duration=1; Adequacy%=0; Total score=3/5

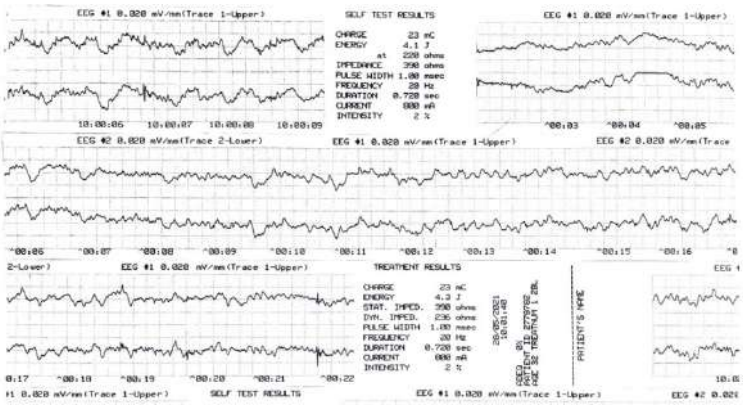


Figure 2.2(iii): ECT-EEG recording sample with inadequate overall seizure adequacy (by NEARS criteria) i.e. Recruitment=0; Amplitude=0; Symmetry=0; Duration=0; Adequacy%=0; Total score=0/5

- However, some of the caveats with NEARS may include:
  (a) in elderly population, ECT-EEG tracing may appear less symmetrical with lower amplitude, poor post-ictal suppression, and of shorter duration i.e. appeared suboptimal ECT-EEG,
  (b) in BL ECT, higher amplitudes, more pronounced symmetry and post-ictal suppression may be observed compared to UL ECT, and
  (c) although bilateral EEG SD is of at least 15 seconds, the termination phase may be prolonged with poor regularity and of low amplitude i.e. disorganized pattern with diffuse slowing.

(ii) ECT-EEG artefacts

- ECT-EEG recording is often obscured by the presence of artefacts.
  - Artefacts are activities recorded on the ECT-EEG tracings that are not produced by electrical activities of the brain[214]
- Common ECT-EEG artefacts are elucidated in Table 2.2(iii).

Table 2.2(iii): Features and causes of common ECT-EEG artefacts [11, 215]

Artefacts	Features	Causes
Muscle Figure 2.2(iv)	High frequency EMG polyspike activity (>30Hz) superimposed on ECT-EEG tracing	Recording electrodes detect the facial muscle activity
Movement Figure 2.2(v) & Figure 2.2(vi)	High amplitude ECT-EEG deflections	Manipulation of patient's head e.g. applying oxygen mask while moving head
Electrode Figure 2.2(v) & Figure 2.2(vi)	Squaring on ECT-EEG amplitude	Loosely applied recording electrodes or detached electrodes
ECG Figure 2.2(vii)	ECG QRS complexes may appear in the ECT-EEG tracing following heart beat rhythm	Improper placement of mastoid recording electrodes may detect pulses from the carotid artery

Abbreviations: EMG, Electromyography; ECT, Electroconvulsive Therapy; EEG, Electroencephalogram; ECG, Electrocardiogram.

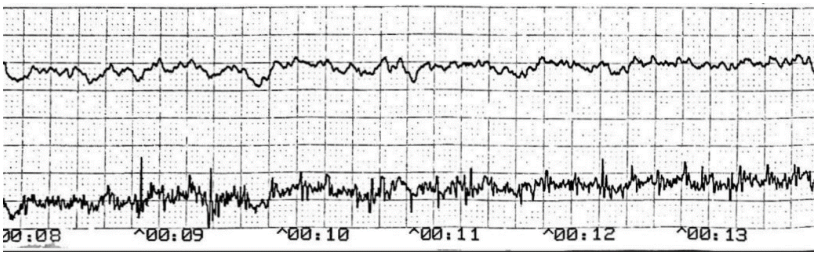


Figure 2.2(iv): Muscle artefact on ECT-EEG 2

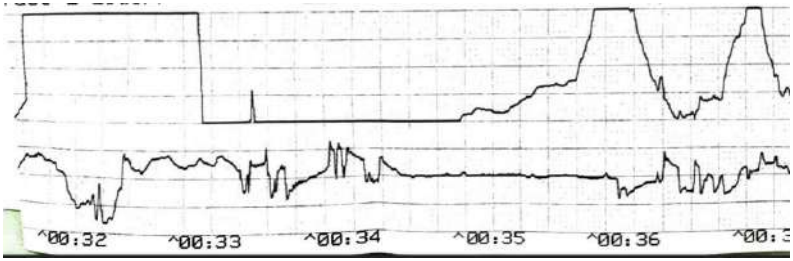


Figure 2.2(v): Movement and electrode artefacts (example 1). These artefacts were due to manipulation of patient's head during assisted ventilation with oxygen mask by trained anaesthetist medical assistant.

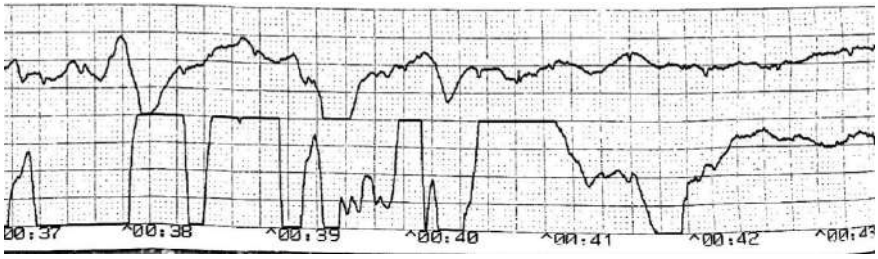


Figure 2.2(vi): Movement and electrode artefacts (example 2). Movement with predominant electrode artefacts on the right recording electrode due to loose placement.

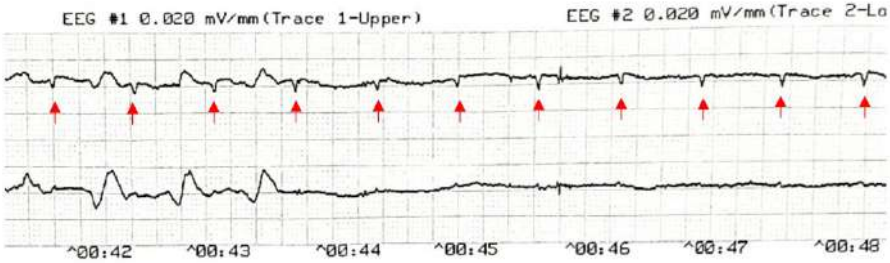


Figure 2.2(vii): ECG artefacts. ECG artefacts in immediate post-ictal phase with appearance of regular QRS complexes in EEG 1 (indicated by red arrows).

2.2.3 Titration dose method

- Titrated dose method is the preferred and recommended strategy to establish the initial ST with individualized treatment compared to age-based and fixed dose methods.[1, 2, 11]
- A comparison of the titration dose method, age-based method and fixed dose method is illustrated in Table 2.2(iv).

Table 2.2(iv): Comparison of the titration dose method, age-based method and fixed dose method

Titration dose method	Description	
	A low stimulus dose is given and a series of increasingly higher stimuli is administered until a seizure occurs.[207, 216]	
	Advantage	Disadvantage
	ST is determined at the first treatment session and stimulus dosing is then carried out with respect to that determined threshold at each successive treatment.	Repeated stimulations may be required during the first treatment session to determine initial ST.
Age-based method	Description	
	The initial threshold stimulus dose is determined by the patient's age[217] or halving the age [218, 219] method, based on the understanding that ST increases with age.	
	Advantage	Disadvantage
	May reduce the number of repeated stimulations to determine initial ST, cumulative stimulus doses delivered and total number of treatment sessions required.[220]	May result in administration of either barely supra-threshold stimulation with ineffective dose for right UL ECT or markedly supra-threshold stimulation with cognitive adverse effects for right UL or BL ECT.[221, 222]
Fixed dose method	Description	
	A high fixed stimulus dose is given to all patients regardless of the ST level.[213, 217]	
	Advantage	Disadvantage
	May be beneficial in situation where avoidance of sub-threshold stimulation is a priority e.g. in co-morbid medical conditions when a rapid, definitive response is needed.	Exposes patient to an unnecessarily high stimulus dose that may lead to exaggerated cognitive impairment.

Abbreviations: ST, seizure threshold; UL, Unilateral; BL, Bilateral; ECT, Electroconvulsive Therapy.

(i) Algorithm for titration dose method

- Typically, the initial stimulus dose is set according to the type of ECT machine model (either Thymatron® or spECTrum®) and gender as shown in Table 2.2(v).

Table 2.2(v): Determination of initial stimulus dose

ECT machine model	Stimulus dose (%)	
	Male	Female
Thymatron®	10	5
spECTrum®	4	2

Abbreviations: %, percentage.

- There is a marked variability of as much as 40 to 50 folds in ST for eliciting an adequate seizure.[79, 207]
    - It is recommended to increase moderately the stimulus dose at 50% to 100% (or 1.5 to 2 times) above the initial ST for BL ECT.[130, 212]
    - The stimulus dose for UL ECT should be at 400% to 500% (or 5 to 6 times) above the initial ST.[130, 213, 223]

- Figure 2.2(viii) shows the algorithm in titration dose method for first treatment session.

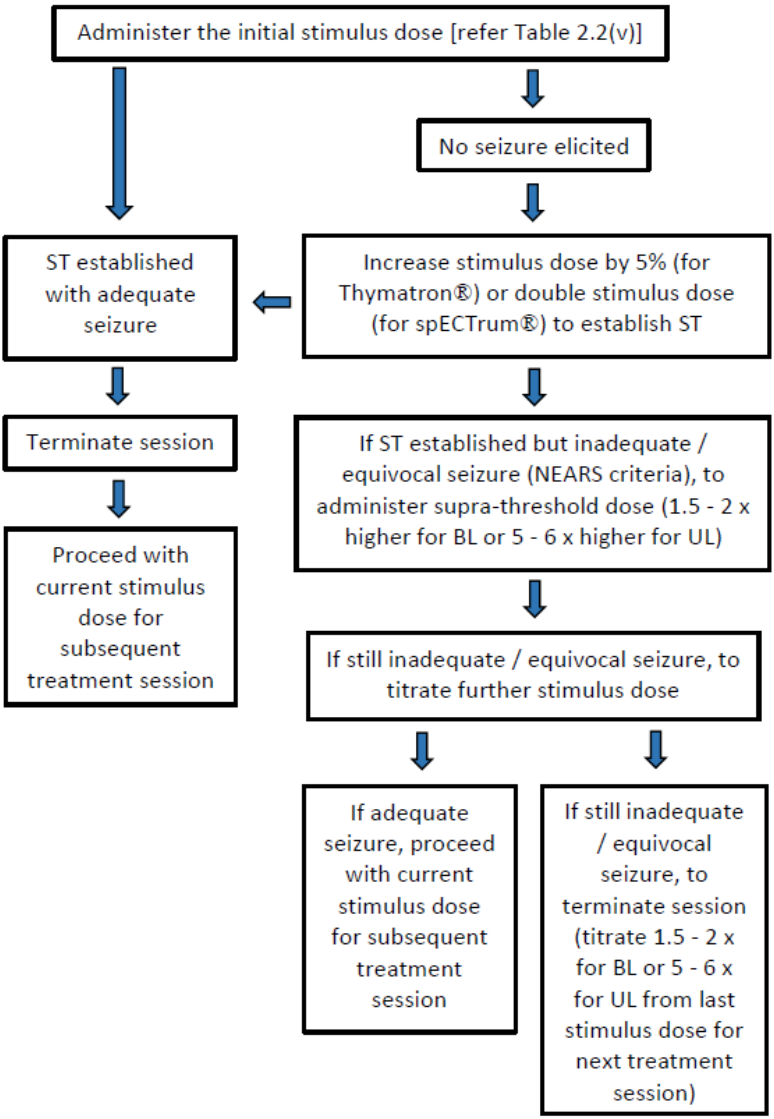


Figure 2.2(viii): Algorithm in titration dose method for first treatment session

- Figure 2.2(ix) shows an example of dose titration for a female patient on BL electrode placement with a Thymatron® machine.

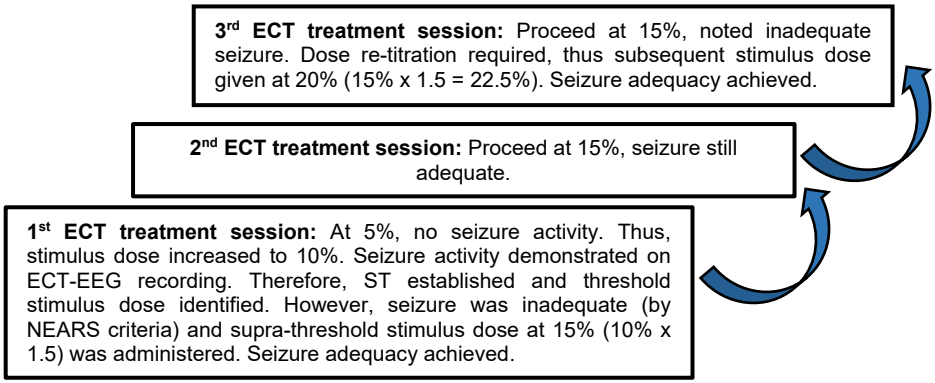


Figure 2.2(ix): Dose titration for a female patient on bilateral electrode placement with a Thymatron® machine

- Figure 2.2(x) shows an example of dose titration for a male patient on UL electrode placement with a spECTrum® machine.

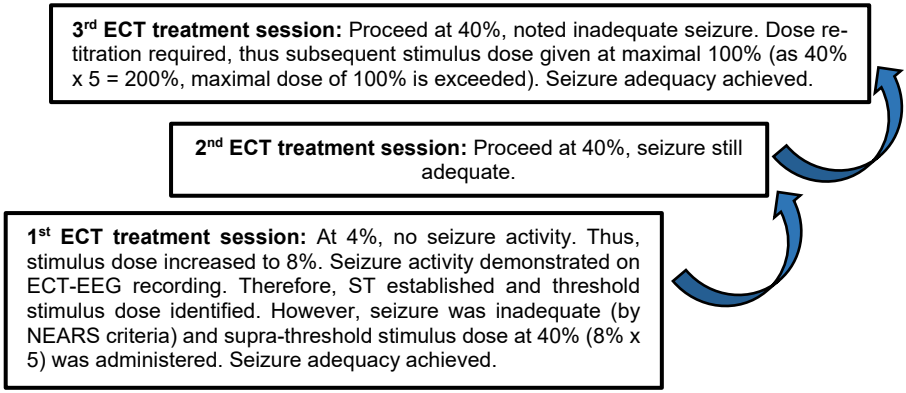


Figure 2.2(x): Dose titration for a male patient on unilateral electrode placement with a spECTrum® machine

(ii) Points to remember on titration dose method:

- The anaesthetic team should be alerted for any first treatment session, as stimulation may be attempted to a maximum of 3 or 4 trials in order to determine the ST or induce adequate seizure; anaesthetic team may need to prepare higher doses of the anaesthetic agents for this purpose.

- After the delivery of each stimulus, observe the patient and ECT-EEG recording to determine if a seizure has been elicited.
  - A missed seizure may occur if no motor (tonic or clonic movements) or ictal EEG was detected after administered the stimulus dose.
    - An interval of at least 20 seconds should precede subsequent restimulation to avoid the possibility of delayed seizure onset.[2]

- Contributing factors include premature stimulus termination and other determinants that increase ST as outlined in Table 2.2(i) on Determinants of Seizure Threshold.

➢ An abortive or brief seizure with reference to duration of generally less than 15 seconds by motor or ECT-EEG criteria is due to similar contributing factors as for a missed seizure.[2]
- An interval of at least 30 to 45 seconds should precede subsequent restimulation due to the refractory period from a sharp and transient increase in ST i.e. no seizure can be elicited till the abortive seizure is completely resolved.[2]

➢ Prolonged seizure on the other hand, may occur, defined as a seizure longer than 3 minutes by motor or ECT-EEG manifestation[2] or more strictly, longer than 2 minutes duration based on ECT-EEG recording.[136, 137]

- In the first treatment session, SD is often the longest. With regards to stimulus dose and SD, the relationship is non-linear as when stimulus dose greatly exceeds ST, the SD decreases progressively rather than increases [as shown in Figure 2.2(xi)]. Also, as the number of treatment sessions increases throughout the acute course, the ST rises with shorter SD.[224]

➢ Thus, very brief SD may be associated with a relatively high stimulus dose e.g. 500% or 6 times for BL ECT, especially towards the end of course.

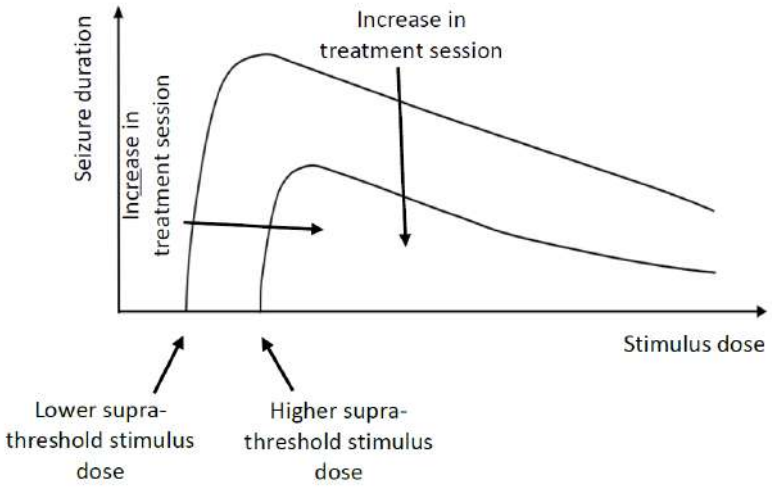


Figure 2.2 (xi): Relationship between stimulus dose and seizure duration with increase in treatment session numbers (adapted from Mankad MV et al., 2010)[130]

- In cases where the maximal stimulus dose is reached yet the seizures remain inadequate and therapeutic outcome is poor, several augmentation strategies have been proposed i.e.
  - Modification of mechanical measure:
    - Use of hyperventilation prior to anaesthesia induction may prolong SD.[225]
  - Modification of ECT administration measure:
    - Anaesthetic medications
      - ☐ Use of etomidate as an induction agent may be associated with longer SD compared to propofol.[226, 227]
      - ☐ Ketamine may act as a potential alternative induction agent or as an augmentation agent for ECT; however, its use may be associated with a lack of clinical efficacy with higher rate of post-ECT confusion, disorientation and prolonged delirium.[228]
      - ☐ Discussion with anaesthetic team is thus required to decide type of anaesthetic agent to use.[117]

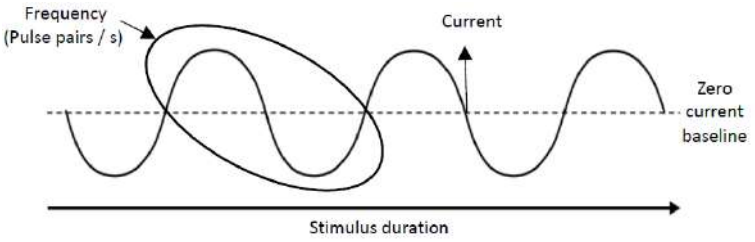
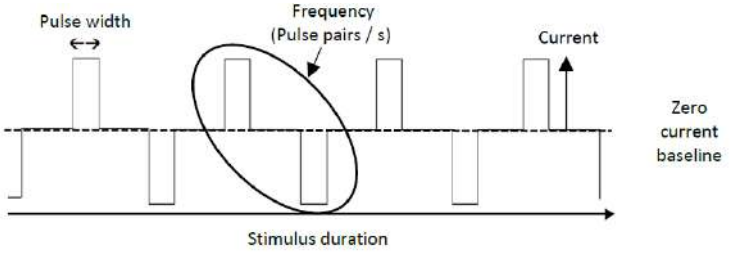
- Psychotropic medications
  - ☐ Concomitant use of psychotropics with potential effect on ECT-induced seizure should be withhold or the doses adjusted accordingly (refer subsection 1.4 on Pharmacotherapy in ECT).
- Adjunctive medications
  - ☐ Use of intravenous caffeine and theophylline is not recommended due to lack of robust evidence on clinical efficacy with higher risk of adverse effects.[130, 229, 230]
- Re-titration of stimulus dose
  - ☐ Re-titration may be considered for cases with very brief SD due to relatively high stimulus dose.

- Re-titration should also be considered in these circumstances:[1, 2, 212]
  - Steep increase in ST level
  - After 10 to 12 treatment sessions
  - An interval period of 4 to 6 weeks between acute treatment sessions
  - When switching between electrode placements

2.2.4 Stimulus parameters

- In ECT, the stimulus dose or electrical charge is delivered in either 2 waveforms i.e. the sine wave or rectangular wave[130] as illustrated in Table 2.2(vi).

Table 2.2(vi): Sine wave and Rectangular wave in ECT

Sine wave	
	▪ Continuous stream of electricity that flows in alternating directions ▪ Not incorporated into modern ECT machine due to higher propensity to raise ST and cause memory impairment[231]
Rectangular wave	
	▪ Bidirectional (i.e. alternating positive and negative phases) ▪ Consist of a series of instantaneously rising and falling rectangular pulses of current with adjacent pulses separated by brief periods of no electrical activity

Abbreviations: ST, seizure threshold; *ECT, Electroconvulsive Therapy.*

- As shown from Table 2.2(vi), the electrical charge delivered from the ECT device is determined by the stimulus parameters (shown in the end of ECT-EEG tracing when recording is stopped) expressed as:

  Electrical charge (mC) = Current (A) x Pulse pairs / second (Hz) x Pulse width (ms) x Stimulus duration (s)

  Where:
  mC, millicoulomb; A, amperes; Hz, hertz; ms, milliseconds; s, seconds

- Table 2.2(vii) describes each of the stimulus parameters.

Table 2.2(vii): Stimulus Parameters

Parameters	Description
Pulse width	• Duration of each pulse, measured in milliseconds (ms) • Table 2.2(viii) compares brief pulse with ultra-brief pulse
Pulse frequency	• Pulse pair per second, measured in hertz (Hz) • The actual number of pulses per second is twice the frequency (in view of bidirectional phase of rectangular wave)
Stimulus duration	• Length of the entire series of pulses delivered, measured in seconds (s) • Functionally the same as the time elapsed between the first and last pulse in the series
Peak current	• Maximum intensity of each pulse, measured from the zero baseline in amperes (A) • Modern ECT devices are mostly current-constant with the ability in limiting the voltage output as a safety feature when the impedance is grossly elevated

Table 2.2(viii): Comparison between brief pulse and ultra-brief pulse

Characteristics	Brief pulse	Ultra-brief pulse*
Pulse width	• 0.5 to 2.0ms[130]	• Less than 0.5ms[232, 233]
When to use	• When rapid definitive response is needed	• When cognitive impairment is the main concern
Electrode placement	• BT and BF (pulse width <1.0ms is not recommended)[232,234] • Right UL	• Favourable for right UL • Limited evidence for ultra-brief pulse BL ECT (BT and BF)[234]
Advantages	• Relatively good efficacy • Faster response and remission	• Less cognitive impairment[232, 235, 236]
Disadvantages	• Cognitive impairment may be apparent	• Slower speed of improvement[237] • Greater number of treatment sessions required[238] • Lower response and remission rates[239] • Efficacy may be reduced[238-241] (though may be comparable at higher doses with less cognitive benefits)[235]

Abbreviations: BT, Bitemporal; BF, Bifrontal; BL, Bilateral; UL, Unilateral; ECT, Electroconvulsive Therapy.

*Current literature on the use of ultra-brief pulse is mostly exclusive for cases of depressive disorders; use of ultra-brief pulse in psychosis and mania is currently limited for recommendation in clinical practice.

2.2.5 Stimulus dose change between different electrode placements [1]

- Re-titration of stimulus dose is required when switching between electrode placements due to differences in ST.
- Consider switching from brief pulse UL ECT to brief pulse BF or BT ECT, if there is no clinical improvement after 4 to 6 treatments.
- Consider switching from ultra-brief pulse right UL ECT to brief pulse right UL, BF or BT ECT, if there is no improvement after 6 to 8 treatments.
- The decision to switch earlier should be determined by the clinical indication for ECT or rapidity of response.
- It is important to assess factors that may compromise the efficacy of the ECT e.g. effect from concurrent use of medication.

2.2.6 Stimulus dose change between different models of ECT machine

- Stimulus dose (in %) on the ECT machine model is not equivalent to the electrical charge (in millicoulombs). Similarly, stimulus dose and electrical charge differ in different ECT machine models as shown by Table 2.2(ix).

Table 2.2(ix): Stimulus dose and electrical charge in different models of ECT machine

ECT machine model	Stimulus dose (%)	Electrical charge (mC)
Thymatron®	100	504
	• Electrical charge can expand to 1008 mC if 2xDGX (200%) software is available.	
spECTrum®	100	1152

Abbreviations: %, percentage; mC, millicoulombs.

- Notably, current (in amperes) in different ECT machine models varies i.e. 900mA for Thymatron® and 800mA for spECTrum®. Similarly, measures of pulse width, frequency and stimulus duration may vary in different settings of ECT machine models.[242]
- Hence, when change between different models of ECT machine, re-titration of stimulus dose is required.

Key Points

- ❖ The effectiveness and adverse effects associated with ECT depends fundamentally on ST and stimulus dose given.
- ❖ ST is defined as the lowest electrical charge that is required to elicit seizure activity, as seen on the EEG and / or visible motor movement, and is determined by age, gender, brain diseases, medications, treatment session interval, electrode placement, impedance, waveform, stimulus parameters and others such as electrolyte imbalances and oxygen or carbon dioxide blood levels.
- ❖ Threshold stimulus dose is the lowest dose needed to induce seizure; supra-threshold stimulus dose refers to the treatment dose of 1.5 to 2 x higher for BL or 5 to 6 x higher for UL electrode placement. Sub-threshold stimulus dose induces inadequate seizure.
- ❖ NEARS is a step-by-step approach to ECT-EEG visual pattern recognition on seizure adequacy from a two-channel EEG recording after administration of a stimulus dose during the ECT procedure based on 5 indices:
  - Recruitment: ≤ 5s prior to polyspike phase
  - Amplitude: ≥ 1.5cm (3 boxes) and ≥ 10s in slow-wave complexes (bilateral)
  - Symmetry: ≥ 50% from recruitment to slow-wave phase
  - Duration: ≥ 15s from recruitment to termination phase
  - Adequacy ≥ 50% or PSI ≥ 80%

  Overall seizure adequacy is categorized as adequate (4-5/5), equivocal (3/5) or inadequate (0-2/5).

- ECT-EEG recording is often commonly obscured by muscle, movement, electrode and ECG artefacts.
- Titration dose method is the preferred and recommended strategy to establish initial ST with individualized treatment, with an increase of stimulus dose above the initial ST at 50% to 100% (or 1.5 to 2 times) for BL ECT and at 400% to 500% (5 to 6 times) for UL ECT.
- Communication with the anaesthetic team for any first treatment session is essential as a maximum of 3 or 4 trials of stimulation may be required to determine the ST or induce adequate seizure.
- At least 20-second interval for missed seizure and 30-second interval for abortive seizure is recommended before subsequent restimulation.
- SD decreases with ongoing treatment sessions, thus requiring titration of stimulus dose throughout the acute ECT course.
- In cases where maximal stimulus dose is reached yet the seizures remain inadequate and therapeutic outcome is poor, may consider hyperventilation prior to anaesthesia induction, change of anaesthetic agents, withhold or adjust doses of concurrent psychotropics or re-titration of stimulus dose.
- Consider re-titration if ST level increases steeply, after 10 to 12 treatment sessions, and an interval of 4 to 6 weeks between acute treatment sessions.
- Electrical charge (mC) = Current (A) x Pulse pairs / second (Hz) x Pulse width (ms) x Stimulus duration (s)
- Re-titration of stimulus dose is required when switching between different electrode placements and between different ECT machine models.

2.3 Practical Aspects of Anaesthesia

2.3.1 Aims of anaesthesia during ECT

The primary goals of providing anaesthesia during ECT are to induce amnesia and good muscle relaxation while ensuring that the anaesthesia is not too deep that may suppress the seizure activity.[18, 33] The Anaesthesia Provider should also be able to provide a stable haemodynamic state and be vigilant should any complications arise.

2.3.2 Pre-ECT anaesthesia preparation

Although ECT is a relatively brief low-risk procedure, it is still an anaesthetic procedure that involves risk. As with all other surgical or ambulatory procedures, anaesthetic review should be performed prior to ECT with special considerations given to patients with high medical risk.

During ECT-induced seizure activity, acute haemodynamic changes and associated autonomic stress may result in cardiac complications in those with pre-existing cardiac disease or those with marginal cardiac function (refer subsections on Electrophysiology in ECT, and Adverse Events).[18, 19] Thus, detailed history is warranted during pre-ECT anaesthetic assessment in particular to identify patients at risk of morbidity during ECT that may necessitate further evaluation before initiating the ECT treatment.

Sedative premedication such as benzodiazepine should be avoided as it can delay emergence and interfere with seizure generation.[18, 243] However, in psychiatric patients with acute or chronic use of benzodiazepine as concomitant treatment, the decision to withhold or continue its use depends on the clinical judgement of the psychiatrist in-charge. Hence, the antagonist, flumazenil should be made available at the ECT treatment area.

Pre-ECT anaesthetic assessment may include the followings as shown in Table 2.3(i) which is mainly adapted from the current national guidelines.[244, 245]

Table 2.3(i): Pre-ECT anaesthetic assessment

History

(1) Detailed medical history includes:
- concomitant medical conditions (e.g. Diabetes Mellitus, hypertension, bronchial asthma)
- current medication and follow-up (and compliance)
- ascertain presence of target organ damage (e.g. renal failure, retinopathy, left ventricular hypertrophy)

(2) Particular attention on:
- cardiorespiratory function (assess effort tolerance; use New York Heart Association (NYHA) classification if required)
- risk of aspiration e.g. patients with Gastroesophageal reflux disease (GERD), obesity or gravid uterus

(3) Allergic history especially to drugs

(4) Drug and medication history
- Be aware of probable drug-drug interaction between psychotropic drugs and anaesthetic drugs (refer subsection 1.4 on Pharmacotherapy in ECT)

(5) Previous anaesthetic history or presence of family members with history of anaesthetic complications

(6) Symptoms of infection especially of upper respiratory tract

(7) Alcohol intake/smoking/vaping history

Examination

(1) Baseline vital signs

(2) Body weight and Body Mass Index (BMI)

(3) Dentition examination i.e. any caries, loose teeth, crowns or bridge

(4) Airway assessment i.e. Mallampati classification, neck mobilisation

(5) Respiratory and cardiovascular assessments

Investigations

These tests are recommended for administration of anaesthesia in general and are not intended to limit those required for issues specific to their management.[245] Although investigations may not be necessary for healthy patients undergoing short minimally invasive procedures, clinical judgment by the Anaesthesia Provider is of great importance. Tests need not be repeated for normal results and in cases with no changes in the patients' health condition throughout the ECT course.

Full Blood Count Age > 60 years old Clinical anaemia Haematological disease Renal disease Chemotherapy **Renal Profile** Age > 60 years old Renal disease Liver disease Diabetes Mellitus Cardiovascular disease Abnormal nutritional states **Liver Function Test** Hepatobiliary disease History of alcohol abuse Tumour with possible metastases	**Electrocardiogram** Age > 50 years old (female) Age > 40 years old (male) Heart disease, hypertension and chronic pulmonary disease Diabetes Mellitus Renal disease **Chest X-Ray** Age > 60 years old Significant respiratory disease Cardiovascular disease Malignancy **Pregnancy Test** Women of child bearing age

The College of Anaesthesiologists, Academy of Medicine of Malaysia Guideline on preoperative fasting (2008)[245] recommends a fasting guideline prior to ECT as shown in Table 2.3(ii):

Table 2.3(ii): Fasting Guideline

Digested material	Minimum fasting time before ECT
Clear fluid	2 hours
Milk / nourishing fluid	6 hours
Solid food / light meal	6 hours
Smoking	24 hours

2.3.3 Preparation of anaesthetic equipment

Anaesthetic equipment should be made available at both the ECT treatment area and the recovery area. It is the responsibility of the Anaesthesia Provider to check functionality of each equipment prior to starting treatment for the day.

The followings are recommended by the Royal College of Anaesthetists in 2021 Guidelines for the provision of anaesthesia service in the non-theatre environment:[246]

i. Suction apparatus
ii. Reliable source of oxygen either from a pipeline or cylinder with a reserve supply immediately available
iii. Procedural sedation requires minimum monitoring of non-invasive blood pressure monitoring, electrocardiogram (ECG) and pulse oximetry. If sedation involves loss of response to verbal contact, use of capnography is required.[247]
iv. Continuous waveform capnography should be made available for ECT patients undergoing general anaesthesia, and moderate to deep sedation.
v. Apparatus for airway management, which includes appropriate size mask, oral airway, nasopharyngeal airway, oxygen delivery system, laryngoscope, appropriate size endotracheal tube, appropriate size supraglottic airway device, stethoscope and bite block.
vi. Stretcher or bed with side rails with the capacity to position the head up or head down.
vii. Defibrillator and means to provide ventilation.

2.3.4 Preparation of anaesthesia staffing

During ECT, staff in-charge that should be present in the ECT suite or operating theatre includes the Anaesthesia Provider i.e. Anaesthetist, Anaesthetic Medical Officer or Non-Anaesthetist Medical Officer, Trained Anaesthetist Medical Assistant and Recovery Nurse. [Refer Figure 3(v) on Electroconvulsive Therapy (ECT) Anaesthetic Team and subsection 3.3.2 on Roles and Responsibilities].

2.3.5 Preparation of anaesthetic medication

Pharmacological agents that are required during ECT treatment should be identified and include the induction agents, muscle relaxants and miscellaneous drugs such as emergency drugs.

(a) **Induction agent** [refer Table 2.3(iii) on Induction agents and properties]

i. Induction agents provide amnesia during the brief period of seizure activity.
ii. Ideally, the induction agents should be of rapid onset and offset with smooth recovery.
iii. The therapeutic effect of ECT is accomplished with seizure induction and not by the electrical charge itself. Hence, the Anaesthesia Provider should be aware that most of the induction agents have anticonvulsant properties especially in high doses that can affect the efficacy of ECT.[18, 19, 33]
iv. In patients with Major Depressive Disorder, treatment outcomes improved with light anaesthesia i.e. low anaesthetic dose compared with high anaesthetic dose.[248]
v. Deep anaesthesia should be avoided, as the quality and duration of seizures can be suppressed. However, this needs to be weighed against the risk of awareness during light anaesthesia and the potential risk of post-ictal agitation with lower doses of the induction agents.
vi. Data is insufficient to recommend one specific induction agent for use in ECT. Based on a meta-analysis, all available induction agents are suitable for ECT use, and the marginal differences in emergence and recovery time should not govern the choice of the drug use.[249]

Table 2.3(iii): Induction agents and properties

Induction agent	Seizure quality	Advantage	Disadvantage
Propofol 0.75 - 2.5mg/kg	• Increase seizure threshold • Shorten duration of seizure especially with higher doses (1 - 2.5mg/kg)	• Familiarity of use • Can blunt acute haemodynamic sympathetic changes in healthy patients • Less post-ECT nausea and vomiting • Rapid emergence	• Pain on injection • Negative impact on seizure quality • Dose dependent decrease in blood pressure (hence, careful use in patients with poor cardiac reserve) • Respiratory and myocardial depression
Etomidate 0.15 - 0.6mg/kg	• May lower seizure threshold • Longer seizure duration • No anticonvulsant effect, hence positive seizure quality	• Reduced cardiovascular depressant properties	• Pain on injection • More pronounced hyperdynamic changes • Increased post-ECT nausea and vomiting • Longer emergence time • Associated with higher risk for post-ECT delirium
Methohexitol 0.5 - 0.15mg/kg	• Lower seizure threshold	• Considered as the gold standard agent with long history of use • Rapid onset and emergence	• Lack of availability
Thiopental 2 - 4mg/kg	• Longer seizure duration	• Better seizure quality compared to propofol	• Need to reconstitute • Increased risk of cardiac arrhythmia • Increased incidence of sinus bradycardia and premature ventricular contractions
Ketamine 0.5 - 2.0mg/kg	• Reduced duration of seizures in some studies, prolonged in other studies	• Suitable for patients with treatment-resistant seizures (though limited evidence) • Probable intrinsic antidepressant quality[247]	• Emergence delirium • Increased sympathetic activity • Transient increase in intracranial pressure • May cause more confusion and emotional blunting post-ECT
Sevoflurane 6 - 8% inspired concentration for induction aiming Minimum Alveolar Concentration (MAC) of 1 - 2	• Reduced seizure duration compared with methohexital • Both proconvulsant and anticonvulsant properties at different doses	• Comparable with thiopental • Use in patients with difficult venous access • Muscle relaxation properties • Attenuate uterine contraction post-ECT in pregnancy[250]	• Extra equipment required • More time-consuming • Higher doses may cause myocardial depression

Points to ponder:

- The extensive use of propofol makes it the drug of choice for inducing patients for ECT in many centres in Malaysia. Care should be taken, as seizure quality is reduced with higher doses of propofol at more than 1mg/kg. Thus, communication between the Anaesthesia Provider and psychiatrist is important to ensure the quality of seizures being induced.
- Compared to other anaesthetic agents, ketamine alone does not appear to improve the efficacy of ECT. However, ketamine in combination with other anaesthetic agents may confer a short-term advantage in improving depressive symptoms at the early stages of ECT.[251]
- Whichever induction agent is being administered, it is preferable to continue its use throughout the course of ECT treatment to avoid interference with seizure threshold.

(b) **Muscle relaxant** [refer Table 2.3(iv) on Muscle relaxants and properties]
The use of muscle relaxant agents is to reduce muscle convulsion and avoid serious musculoskeletal injury during ECT-induced seizure. Succinylcholine remains the drug of choice due to its rapid onset and short duration of action.

Table 2.3(iv): Muscle relaxants and properties

Muscle relaxant	Advantage	Disadvantage	Remarks
Succinylcholine 0.5 - 1.5mg/kg	• Rapid onset • Short duration	• Hyperkalaemia • Transient increase in intracranial pressure, intraocular pressure and intragastric pressure • Post-succinylcholine myalgia is common	• Careful use in patients with upregulated nicotinic acetylcholine receptors such as burns patients or patients with neuromuscular disorder, as it can produce aggravated hyperkalaemic response • Careful use in patients with closed-angle glaucoma and increased intracranial pressure • Larger doses may be required in patients with severe cachexia and osteoporosis
Atracurium 0.5mg/kg	• Safe to use as non-organ dependent clearance from the body	• Longer onset and duration of action • Airway management required while waiting for the effect to wear off	• Hypotension due to histamine release
Rocuronium 0.6mg/kg or 1mg/kg in modified rapid sequence induction	• Safe to use due to availability of sugammadex (16mg/kg) as an immediate reversal agent	• Longer onset and duration of action • Airway management is required while waiting for the effect to wear off	• Recommend to use in Neuroleptic Malignant Syndrome patients

(c) **Miscellaneous drugs** [refer Table 2.3(v) on Miscellaneous drugs]
Miscellaneous drugs used in anaesthesia for ECT may include the emergency drugs and anticholinergic agents.

Table 2.3(v): Miscellaneous drugs

Miscellaneous drugs	Indication	Remarks
Emergency Drugs		
Vasopressor e.g. phenylephrine and ephedrine	• Increase blood pressure by vasoconstriction of vessels	• Caution with drug-drug interaction with Monoamine oxidase inhibitors (MAOIs)
Intravenous antihypertensive agent e.g. esmolol (1mg/kg) and labetalol (0.3mg/kg)	• Attenuate sympathetic surge in systolic pressure and heart rate	• Esmolol has a lower effect on seizure duration compared to labetalol • Need to consider patient's cardiovascular risk
Adrenaline for anaphylactic shock	• First line of treatment for suspected anaphylactic shock	• An important resuscitative drug for profound hypotension and refractory shock
Anticholinergic Agents		
Atropine and **glycopyrrolate** (0.01 mg/kg)	• Vagolytic effect to antagonise the initial parasympathetic discharge • Antisialagogues	• Sometimes used as premedication to avoid salivation • But routine use as premedication has remain controversial and deemed unnecessary as the anticholinergic agents can aggravate hypertension and tachycardia during the subsequent sympathetic phase

2.3.6 Anaesthesia technique for ECT

A qualified Anaesthesia Provider should always be present in the ECT treatment room throughout the conduct of anaesthesia.[252] This is the essence of anaesthesia practice and delivery of quality patient safety.

The following are step-by-step recommended anaesthesia techniques for safe ECT delivery [refer Table 2.3(vi)].

Table 2.3(vi): Anaesthetic technique for safe ECT delivery

Steps	Details
1. Applying standard monitoring	The Association of Anaesthetist Great Britain and Ireland (AAGBI) recommendation for standard monitoring during anaesthesia and recovery (2021)[247] includes: • Electrocardiography • Non-invasive blood pressure monitoring • Pulse oximetry • Capnography in procedural sedation that involves loss of response to verbal contact
2. Induction of anaesthesia	• Preoxygenation of patients • Administer intravenous induction agent and muscle relaxant of choice • Insert bite block when patient is relaxed to prevent oropharyngeal injury during seizure activity

3. Airway management	● Holding the mask is normally adequate during ECT in view of the short duration of procedure ● Hyperventilation can lower seizure threshold and assist to prolong seizure duration ● Patient positioning, including ramping in the obese and reverse Trendelenburg positioning, should be adopted to maximise safe apnoea time ● Patients with possible difficult mask ventilation or those requiring long-acting muscle relaxants may benefit from the use of supraglottic airway devices to better secure the airway ● Endotracheal intubation is not routinely required, unless patients pose a high risk of aspiration e.g. pregnant patients with gravid uterus
4. Recovery	● Standard monitoring as per American Society of Anesthesiology (ASA) recommendation should be applied until patients have recovered fully from anaesthesia at the recovery area ● Patients should be observed at least 30 minutes post-ECT, to ensure haemodynamically stable before being transferred out from the recovery area

2.3.7 Discharge criteria

Patients should be observed at the recovery area for at least 30 minutes post-ECT administration to ensure stable haemodynamic and cardiac state before transferred back to ward post-anaesthesia.

Modified Post Anaesthesia Recovery Score is the scoring system used to determine whether a patient is ready to be discharged from the recovery area (refer Table 2.3(vii) on Modified Post Anaesthesia Recovery Score). A score of 6/6 is required before a patient is allowed to be discharged from the recovery area.

Table 2.3(vii): Modified Post Anaesthesia Recovery Score

No	Parameter	Criteria	Score
1	Activity	Able to lift head and has good hand grip None of the above	1 0
2	Respiration	Able to breath and cough easily Dyspnoeic or apnoeic	1 0
3	Circulation	BP within +/- 20% of pre-ECT level BP above or below 20% of pre-ECT level Pulse regular, within +/- 20% of pre-ECT rate Pulse irregular, above or below 20% of pre-ECT rate	1 0 1 0
4	Consciousness	Arousable Not responding	1 0
5	Colour	Pink Dusky	1 0

2.3.8 ECT in a daycare setting

Daycare or outpatient surgery is defined as a scheduled surgical procedure provided to patients who do not require hospital stay overnight. This practice has grown globally and is seen to offer several advantages especially in terms of cost effectiveness and patients' satisfaction.

i. Pre-ECT assessment

Pre-ECT assessment should be performed at the Anaesthetic Clinic at least 2 weeks before the procedure date to ensure adequate time to correct any abnormalities and allow the patient to be adequately informed and prepared for the procedure. In addition, timely pre-ECT assessment reduces cancellations and failure to attend the planned procedure. Patient selection should be based on social and medical criteria and agreed with the Anaesthesiology Department.

ii. Selection criteria of patients for daycare ECT

The followings are selection criteria to decide on suitability of patients for daycare ECT procedure (refer Table 2.3 (ix) on Criteria that need to be fulfilled for selection of patients for daycare ECT procedure).

Patient criteria:

a) Health factor: Patients classified as American Society of Anesthesiologists' (ASA) 1 and 2 are suitable for daycare surgery. Patients with ASA classification 3 can be selected after consultation with the anaesthetic team provided their disease is well controlled (refer Table 2.3 (viii) on The American Society of Anesthesiologists' (ASA) classification of physical status).

Table 2.3(viii): The American Society of Anesthesiologists' (ASA) classification of physical status

Class 1: Patient has no organic, physiological, biochemical or psychiatric disturbance. **Class 2:** Mild to moderate, systemic disturbance caused either by the condition to be treated surgically or by other pathophysiological processes. (e.g. slightly limiting organic heart disease; mild diabetes; essential hypertension; anaemia) **Class 3:** Severe systemic disturbance or disease from whatever cause, even if it may not be possible to define the degree of disability with finality. (e.g. severely limiting organic heart disease; severe diabetes with vascular complications; moderate to severe degrees of pulmonary insufficiency; angina pectoris; healed myocardial infarction)

b) Age limits: Patients older than 75 years old should not be selected.

c) Physical factors: Patients with no obvious features of difficult airway, or symptoms of Obstructive Sleep Apnoea (OSA) and has a BMI < 35 kg/m^2.

Social criteria:

a) Patient or relative / parents / guardian must be willing to cooperate and able to understand and comply with pre- and post-procedural instructions after receiving adequate information and an opportunity to discuss any anxieties.

b) Escort: Each patient selected for daycare ECT must have a physically and mentally capable escort, who is responsible for the patient's care and able to accompany the patient home and supervise his or her recovery at home for a minimum of 24 hours. In children, two responsible adults should accompany a child home – one to drive the car and the other to care for the child.

c) Transport: Suitable transport must be available to transport patients home post-ECT and also to come back to the hospital in the event of an emergency. Travel on public transport or motorcycle following a general anaesthesia is inappropriate.

d) Geography: Patients should live within 1 hour of travelling distance from hospital.

e) Social support: Patients must have access to or readily available telephone services at all times.

Table 2.3(ix): Criteria that need to be fulfilled for selection of patients for daycare ECT procedure

Patient Criteria			
		YES	**NO**
1.	ASA classification of 1 or 2	☐	☐
2.	Age 75 years old or less	☐	☐
3.	BMI less than 35 kg/m^2	☐	☐
4.	No features of difficult airway	☐	☐
5.	No symptoms of Obstructive Sleep Apnoea (OSA)	☐	☐
Social Criteria			
		YES	**NO**
1.	Patient/Relative/Parents/Guardian is capable to comply with instructions	☐	☐
2.	Physically and mentally capable escort	☐	☐
3.	Availability of suitable transport	☐	☐
4.	Lives within 1 hour travelling distance from hospital	☐	☐
5.	Readily available telephone services	☐	☐

iii. Practical conduct

The infrastructure which includes location, facility and staff including administrative staff should conform to national guidelines for patient care undergoing anaesthesia.[253] Anaesthetic technique should adopt the use of short-acting drugs with minimal hangover effect, to make the recovery of patients adequate and safe for discharge.

iv. Pre-ECT instruction for patients undergoing daycare ECT procedure: to be given to patients after assessment at Anaesthetic Clinic*

1. You should not eat any solid food after 12 midnight.
2. You can take unrestricted plain water until 2 hours before the procedure.
3. Do not drink any alcohol and stop smoking 24 hours before the procedure.
4. Take routine medications with small sips of water as directed by your psychiatrist or anaesthetist (please bring a list of these medications and the dosages with you).
5. Shower with soap, shampoo your hair and brush your teeth on the morning of procedure and remove all nail polish and makeup.
6. You are required to remove any contact lenses, dentures or partial plates before the procedure (remember to bring containers for these articles).
7. Leave all jewellery, money, watches and other valuables at home.
8. Wear comfortable and casual clothing that is easy to get on and off. The hospital will provide you with a gown or hospital attire and slippers.
9. Bring your appointment card and other related documents.
10. Before you come to the hospital, please make arrangements for an adult friend or relative to accompany you to and fro on the day of ECT.
11. Persons under 18 years of age must have the parents or guardian with them to sign consent form.

**Failure to follow the stated instructions may result in ECT procedure being cancelled.*

v. Criteria for home discharge

Fitness for discharge shall be protocol-driven, doctor-led discharge which is fundamental to safe and effective daycare ECT procedure. There should be clear written post-procedure instructions. The discharge criteria shall be strictly adhered to as safety of the patient upon discharge is of utmost concern. Patients should be free from any anaesthetic and ECT complications.

The followings are criteria that need to be fulfilled before a patient is being allowed discharged on the same day of procedure:

1. The patient must be awake, alert and orientated to person, place and time.
2. Vital signs must be stable.
3. The patient must be able to tolerate fluids.
4. Any pain should be manageable with oral analgesics.
5. There must be minimal nausea, vomiting and dizziness.
6. Upon discharge patients must be given:
   - Verbal and written instructions
   - A discharge prescription
   - Relevant contact numbers in case of an emergency
7. Patients will be informed that they may be contacted the next day by the daycare staff to enquire about their well-being.
8. Patients must be advised not to consume alcohol, drive, operate machinery and sign legal documents for at least 24 hours post-anaesthesia.
9. The patient must be accompanied by a responsible adult (2 adults for children) who will care and stay with the patient for at least 24 hours.

A Modified Post Anaesthetic Discharge Scoring Systems (PADSS) as shown on Table 2.3(x) that was developed for discharge after ambulatory surgery may be adopted for ECT use.[254] A PADSS score of ≥ 9 is required before a patient is allowed for home discharge.

Table 2.3(x): A Modified Post Anaesthetic Discharge Scoring Systems (PADSS)

	SCORE
Vital Signs	
Vital signs must be stable and consistent with age and pre-ECT baseline.	
BP and pulse within 20% of pre-ECT baseline	2
BP and pulse within 20-40% of pre-ECT baseline	1
BP and pulse >40% from pre-ECT baseline	0
Activity Level	
Patient must be able to ambulate at pre-ECT level.	
Steady gait, no dizziness (or meets pre-ECT level)	2
Requires assistance	1
Unable to ambulate	0
Nausea & Vomiting	
The patient should have minimal nausea and vomiting prior to discharge	
Minimal: successfully treated with oral medication	2
Moderate: successfully treated with intramuscular/intravenous medication	1
Severe: continues after repeated treatment	0
Pain	
The patient should have minimal or no pain prior to discharge. The level of pain that the patient has should be acceptable to the patient. Pain should be controllable by oral analgesics. The location, type and intensity of pain should be consistent with the anticipated post-ECT discomfort.	
Acceptability: Yes	2
No	0
Surgical Bleeding	
(Note that this is not applicable for ECT procedure, hence patient may gain 2 marks by default)	
Minimal: does not require dressing change	2
Moderate: up to two dressing changes required	1
Severe: more than three dressing changes required	0

Key Points

- ❖ Detailed history is warranted during pre-ECT anaesthetic assessment to ensure patients at risk of morbidity are identified.
- ❖ Deep anaesthesia should be avoided, as this can suppress seizures and reduce the effectiveness of ECT. However, too light anaesthesia can create unpleasant awareness under anaesthesia and potentially cause post-ictal agitation.
- ❖ Data is insufficient to recommend one specific induction agent for use in ECT; all available induction agents are suitable provided the Anaesthesia Provider is familiar and comfortable with the drug of choice.
- ❖ Whichever induction agent is being administered, it's use should be continued throughout the course of ECT treatment to avoid interference with seizure threshold.
- ❖ Succinylcholine remains the muscle relaxant of choice due to its rapid onset and short duration of action; however, caution is required on its side effects to certain group of patients.
- ❖ Preoxygenation of patients is important to improve safe apnoea time especially in susceptible patients with poor lung reserve.
- ❖ Holding the mask is normally adequate in view of the short duration of ECT procedure.
- ❖ Patients should be observed at the recovery area for at least 30 minutes post-ECT to ensure haemodynamically stable before discharge.
- ❖ The criteria for patient selection are important to decide which ECT patient is suitable for daycare setting.

2.4 Continuation and Maintenance ECT

Commonly, a course of acute ECT (aECT) is administered until one of the therapeutic end points is achieved i.e. either no further gains have been observed after the last 2 treatment sessions with a plateau in clinical improvement or a full recovery is attained. However, relapse rates for depressive disorder within 12 months have been shown to be over 50% with the majority of relapses occurred in the first 6 months despite maintenance pharmacotherapy or following a course of ECT.[255-258]

2.4.1 Definition of terms

- ➢ Continuation ECT (cECT) refers to ECT administered in the first 6 months after a successful course of aECT, with the aim of preventing relapse of that same episode of illness.[2]
- ➢ Maintenance ECT (mECT) refers to ECT given after the initial 6 months of cECT, with the aim of preventing recurrence of a new episode of illness[2], with no fixed endpoint.

2.4.2 Indications

After a course of aECT, cECT and mECT should be considered for cases that:

- demonstrated optimal response or achieved symptomatic remission with aECT, AND
- despite adequate adherence to optimal pharmacotherapy, subsequent response was inadequate with frequent relapses or recurrences, or poor tolerance to pharmacotherapy.

(i) For major depressive disorders, cECT and mECT have shown to be effective in:

- maintaining remission with significantly lower mean Hamilton Depression Rating Scale scores at 6 months post-aECT in elderly depressed patient as demonstrated by The Prolonging Remission in Depressed Elderly (PRIDE) study.[259]
- relapse or recurrent prevention in depressed adults with combination of cECT and mECT with pharmacotherapy,[260] with the flexibility of adjusting the frequency of cECT and mECT at early signs of relapse or recurrence.[261]
- relapse prevention for depression in adult and elderly patients with or without antidepressant[262] and adolescents with severe treatment-resistant depression.[263]
- relapse prevention in depressed adults without concomitant medications as compared with those on the combination of lithium and nortriptyline in the Consortium for Research in Electroconvulsive Therapy (CORE) study.[256]
- reducing hospitalization rates among cases with recurrent mood disorders on cECT.[264]

(ii) For schizophrenia, cECT and mECT:
- in combination with risperidone was shown in a prospective randomized controlled trial to have a lower relapse rate and longer relapse-free duration after a successful course of aECT.[265]
- in combination with antipsychotics (i.e. flupenthixol, risperidone, olanzapine and clozapine) reduced the relapsed episodes of psychosis in patients with schizophrenia.[266]

(iii) For treatment-resistant schizophrenia,
- administration of cECT has shown to be effective in lowering the rates of relapse when combined with oral flupenthixol compared to either treatment with oral flupenthixol or cECT alone.[267]
- combination of clozapine with cECT may be effective in preventing relapse among patients with clozapine-resistant schizophrenia.[268]

(iv) For bipolar disorder,
- administration of cECT and mECT has shown to be effective for relapse and recurrence prevention of any further mood episodes in patients who have responded to a course of aECT,[269] though evidence is not robust in some studies.

(v) For autism spectrum disorder,
- mECT has proven to be effective in the management of catatonia, agitation and self-injurious behaviour. However, evidence is only limited to case reports and case series.[10, 270, 271]

The evidence of efficacy for cECT and mECT in other major psychiatric illnesses has not been established.

2.4.3 Overall tolerability

(i) Physical or somatic risk

cECT and mECT appear to cause no adverse physical effect other than those found in aECT.

(ii) Cognitive risk

Generally, the extent of cognitive adverse effects of cECT or mECT is dependent on the interval period between treatment sessions i.e. risk is lower compared to aECT as the interval for cECT or mECT is of longer duration. Cognitive functions during cECT or mECT have been shown to be largely unaffected:
- A meta-analysis showed that after a course of either bilateral or unilateral brief pulse ECT, the cognitive test performance was only impaired within the first 3 days with improvements beyond baseline levels after 15 days in terms of processing speed, working memory, anterograde memory and some aspects of executive function.[272]
- A long-term mECT course over the span of 153 months demonstrated that cognitive functions remained largely unchanged as measured by Mini Mental State Examination (MMSE) and Neuropsychiatry Unit Cognitive Assessment Tool (NUCOG).[273]
- Cognitive performance among 199 patients who received several courses of ECT over 10 years did not lead to cumulative cognitive deficits.[274]

2.4.4 Principles of management

cECT should commence as soon as possible after termination of an aECT course, except when adverse effects necessitate a delay. Management of cECT or mECT should consider the frequency of sessions, duration of course, choice of electrode placement, stimulus dose adjustment and concurrent pharmacotherapy.

Frequency of cECT and mECT sessions
- An optimal or standard protocol for timing of treatments remains to be determined systematically.
- Timing of treatments should be individualized for each patient and adjusted accordingly after considering both clinical outcome and adverse effects.
- Three types of schedules in clinical practice:

- Tapered schedule: treatment often starts weekly for 2 to 4 weeks then a gradual decrease in frequency to once per month.
- Fixed-interval schedule: treatment for every 1 to 4 weeks.
- As-needed schedule: for each episode of impending relapse, consider increasing the frequency of sessions or provide rescue sessions as either a single ECT treatment or a short course of 2 to 3 treatment sessions.[259, 275, 276]

- A possible suggestion for frequency of cECT and mECT sessions is based on a fixed interval in a tapered treatment schedule with as-needed approach, depending on the patient's clinical response and adverse effect(s) i.e. treatment schedule for the first 6 months of cECT:
  - biweekly for 2 weeks, then
  - weekly for 4 weeks, then
  - 2 weekly for 4 weeks, then
  - 3 weekly for 6 weeks, then
  - 4 weekly for 8 weeks, and onwards for mECT phase (if required)
  - for relapsed or recurrent episodes in-between the intervals, aECT treatment sessions can be given (number of sessions depends on severity of each episode) or revert to earlier treatment interval and proceed at individualised timing.
  - Overall clinical treatment plan should be reviewed at 3 months and 6 months post-cECT, and thereafter every 6 months.
- The clinical outcome should be performed at baseline (prior to initiation of cECT) and subsequently at 3 months and 6 months post-cECT, and thereafter every 6 months. Assessment tools for monitoring of clinical progress may include:
  - Cognitive function: NUCOG / MMSE / Montreal Cognitive Assessment (MoCA)
  - General psychopathology: Clinical Global Impression-Severity Scale (CGI-S)
  - Depression: Hamilton Depression Rating Scale (Ham-D)
  - Psychosis: Brief Psychiatric Rating Scale-24 (BPRS-24)
  - Mania: Young Mania Rating Scale (YMRS)

<u>Duration of cECT and mECT course</u>

- If the patient's illness has remained in remission or no recurrence for a relatively long period of time, an attempt may be initiated to taper off the cECT or mECT and monitor closely for signs of impending relapse or recurrence as,
  - the recurrence rate after discontinuation of mECT (mean of 12.69 months on mECT) was observed to be 50% with 44% of the recurrences occurred during the first 6 months for mood disorders.[277]
  - within the first 8 months, after discontinuation of cECT and mECT (mean of 19 months on treatment, ranging from 1 to 78 months), approximately 44% of patients relapsed or had recurrence of symptoms with a higher risk for those with bipolar disorder, schizophrenia and schizoaffective disorder than those with major depressive disorder.[278]
  - after discontinuation of cECT and mECT (mean of 12.5 months on treatment), the risk of relapse and recurrence is higher among patients with treatment session interval of less than one month and those with more previous relapsed or recurrent episodes.[279]
- Generally, if attempts to space out the interval sessions and / or withdraw mECT have failed in the past, mECT may be required indefinitely.[280]

<u>Electrode placement</u>

- In most cases, it is appropriate to use the same electrode placement and pulse width that were effective with the acute course.

<u>Stimulus dose</u>

- Stimulus dose may need to be adjusted as and when necessary, as ST may reduce over time with less frequent cECT or mECT.

<u>Concurrent pharmacotherapy</u>

- Nearly all published literature recommended the concurrent use of antidepressants and antipsychotics.[269]

- Concurrent use of mood stabilisers in cECT and mECT is unknown but lithium should be used cautiously due to the reported increased risk of post-ECT confusion and cognitive impairment.[281]
    - Lithium is recommended to be discontinued at least 48 hours before ECT with longer washout period for high or toxic level[53, 91] and maintaining lithium level at lower therapeutic range.[11, 86]
- Mood stabilisers are generally withheld on the night before and the morning prior to each treatment session[2, 269] and resumed after ECT is done.[259]
    - On the use of mood stabiliser as an anticonvulsant in epilepsy cases, the morning dose is usually withheld before ECT[2] (consultation with the neurologist or physician may be required prior to ECT initiation).
- Shorter-acting benzodiazepines such as lorazepam or reversing benzodiazepines with flumazenil at the time of ECT should be considered.[269]
- Systemic medications should be continued with caution especially those which can affect ECT efficacy.[269]

Pre-ECT investigations

- Investigations may not be necessary for healthy patients undergoing short minimally invasive procedures such as ECT.[245]
- However, it is based on the assessment of the attending Anaesthesia Provider to order investigations deemed necessary prior to ECT.
- Refer Table 2.3(i) on Pre-ECT anaesthetic assessment (on Investigations) in subsection 2.3 on Practical Aspects of Anaesthesia for recommended tests on cECT and mECT patients planned for administration of general anaesthesia.

Key Points

- ❖ After a course of aECT, cECT and mECT should be considered for cases that:
  demonstrated optimal response or achieved symptomatic remission with aECT, AND
  despite adequate adherence to optimal pharmacotherapy, subsequent response was inadequate with frequent relapses or recurrences, or poor tolerance to pharmacotherapy.
- ❖ Overall cognitive functioning is largely unaffected during cECT and mECT.
- ❖ No standard protocol for timing of treatments; however, a possible treatment schedule suggestion for cECT:
    - biweekly for 2 weeks, then
    - weekly for 4 weeks, then
    - 2 weekly for 4 weeks, then
    - 3 weekly for 6 weeks, then
    - 4 weekly for 8 weeks, and onwards for mECT phase (if required); with aECT for each relapsed or recurrent episode in-between interval or revert to earlier treatment interval with individualised timing.
- ❖ Assessment for clinical outcome, adverse effects of cECT and mECT as well as indication to continue should be done periodically.
- ❖ Generally, if attempts to space out the interval sessions and / or withdraw mECT have failed in the past, mECT may be required indefinitely.
- ❖ Same electrode placement and pulse width are recommended in cECT and mECT as in the acute course of ECT.
- ❖ Adjustment of stimulus dose may be needed due to reduction in ST with less frequent cECT or mECT.
- ❖ Antidepressants and antipsychotics are recommended to be continued with cECT and mECT, with judicious use of mood stabilisers, benzodiazepines and other systemic medications.
- ❖ Investigations required for general anaesthesia are determined by the assessment of the attending Anaesthesia Provider prior to ECT.

Clinical governance is a system through which an organisation (in this case the Electroconvulsive Therapy or ECT unit) is enabled to continually improve the quality of its services and safeguard high standards of patient care in a setting in which provision of excellent clinical care is given an upmost priority. [282] It encompasses adherence to current legislation pertaining to ECT, review and monitor of ECT service, maintaining the level of competency among ECT practitioners and accreditation standard, as well as a commitment to education and training, and participation in quality initiatives or research development. Figure 3(i) shows the six core elements of clinical governance in ECT.

- Prior to the implementation of clinical governance in ECT, a local core committee team needs to be established first that includes the psychiatrist, medical officer and ECT Co-ordinator, and preferably an anaesthetist (number of members depends on manpower capacity in the hospital).

- The major role of the ECT committee is to ensure adherence of the local ECT unit to the six elements of clinical governance. Operational meetings on clinical matters, policies, procedures and administration related to ECT should be held on a regular basis.

Figure 3(i): Six core elements of clinical governance in Electroconvulsive Therapy (ECT)

3.1 Legislation and Consent in ECT

As ECT is a regulated surgical procedure, it is governed by specific legislation in Malaysia i.e. Mental Health Act 2001 and Mental Health Regulations 2010.

3.1.1 Mental Health Act 2001 (MHA 2001)[283]

The provision that relates to ECT is contained in Section 77 of the MHA 2001 that addresses on the consent of a mentally disordered person who is required to undergo ECT.

i. Informed consent may be obtained:
   a. first from the patient himself if he is capable of giving consent as assessed by a psychiatrist.
   b. from his guardian in the case of a minor (child), or a relative in the case of an adult, if the patient is incapable of giving consent.
      - According to the Malaysia Child Act 2001[284], a child is defined as a person under the age of 18 years; therefore, the consent for ECT must be obtained from the child's guardian i.e. the parent or parents of the minor, or a person lawfully appointed by will or by an order of a competent Court to be the guardian of the minor, or a person who has lawful custody of the minor.
   c. from two psychiatrists, one of whom shall be the attending psychiatrist, if there is no guardian or relative of the patient available or traceable and the patient himself is incapable of giving consent.

ii. In cases of emergencies, consent for ECT may be given
   a. by the guardian or a relative of the patient, or
   b. by two medical officers or two registered medical practitioners, one of whom shall preferably be a psychiatrist, if there is no guardian or relative of the patient immediately available or traceable.

iii. In determining whether or not a mentally disordered person is capable of giving consent, the examining psychiatrist shall consider whether or not the person examined understands:

a. the condition for which the treatment is proposed
b. the nature and purpose of the treatment
c. the risks involved in undergoing the treatment
d. the risks involved in not undergoing the treatment, and
e. whether or not his ability to consent is affected by his condition

3.1.2 Consent for ECT

For ECT, the consent should be in writing and documented on specific forms for medicolegal purposes.[285]

i. The written informed consent on ECT procedure is required to attest the consent has been obtained appropriately from patient, relative or guardian, or two psychiatrists, with a qualified witness to the process and certified by the ECT Prescribing Psychiatrist (refer 3.3.2 on Roles and Responsibilities). Any of these ECT consent forms is to be completed and correctly filled in i.e.
   a. Patient's Consent Form for ECT (**refer Appendix 1 & 2**)
   b. Relative's / Guardian's Consent Form for ECT (**refer Appendix 3 & 4**)
   c. Consent by Two Psychiatrists for ECT (**refer Appendix 5**)
      - The ECT Information Sheet (**refer Appendix 6**) is attached to the consent forms to provide a more detailed explanation on ECT to patient, relative or guardian prior to signing the form.

ii. For informed consent on anaesthetic procedure i.e. administration of general anaesthesia and muscle relaxant, the Anaesthesia Disclosure and Consent form (**refer Appendix 7 & 8**) is to be completed by the Anaesthesia Provider in-charge.

iii. Informed Consent for ECT
   a. The psychiatrist in-charge should assess the patient's capacity to give informed consent for ECT and be involved in the consent-taking process by discussing the procedure with the patient or by delegating this responsibility to the Medical Officer who is directly involved in the patient's care.
   b. In order to provide informed consent and for the patient to make an informed decision, sufficient information must be given in both verbal and written format that the patient can understand (**refer Appendix 6 on ECT Information Sheet**) i.e.
      - the current condition that requires ECT
      - the nature and purpose of ECT
      - expected benefits and likely risks without ECT
      - likely discomforts or side effects and risks associated with ECT including cognitive impairment
      - benefits and risks of alternative treatment(s) explained
      - preparation before procedure on that day
      - explanation on anticipated events during ECT (including change in placement of electrodes) and after procedure
      - opportunity to ask any further questions about ECT
   c. For a patient with the capacity to give informed consent, the consent is given voluntarily, not under coercion or undue pressure.

iv. Informed Consent for anaesthesia
   a. The capacity to give informed consent for ECT procedure is a prerequisite to obtain consent for anaesthetic procedure, in accordance with subsection 3.1.1 on MHA 2001 in the order in which ECT informed consent is obtained.

v. Validity of ECT consent form
   a. ECT is unique compared to other surgical procedures as a single course of ECT consists of several treatment sessions over a period of time.
   b. The validity of ECT consent form in Malaysia is for a period of four (4) weeks i.e.
      - Acute phase: a period of up to four (4) weeks at a treatment interval of 2 or 3 sessions per week;

- Continuation or Maintenance phase: a period of up to four (4) weeks at a treatment interval determined by the ECT Prescribing Psychiatrist.

c. The duration of the course of ECT commences on the date of the first treatment session, not the date that the consent form is signed by the patient or relative / guardian giving the informed consent.
   - However, the time interval between the date of the first treatment session and date of signature should not be more than one (1) week.

d. The psychiatrist in-charge is responsible for reviewing each treatment session and monitoring the clinical response of patient and any ECT-related sequelae. The next session is then either continued or the course terminated before the consent validity expired based on the clinical judgement of the psychiatrist.

e. For the continuation of another ECT course, the decision is to be re-discussed with the patient or relative / guardian or as determined by the two assigned psychiatrists, and a new consent form is then required.

vi. Validity of anaesthetic consent form
   a. The validity of anaesthetic consent form corresponds to the validity of ECT consent form.

vii. Invalidity of ECT consent form
   a. The consent form for ECT procedure is rendered invalid and a new form is required in the following situations:
      - information on the consent form is incomplete, incorrectly entered or not clearly stated
      - change of hospital in which ECT is to be administered
      - change in the ECT phase e.g. from acute ECT to continuation phase
      - stipulated duration of course exceeded i.e. more than four (4) weeks
      - when the interval between two treatment sessions is more than seven (7) days (for acute ECT phase only)
      - change in principal diagnosis for which the consent had initially been obtained
      - time interval between the date of the first treatment session and date of signature by patient / relative / guardian is more than one (1) week.
      - change in patient's capacity to give informed consent due to change in psychiatric condition

viii. Invalidity of anaesthetic consent form
   a. The consent form for anaesthetic procedure is rendered invalid and a new form is required in the following situations:
      - when consent form for ECT procedure is invalid, and
      - change in the nature, presentation or clinical course of the patient's medical condition which can alter the management of patient for which the consent had initially been obtained.

3.1.3 Mental Health Regulations 2010 (MHR 2010)[283]

Part IV of MHR 2010 is specifically on ECT with mentions as follows:

i. The decision to initiate ECT and the number of treatment sessions on any patient in any psychiatric hospital shall be made by a psychiatrist.

ii. All ECT on any patient is to be conducted in an operating theatre or treatment suite of the psychiatric hospital by a psychiatrist or a medical officer or registered medical practitioner under the supervision of a psychiatrist.

iii. The operating theatre or treatment suite shall have a dedicated waiting, treatment and recovery rooms or area which are:
   - adequately lit and ventilated, and
   - adjoining and connected to each other.

iv. The operating theatre and treatment suite shall not be used as traffic flow.

v. The treatment room in the operating theatre or treatment suite shall have a minimum dimension of 16 square meters and dedicated area for ECT equipment, supplies and records.

- For the ECT suite, minimum requirement of equipment includes the ECT device, device for monitoring electrocardiogram (ECG), device for monitoring blood pressure, pulse oximeter, oxygen delivery system capable of providing intermittent positive pressure oxygen by mask or endotracheal tube, suction apparatus, intubation set with airways (assorted sizes), defibrillator, and an emergency drug trolley with a list of emergency drugs.

vi. The recovery room or area shall have a dedicated staff with the relevant qualification, training and experience.

vii. The oxygen supplies in the treatment and recovery rooms or area shall be adequately monitored and recorded in a logbook.

viii. The ECT device shall have regular maintenance according to the manufacturer's guidelines and all maintenance activities, test results, deficiencies and corrective measures shall be documented in a logbook.

3.2 Review and Monitor ECT Service

ECT procedure commences when it is prescribed and consent is obtained and ends when the course is completed. Thus, a protocol on the management of ECT cases from the time of prescription till its completion needs to be properly undertaken specifically with regards to the assessment of capacity to give informed consent and documentation of implementation process.

➢ For subsections 3.2.1 on Pre-ECT preparation, 3.2.2 on Monitoring of patient during ECT procedure and 3.2.3 on Monitoring of patient post-ECT procedure, **refer Appendix 9 on Work Process on Management of Electroconvulsive Therapy (ECT) Cases (inpatient & outpatient cases)**.

3.2.1 Pre-ECT preparation

- Pre-ECT management includes initial identification of cases as outpatient (daycare) or inpatient after ECT is prescribed.
  - For an outpatient case, the patient is managed as for a daycare procedure and generally for continuation or maintenance ECT.
    - Outpatient ECT may be suitable for those with relatively less severe illness with low risk of suicide, no evidence of cognitive impairment during the ECT course, no significant medical illnesses, no impaired nutrition or hydration, low anaesthetic risk, the ability to adhere to pre-ECT preparation (e.g. fasting) and with good family or caregiver support who is able to provide transport to and from the hospital for ECT.[177]
  - For inpatient cases, these are either for acute phase or continuation or maintenance phase.

- Patient's capacity to give informed consent is first assessed by the psychiatrist in-charge (i.e. ECT Prescribing Psychiatrist or Treating Psychiatrist; refer 3.3.2 on Roles and Responsibilities) and the relevant consent form is then filled in.

- Pre-ECT investigations are subsequently performed (if relevant) and the ECT Prescription & Review Form or ECT-PRESCRIBE form (**refer Appendix 10**) is completed. The ECT-PRESCRIBE form is to be filled in each time the relevant ECT consent form is required e.g when ECT is prescribed, or a new ECT consent form is needed.
  - If eligible for ECT, the case is informed to the anaesthetic team by submitting the Schedule on Electroconvulsive Therapy (ECT) Cases (**refer Appendix 11**) according to the designated day and timing of the respective hospital**.** Pre-ECT assessment by the anaesthetic team is then performed (refer subsection 2.3 on Practical Aspects of Anaesthesia) and the Anaesthesia Disclosure and Consent (refer Appendix 7) is filled in.
    - However, the anaesthetic team should be duly informed in advance for cases that require special precaution during ECT procedure for early pre-ECT anaesthetic assessment (refer subsection 1.5 on Special Populations).

- Prior to sending patient to the treatment area, the ECT Treatment Session Form or ECT-SESSION form (**refer Appendix 12**) i.e. Section 1 on Current ECT Treatment and Section 2 on Pre-ECT Treatment Checklist, are to be completed by the staff in-charge.

3.2.2 Monitoring of patient during ECT procedure

- Immediately prior to delivering ECT to patients, a time-out period is to be initiated in the treatment area (refer Section 3: Time Out in Treatment Area on ECT-SESSION form).
  - Time out is a pre-ECT verification procedure that aims to facilitate or improve the safety of ECT and reduce the risk of any potential error in its administration.[286]

- During time out, all tasks undertaken by the ECT team and anaesthetic team are suspended at that particular time, in order to ensure that all required items are correctly done, ready or in place before administering the anaesthetic drugs and delivering the stimulus dose or electrical charge. These items include [refer Figure 3 (ii) on Electroconvulsive Therapy (ECT) Time-Out Visual Chart]:
  - correct patient identity
  - dentures out (if applicable)
  - bite block in place
  - correct electrode placement (both recording and stimulus electrodes)
  - correct, valid, completed and signed consent form
  - completed and certified ECT-PRESCRIBE form
  - pre-ECT treatment observation done
  - correct stimulus dose to be given
  - correct pulse width to be given
  - correct type and dose of anaesthetic medication (induction agent and muscle relaxant) to be given

- Time out ensures that the right patient is for the right procedure, done in the right manner. Time out is to be conducted together by the ECT Administering Psychiatrist or ECT Medical Officer (under supervision of ECT Administering Psychiatrist), ECT Co-ordinator and Anaesthesia Provider.

- Following time out, the stimulus dose is to be delivered after anaesthetic team has administered the induction agent and muscle relaxant.

- After ECT procedure is performed, Section 3 on Time Out in Treatment Area in the ECT-SESSION form is to be completed.

Figure 3(ii): Electroconvulsive Therapy (ECT) Time-Out Visual Chart

3.2.3 Monitoring of patient post-ECT procedure

- After completion of ECT procedure, patient is transferred from the treatment area to the recovery area for observation before sending to the ward for inpatient case for further observation (refer Section 4 on Post-ECT Recovery on ECT-SESSION form).

- Outpatient case will be discharged home once stable.

3.2.4 ECT-related incidents

- The ECT committee in each hospital should have a monitoring system in place to ensure that any ECT-related incidents and events are reported appropriately and responded to accordingly.

- Analysis of risk factors and re-examination of remedial measures or implementation of additional control measures may need to be undertaken to prevent further similar incidents.

3.2.5 Management of ECT during COVID-19 pandemic

- During the drafting of this guideline, issues on the practice of ECT in the midst of the COVID-19 pandemic was pertinent as ECT is an aerosol generating procedure that poses a high risk of viral transmission.
    - Following that, Guideline on Management of Electroconvulsive Therapy During COVID-19 Pandemic has been drawn up and can be viewed as Annex 37 on http://covid-19.moh.gov.my/garis-panduan/garis-panduan-kkm
    - As the pandemic evolves with increased transmissibility, limitations of available staff and facilities are inevitable, including transit rooms for patients awaiting reverse transcription-polymerase chain reaction (RT-PCR) test result e.g. due to certain hospitals in Malaysia experiencing emergence of positive COVID-19 cases in the psychiatric ward and the need to isolate these cases in a separate room(s) or increasing number of suspected cases detected that required to be isolated in a room(s) from the general psychiatric ward.
        - As such, in these hospitals with limited transit rooms, for those patients on continuation or maintenance ECT who need ECT:
            - conduct initial pre-ECT risk assessment (e.g. indication for ECT, contact with positive COVID-19 cases, physical symptoms)
            - schedule the admission date for ECT and secure availability of the transit room(s)
            - on admission day, do the screening questionnaire and perform the Rapid Test Kit-Antigen (RTK-Ag) test
            - if tested negative with RTK-Ag, for entry into the transit room and to wait for RT-PCR test result
            - if RT-PCR test result is negative, to transfer patient to general psychiatric ward and proceed with ECT as planned
    - For further management on anaesthesia care for ECT during COVID-19 pandemic, **refer Appendix 13**.

- **Post-COVID-19 positive cases**
    - At the time of publishing this guideline, ECT data on the management of post-COVID-19 positive cases was still emerging though insufficient to recommend or establish a protocol.
    - No study specifically measures the direct effect of ECT that may potentially impact the physical condition of the patients who just recovered from COVID-19 infection.
    - In Covid-19 positive cases, it is advisable to avoid ECT during the first two weeks unless it is urgent and life-saving[287-289] and the pre-ECT anaesthetic risk assessment should be individualized as well.
        - For such cases, it is recommended to follow the American Society of Anesthesiologists (ASA) and Anesthesia Patient Safety Foundation (APSF) Joint Statement on Elective Surgery and Anesthesia for Patients after COVID-19 Infection (**refer Appendix 14**) on timing for ECT after recovery from COVID-19 and repeat of RT-PCR testing.
    - Post-COVID-19 cardiac and pulmonary sequelae e.g. bacterial pneumonia, pneumothorax and pleural effusion may frequently complicate ECT procedure[290] that requires general anaesthesia, and thus thorough pre-ECT assessment is required.[291]

3.3 Monitor Staff Competence

The ECT treatment team is required to be privileged to perform ECT in the respective hospital. Each ECT unit is responsible to designate the required roles and responsibilities to the qualified staff in-charge.

3.3.1 Credentialing and Privileging

- Credentialing refers to the formal process of verifying the qualifications, training, experience and professional attributes of a medical practitioner for the purpose of establishing the clinician's performance, competence and professional suitability to provide a safe and high quality ECT within a specific organisational environment.

- Clinical privileging is a process that involves delineating the extent of a medical practitioner's clinical practice within a particular organisation based on credentials and level of competence.

i. Psychiatrist

- Given the advances and technical complexity of modern ECT, the general credentialing of a psychiatrist to practise psychiatry in a particular hospital is not of itself sufficient to confer the privilege to prescribe and administer ECT [refer Figure 3(iii) on Monitoring process on competency of Psychiatrist in ECT].

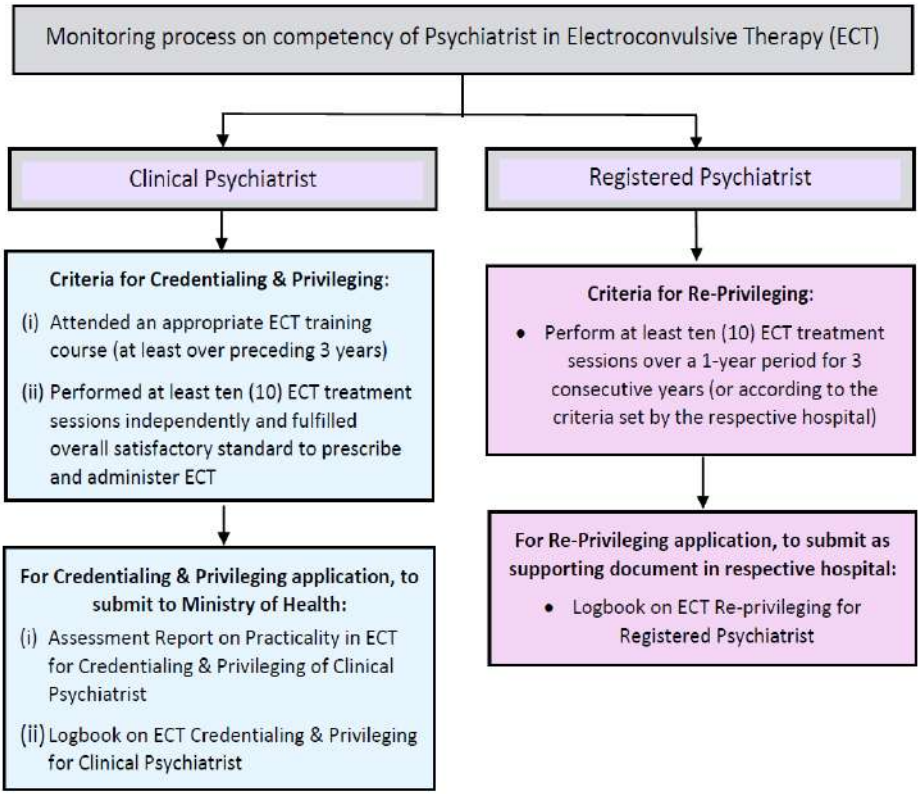


Figure 3(iii): Monitoring process on competency of Psychiatrist in Electroconvulsive Therapy (ECT)

a. Clinical Psychiatrist

- For Credentialing & Privileging purpose, the Clinical Psychiatrist* is required to have:
  - attended an appropriate ECT training course** (at least over the preceding 3 years), and
  - performed at least ten (10) ECT treatment sessions independently in the ECT treatment area and fulfilled an overall satisfactory standard to prescribe and administer ECT based on the assessment on practicality in ECT (**refer Appendix 15 on Assessment Report on Practicality in ECT for Credentialing & Privileging of Clinical Psychiatrist**);
    - the purpose of assessment is to determine the competency of Clinical Psychiatrist to deliver ECT in a safe and effective manner.

* a medical practitioner who is yet to be registered under the Medical (Amendment 2012) Act 1971[292] to practise as a specialist and whose name has not been entered into the National Specialist Register (NSR) of the Malaysian Medical Council.

** ECT training course may be conducted at each respective departmental or hospital level with lectures covering the sections in this guideline.

- Both,
  - Assessment Report on Practicality in ECT for Credentialing & Privileging of Clinical Psychiatrist, and
  - Logbook on ECT Credentialing & Privileging for Clinical Psychiatrist **(refer Appendix 16)**

  are to be submitted as supporting documents for Credentialing & Privileging application on ECT.

b. Registered Psychiatrist

- Each hospital granting privileges for ECT should have policies and procedures in place to maintain ongoing privileges. This practice of re-privileging is required to ensure that a sustained level of clinical competence is achieved.

- For re-privileging purpose, the registered psychiatrist i.e. registered under the Medical (Amendment 2012) Act 1971, is required to perform at least ten (10) ECT treatment sessions over a 1-year period for 3 consecutive years (or according to the criteria set by the respective hospital).

- When applying for re-privileging in ECT, apart from the documents in compliance with the requirement in each respective hospital, the supporting document to be attached is the Logbook on ECT Re-privileging for Registered Psychiatrist (**refer Appendix 17**).

ii. ECT Medical Officer

- ECT Medical Officer is a registered medical practitioner, either a medical officer in service or a trainee in the psychiatry training program.

- For privileging purpose, the Medical Officer is required to have:
  - attended an appropriate ECT training course (at least over the preceding 3 years), and
  - assisted at least ten (10) ECT treatment sessions under the supervision of an ECT Administering Psychiatrist (EAP) in the ECT treatment area and fulfilled an overall satisfactory standard for an ECT privileged Medical Officer based on the assessment on practicality in ECT (**refer Appendix 18 on Assessment Report on Practicality in ECT for Privileging of Medical Officer**).

- Both,
  - Assessment Report on Practicality in ECT for Privileging of Medical Officer, and
  - Logbook on ECT Privileging for Medical Officer (**refer Appendix 19**)

  are to be submitted as supporting documents for privileging application on ECT.

- For re-privileging purpose, the Medical Officer is required to assist at least ten (10) ECT treatment sessions over a 1-year period for 3 consecutive years (or according to the criteria set by the respective hospital), and submit the Logbook on ECT Re-privileging for Medical Officer (**refer Appendix 20**) as the supporting document for re-privileging application in the respective hospital.

iii. ECT Co-ordinator

- ECT Co-ordinator is an Assistant Medical Officer or a nurse in psychiatry care with a recognized Diploma or Degree for Assistant Medical Officer / Nursing, who is required to have:
  - attended an appropriate ECT training course (at least over the preceding 3 years),
  - at least 6 months of experience working in a psychiatry ward with ECT service,
  - observed at least 2 ECT procedures and perform competently at least 2 ECT procedures in the ECT treatment area within the 6-month period prior to being credentialed and privileged for ECT[293]
  - recommendation and appointment from the Head of Psychiatry Department or Hospital Director (priority given for Assistant Medical Officer or nurse with Advanced Diploma in Psychiatric Nursing)

iv. Anaesthetist

- A registered Anaesthetist is credentialed by the Ministry of Health, Malaysia and privileged to provide anaesthesia in the respective hospital.

v. Anaesthetic Medical Officer

- Anaesthetic Medical Officer is a registered medical practitioner, with at least 1-year experience in Anaesthesiology and critical care and privileged to perform anaesthesia by the respective hospital.

vi. Non-Anaesthetist Medical Officer

- Non-Anaesthetist Medical Officer is a registered medical practitioner who administers sedation for ECT procedures at selected hospitals with psychiatric services in Malaysia.

- For privileging on providing sedation in ECT **[refer Appendix 21 on Logbook on Privileging Non-Anaesthetist Medical Officer Providing Sedation in Electroconvulsive Therapy (ECT)]**, the Non-Anaesthetist Medical Officer is required to have:
  - undergone a minimum of one (1) month training in an Anaesthesiology Department i.e. to observe or assist at least two (2) each, and perform satisfactorily at least ten (10) each for the procedures that include:
    - Pre-sedation assessment
    - Mask ventilation ± oropharyngeal airway insertion
    - Endotracheal intubation
    - Supraglottic airway device insertion
    - Peripheral venous cannulation
    - Oropharyngeal and endotracheal suctioning
    - Post-sedation care and monitoring
  - attended Continuing Medical Education (CME) sessions on practical aspects of anaesthesia (refer subsection 2.3 on Practical Aspects of Anaesthesia)

vii. Trained Anaesthetist Medical Assistant / Recovery Nurse

- A trained Anaesthetist Medical Assistant / Recovery Nurse is an Assistant Medical Officer or a nurse in perioperative care with a recognized Diploma or Degree for Assistant Medical Officer / Nursing, and completed the required logbook or credentialed with recommendation from the supervisor or Head of Anaesthesiology Department.

3.3.2 Roles and Responsibilities

Although the roles and responsibilities of the staff in-charge of ECT may overlapped including the psychiatrist in prescribing ECT, administering ECT and treating ECT patients, it is important to recognise the respective entailment of each designation to ensure smooth implementation of the whole ECT process. In cases of staff with delineated duties, it is vital to communicate with each other for the overall management and care of ECT patients.

- Staff in-charge of ECT from the psychiatric team include ECT Prescribing Psychiatrist, ECT Administering Psychiatrist, Treating Psychiatrist, ECT Medical Officer, Treating Medical Officer and ECT Co-ordinator [refer Figure 3(iv) on Electroconvulsive Therapy (ECT) Psychiatric Team].

- Anaesthetic team include Anaesthesia Provider (i.e. Anaesthetist, Anaesthetic Medical Officer or Non-Anaesthetist Medical Officer), Trained Anaesthetist Medical Assistant and Recovery Nurse [refer Figure 3(v) on Electroconvulsive (ECT) Anaesthetic Team].

i. ECT Psychiatric Team

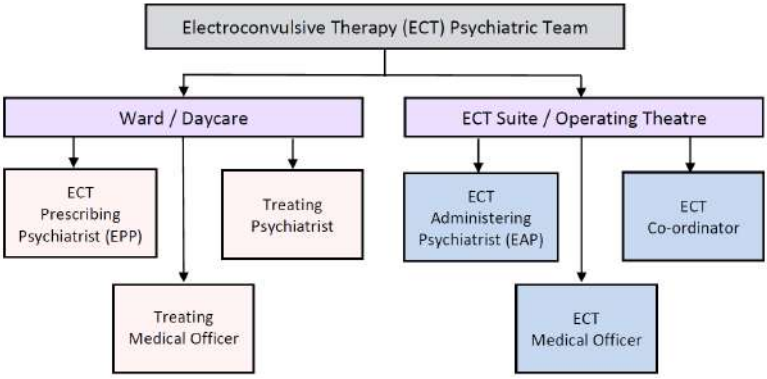


Figure 3(iv): Electroconvulsive Therapy (ECT) Psychiatric Team

a. ECT Prescribing Psychiatrist (EPP)

EPP is an ECT privileged psychiatrist, and is often the psychiatrist who treats and manages the patient in ward or daycare from the time ECT was prescribed till completion of ECT course, either acute or continuation/maintenance ECT.

Responsibilities:

- Initiate or prescribe ECT and determine the phase of either acute or continuation/maintenance ECT prior to certifying the relevant consent form for ECT.
- Assess patient's capacity to give informed consent for ECT and determine the relevant consent form to use (may delegate the consent-taking process to Treating Medical Officer to discuss the ECT procedure with the patient or relative / guardian).
- Ensure all required pre-ECT investigations (if any) are completed before commencing ECT.
- Ensure information in the relevant consent form, ECT-PRESCRIBE form and ECT-SESSION (Section 1: Current ECT Treatment) form is complete and correctly entered prior to certifying the forms.
- Decide the type of placement for stimulus electrodes.
- Decide the stimulus dose and record it in the STIMULUS DOSE (%) boxes on the ECT-SESSION form (Section 3: Time Out in Treatment Area) prior to each treatment session.
- Monitor clinical response of patient to ECT and any ECT-related sequelae in particular during the post-ECT period e.g. post-ictal agitation.
- Decide termination of an ECT course.

b. ECT Administering Psychiatrist (EAP)

EAP is an ECT privileged psychiatrist, whose duties basically confined to the treatment area of the ECT suite or operating theatre during ECT treatment session days. EAP may be scheduled on a rotational basis depending on the availability of manpower or staff capacity.

Responsibilities (EAP may assign the following tasks to the ECT Medical Officer in-charge under the supervision of the EAP in the treatment area):

- Ensure information in the relevant documents i.e. consent form, ECT-PRESCRIBE form and ECT-SESSION (Section 1 and Section 2) form is complete and correctly entered and signed prior to proceeding with the case in the treatment area;
    - failure to adhere to this proper documentation may result in cancellation of the particular case by EAP.
- Position the recording and stimulus electrodes (with adjustable rubber headband or hand-held).
- Initiate and perform the time-out session with ECT Co-ordinator and Anaesthesia Provider, and sign off on the Time-Out Items subsection on ECT-SESSION form to certify time out has been correctly performed.
- Deliver the stimulus dose (after checking the correct dose to be administered) and titrate accordingly.
- Sign off the ECT-SESSION form (on Section 3: Time Out in Treatment Area) for conducting the ECT in the treatment area.
- Liaise with the anaesthetic team to address any possible complications during the ECT procedure e.g. termination of a prolonged seizure with intravenous propofol by anaesthetic team.
- Collaborate with team members from other disciplines in preparation of certain groups of patients in the treatment area e.g. pregnant patient or those with cardiac pacemaker (refer subsection 1.5 on Special Populations).
- Attend to post-ECT patient in recovery area if required e.g. to manage post-ictal disorientation and agitation.
- Communicate with EPP on matters related to ECT procedure e.g. close monitoring of possible complication post-procedure such as post-ictal confusion in ward due to a prolonged seizure.

c. Treating Psychiatrist

Treating Psychiatrist, is the psychiatrist in-charge of directly managing the patient in ward or daycare from the time ECT was prescribed till completion of ECT course, either acute or continuation/maintenance ECT. However, Treating Psychiatrist is not an ECT privileged psychiatrist. The roles and responsibilities share with those of EPP except to initiate or prescribe ECT and determine the phase or to certify the consent form.

d. ECT Medical Officer

ECT Medical Officer's duties are basically confined to the treatment area during ECT treatment session days.

Responsibilities:

- Enter patient's data into the ECT machine's electronic medical record (depends on model).
- All the tasks assigned by EAP (refer Responsibilities of EAP) and performed under the supervision of the EAP in the treatment area.

e. Treating Medical Officer

Treating Medical Officer is in-charge of directly managing the patient in ward or daycare from the time ECT was prescribed till completion of ECT course, either acute or continuation/maintenance ECT.

Responsibilities:

- Conduct consent-taking process by discussing the ECT procedure with the patient or relative / guardian as delegated by EPP or Treating Psychiatrist.
- Ensure all required pre-ECT investigations (if any) are completed before commencing ECT.

- Ensure information in the relevant consent form (except Consent by Two Psychiatrists for ECT) and ECT-PRESCRIBE form is complete and correctly entered prior to certification by EPP and EPP or Treating Psychiatrist respectively.
- Fill in Section 1: Current ECT Treatment on ECT-SESSION form before each treatment session and ensure it is complete and correctly entered and may sign it off if assigned by EPP or Treating Psychiatrist.
- Ensure Section 2: Pre-ECT Treatment Checklist on ECT-SESSION form is done by staff in-charge prior to sending patient to ECT suite / operating theatre.
- Review patient's status during each post-ECT recovery period in the ward or daycare and in-between treatment sessions.

f. ECT Co-ordinator

ECT Co-ordinator is privileged for ECT procedures and depending on manpower capacity, may adopt the role of a recovery nurse in the ECT suite / operating theatre.

Responsibilities:

On ECT treatment session day:

- Prepare the treatment area for ECT and check proper functioning of ECT machine and equipment prior to starting ECT cases for the day.
- Co-ordinate nursing care in the ECT suite or operating theatre during treatment sessions including assisting patients to and from treatment area.
- Prior to sending patient to treatment area:
    - ensure Pre-ECT Treatment Checklist in ECT-SESSION form is done and completed by staff in-charge, and
    - all relevant documents i.e. medical file, medication chart, consent form and ECT-PRESCRIBE form are available.
- In the treatment area:
    - apply the necessary appliances on the patient such as electrocardiographic (ECG) electrodes for cardiac observation, blood pressure cuff for vital signs monitoring, pulse oximetry sensor for monitoring of oxygen saturation, and perform pre-ECT treatment observation prior to stimulus dose delivery.
    - perform time-out session in the treatment area with the EAP or ECT Medical Officer and Anaesthesia Provider, and sign off on the Time-Out Items subsection on ECT-SESSION form to certify time out has been correctly performed.
- In the recovery room or area:
    - monitor post-ECT patient i.e. state of consciousness and vital signs (refer Appendix 12 on ECT-SESSION form, on Section 4: Post-ECT Recovery in ECT suite / Operating Theatre).
    - administer oxygen and intravenous fluids and provide suctioning (if required) to post-ECT patients till stable prior to transferring patients back to ward for inpatient cases or discharging outpatient cases.
    - attend to patients with post-ictal disorientation and agitation (may need to alert EAP or ECT Medical Officer in-charge if unmanageable).

On non-ECT treatment session day:

- Ensure availability of adequate ECT nursing staffing, equipment and supplies.
- Conduct regular checking on ECT machine performance, and scheduling on maintenance routines (planned preventive maintenance) for the care of ECT device.
- Liaise with the Anaesthesiology Department / Anaesthesia Provider in-charge on scheduling of ECT cases (**refer Appendix 11 on Schedule on ECT Cases**).
- Maintain a registry of ECT cases and appropriate quality improvement activities.
- Co-ordinate training for nursing staff on ECT management.

ii. ECT Anaesthetic Team

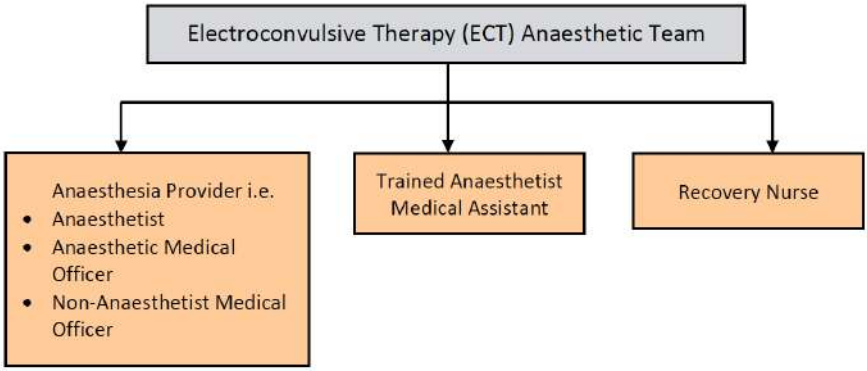


Figure 3(v): Electroconvulsive Therapy (ECT) Anaesthetic Team

a. Anaesthesia Provider i.e. Anaesthetist / Anaesthetic Medical Officer / Non-Anaesthetist Medical Officer

Anaesthesia Provider is privileged to provide anaesthesia or sedation in the treatment area.

Responsibilities:

- Conduct pre-ECT anaesthetic assessment and consent-taking process by discussing the anaesthetic procedure with the patient or relative / guardian.
- Monitor the effects of concurrent medications, anaesthetic agents and use of anaesthetic techniques and airway management during ECT procedure.
- Perform time-out session in the treatment area with the EAP / ECT Medical Officer and ECT Co-ordinator, and sign off on the Time-Out Items subsection on ECT-SESSION form to certify time out has been correctly performed.
- Liaise with EAP / ECT Medical Officer to address any possible complications during the ECT procedure e.g. termination of a prolonged seizure with intravenous propofol.
- Ensure post-ECT patient is stable and safe for transfer to ward or discharge for outpatient case.

b. Trained Anaesthetist Medical Assistant

Trained Anaesthetist Medical Assistant is privileged to assist in providing anaesthesia in the treatment area.

Responsibilities:

- Assist the Anaesthesia Provider in managing airway during ECT procedure.
- Monitor vital signs and detect any abnormalities.

c. Recovery Nurse

Recovery nurse is privileged to provide care in patients who received anaesthesia in the recovery room or area.

Responsibilities:

- Monitor post-ECT patient's mental status, vital signs, pulse oximetry and ECG (may need to alert the Anaesthesia Provider if abnormalities detected).
- Administer oxygen and intravenous fluids and provide suctioning (if required) to post-ECT patients till stable prior to transferring patients back to ward for inpatient cases or discharging outpatient cases.

3.4 Monitor ECT Accreditation

- To ensure the provision of an accredited ECT service, the establishment of the service should include all aspects of the ECT process from implementation of the local policy and procedure on ECT, facilities in the ECT suite or operating theatre, staffing and level of competence of the ECT staff, safety of ECT device, to the documentation, and administration of treatment protocol. These requirements aim to achieve and maintain a safe, effective and high standard of patient care.

- In order to ensure safety standards are met during the procedure itself, emphasis should be given on the appropriate manner of performing time out prior to the stimulus dose administration in the ECT treatment area.
    - An audit of the time-out period by the ECT committee team should be done periodically and with direct observation of the process **(refer Appendix 22 on ECT Time-Out Audit Report)**.
    - An audit should provide documentary evidence of what a service is doing and how it is functioning, as well as evidence of the therapeutic effectiveness or clinical outcome of ECT in each hospital with ECT service.

3.5 Provide ECT Training

- The ECT committee team in each hospital should provide regular training and education or workshops on ECT for all levels of staff in the department.

- Continuing Professional Development (CPD) and education is an integral part of ensuring the maintenance of the standard of good clinical practice as well as delivery of optimal care and treatment for ECT patients.

- It is recommended that this guideline be operationalised as the basis for devising ECT training program in each local hospital for credentialing requirement and CPD activity.

3.6 Research and Monitoring

- Initiating research or quality assurance project may assist in identifying the strengths and limitations of the ECT service delivery in the respective local setting, apart from developing evidence-based practice for ECT.

- The therapeutic effectiveness of the given ECT on psychiatric illnesses as well as any potential adverse effects from the procedure in the local hospital could be determined objectively from conducting research.

- The Health Informatics Centre at the Ministry of Health Malaysia requires ECT procedure in the daycare setting to be registered in the Malaysian Health Data Warehouse (MyHDW) for data collection system to facilitate evidence-based decision making related to ECT service **(refer Appendix 23 on *Borang Daftar Pesakit Rawatan Harian*)**.

Key Points

- Clinical governance in ECT encompasses six elements i.e.
  - **Legislation and Consent in ECT**: The operation of ECT is governed by MHA 2001 and MHR 2010; the validity of ECT consent form is for a period of four (4) weeks i.e.
    - Acute phase: a period of up to four (4) weeks at a treatment interval of 2 or 3 sessions per week;
    - Continuation or Maintenance phase: a period of up to four (4) weeks at a treatment interval determined by the ECT Prescribing Psychiatrist.
  - **Review and Monitor ECT Service**: ECT procedure commences when it is prescribed and consent is obtained, and ends when the course is completed, and incorporates pre-ECT preparation i.e. assessment on capacity to give informed consent and pre-ECT investigations, monitoring during ECT procedure with time-out session and monitoring recovery post-ECT; also review of ECT-related incidents and monitoring adaptation of management of ECT service to current ongoing COVID-19 pandemic.
  - **Monitor Staff Competence**: Credentialing and Privileging ensures sustained level of clinical competence i.e.
    - Clinical Psychiatrist is required to attend an ECT training course over past 3 years and assessed performance on 10 sessions for credentialing and privileging;
    - Registered Psychiatrist is required to perform 10 sessions over a 1-year period for 3 consecutive years for re-privileging;
    - Medical Officer is required to attend an ECT training course over past 3 years and assist 10 sessions with assessment for privileging, and thereafter assist 10 sessions over a 1-year period for 3 consecutive years for re-privileging;
    - ECT Co-ordinators to attend an ECT training course over past 3 years, with at least 6-month working experience in a psychiatry ward with ECT service, and at least observe and perform competently 2 ECT procedures each, within the 6-month period prior to being credentialed and privileged for ECT.
    - Although the roles and responsibilities of the staff in-charge of ECT may overlapped, it is important to recognise the respective entailment of each designation to ensure smooth implementation of the whole ECT process.
  - **Monitor ECT Accreditation**: To ensure the provision of an accredited ECT service, the service establishment should include all aspects of the ECT process from implementation of the local policy and procedure on ECT, facilities in the ECT suite or operating theatre, staffing and level of competence of the ECT staff, safety of ECT device, to the documentation, and administration of treatment protocol.
  - **Provide ECT Training**: It is recommended that this guideline be operationalised as the basis for devising ECT training program in each local hospital for credentialing requirement and CPD activity.
  - **Research and Monitoring**: Initiating research or quality assurance project may assist in identifying the strengths and limitations of the ECT service delivery in the respective local setting, apart from developing evidence-based practice for ECT.

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APPENDICES

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

PATIENT'S CONSENT FORM FOR ELECTROCONVULSIVE THERAPY (ECT)

I, _____

I.C. No.: _____ hereby consent to undergo a course of Electroconvulsive Therapy (ECT) in _____ (name of hospital) as follows:

☐ **ACUTE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval of 2 or 3 sessions per week.

OR

☐ **CONTINUATION** or **MAINTENANCE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval determined by the ECT Prescribing Psychiatrist.

Dr. _____ has explained that I have the following condition: _____ (principal diagnosis to be treated by ECT), and that:

1. The doctor has recommended Electroconvulsive Therapy (ECT) to be an appropriate treatment for my condition.
2. The doctor has explained ECT and why it is an appropriate treatment for my condition. The explanation has included information about the expected benefits of ECT and the likely consequences if I do not have ECT.
3. The doctor has explained the likely discomforts and risks associated with ECT.
4. The doctor has informed me of the benefits and risks of other alternative treatment(s).
5. I understand that I will have a general anaesthesia and muscle relaxant administered before being given ECT.
6. I have been given the ECT Information Sheet and explained on it by the doctor.
7. I have been given the opportunity to ask questions about ECT and my condition, and I have understood the answers.
8. I understand that I am free to refuse ECT or to withdraw my consent and have the ECT stopped at any time.
9. I understand that an assurance has not been given that the treatment will be administered by a specific practitioner; however, it will be administered by a privileged practitioner in ECT from _____ _____ (name of hospital).

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

PATIENT'S CONSENT FORM FOR ELECTROCONVULSIVE THERAPY (ECT)

Patient's statement

I, the abovenamed patient: _____

I.C. No.: _____ consent to being treated with ECT.

This consent is valid from the day I sign this consent form for **ACUTE** OR **CONTINUATION** or **MAINTENANCE** ECT (delete whichever is not applicable) from _____ to _____ for a period of up to four (4) weeks.

I've also read and understood the ECT Information Sheet as provided.

Signature: _____ Date: _____

Witness' statement

I, _____ (name of witness) bear witness to the process of obtaining informed consent on ECT from the abovenamed patient.

The patient signed this consent form voluntarily in my presence.

(The witness should be a fully registered medical practitioner or staff nurse or assistant medical officer, who is not directly involved in the management of the abovenamed patient nor related to the patient, to attest to the consent-taking process from the patient).

Signature & official stamp: _____ Date: _____

ECT Prescribing Psychiatrist's statement

I, Dr. _____ hereby certify that I am the ECT Prescribing Psychiatrist for the abovenamed patient.

I am of the opinion that ECT is an appropriate treatment for the abovenamed patient. The patient has understood the above explanation on ECT and is capable of giving informed consent to the proposed course of ECT. This consent form is complete and correctly filled in.

Signature & official stamp: _____ Date: _____

KEMENTERIAN KESIHATAN MALAYSIA
JABATAN PSIKIATRI DAN KESIHATAN MENTAL
HOSPITAL _____ **(nama hospital)**

BORANG KEIZINAN PESAKIT MENJALANI TERAPI ELEKTROKONVULSIF (ECT)

Saya, _____

No. K/P: _____ dengan ini memberi keizinan untuk menjalani Terapi Elektrokonvulsif (ECT) di _____ (nama hospital) seperti yang tertera:

☐ Fasa ***ACUTE***: dari _____ (tarikh sesi rawatan pertama) hingga _____ (tarikh sesi rawatan terakhir) untuk tempoh sehingga empat (4) minggu pada selang waktu rawatan 2 atau 3 sesi seminggu.

ATAU

☐ Fasa ***CONTINUATION*** atau ***MAINTENANCE***: dari _____ (tarikh sesi rawatan pertama) hingga _____ (tarikh sesi rawatan terakhir) untuk tempoh sehingga empat (4) minggu pada selang waktu rawatan yang ditetapkan oleh pakar psikiatri yang mempreskripsi ECT.

Dr. _____ telah menerangkan bahawa saya menghidapi penyakit berikut: _____ (diagnosis utama yang perlu dirawat menggunakan ECT) dan:

1. Doktor telah menyarankan Terapi Elektrokonvulsif (ECT) merupakan rawatan yang wajar untuk keadaan penyakit saya ini.
2. Doktor telah menerangkan tentang ECT dan mengapa rawatan ini wajar bagi merawat keadaan penyakit saya. Penerangan doktor telah meliputi manfaat yang dijangka akan diperolehi oleh saya jika menjalani ECT dan akibatnya jika tidak menjalani ECT.
3. Doktor telah menerangkan tentang kemungkinan saya akan mengalami ketidakselesaan dan risiko-risiko berkaitan ECT.
4. Doktor telah memberitahu saya tentang manfaat dan risiko pilihan rawatan lain.
5. Saya memahami bahawa ubat bius dan penenang otot akan diberikan kepada saya sebelum ECT dimulakan.
6. Saya telah diberi Lembaran Maklumat ECT berserta penerangannya oleh doktor.
7. Saya telah diberi peluang untuk bertanya tentang ECT serta keadaan penyakit saya dan saya telah memahami penerangan yang diberikan.
8. Saya memahami bahawa saya bebas untuk tidak bersetuju menjalani ECT atau menarik semula keizinan saya dan berhenti menjalani ECT pada bila-bila masa.
9. Saya memahami tiada jaminan bahawa ECT akan dijalankan oleh pengamal yang tertentu; walau bagaimanapun, rawatan ini akan dijalankan oleh pengamal yang diberi hak keistimewaan untuk rawatan ECT di _____ (nama hospital).

KEMENTERIAN KESIHATAN MALAYSIA
JABATAN PSIKIATRI DAN KESIHATAN MENTAL
HOSPITAL _____ **(nama hospital)**

BORANG KEIZINAN PESAKIT MENJALANI TERAPI ELEKTROKONVULSIF (ECT)

Kenyataan Pesakit

Saya, pesakit bernama seperti di atas _____

No. K/P: _____ dengan ini memberi keizinan untuk menjalani rawatan ECT.

Keizinan ini sah bermula daripada tarikh borang keizinan ini ditandatangani untuk ***ACUTE*** ATAU ***CONTINUATION*** atau ***MAINTENANCE*** ECT (potong yang mana tidak berkenaan) dari _____ hingga _____ untuk tempoh sehingga empat (4) minggu.

Saya juga telah membaca dan memahami Lembaran Maklumat ECT yang disediakan.

Tandatangan: _____ Tarikh: _____

Kenyataan Saksi

Saya, _____ (nama saksi) telah menyaksikan proses pengambilan keizinan termaklum berkenaan ECT daripada pesakit bernama seperti di atas.

Pesakit telah menandatangani borang keizinan ini secara sukarela di hadapan saya.

(Saksi mestilah merupakan seorang pengamal perubatan atau jururawat atau pembantu pegawai perubatan yang mempunyai pendaftaran penuh, tidak terlibat secara langsung dalam perawatan pesakit, dan tidak mempunyai hubungan dengan pesakit, bagi tujuan memperakui proses pengambilan keizinan daripada pesakit).

Tandatangan dan cap rasmi: _____ Tarikh: _____

Kenyataan Pakar Psikiatri Yang Mempreskripsi ECT

Saya, Dr. _____ memperakui bahawa saya adalah pakar psikiatri yang mempreskripsi ECT untuk pesakit bernama seperti di atas.

Saya berpendapat bahawa ECT merupakan rawatan yang wajar untuk pesakit bernama seperti di atas. Pesakit telah memahami penerangan berkenaan ECT di atas dan berkebolehan memberi keizinan termaklum untuk menjalani rawatan ECT seperti yang telah dibincangkan. Borang keizinan ini adalah lengkap dan diisi dengan betul.

Tandatangan dan cap rasmi: _____ Tarikh: _____

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

RELATIVE'S / GUARDIAN'S CONSENT FORM FOR ELECTROCONVULSIVE THERAPY (ECT)

I, _____

I.C. No.: _____ being the _____ (state nature of relationship) of _____ (patient's name), (patient's I.C. No.: _____) hereby consent the patient to undergo a course of Electroconvulsive Therapy (ECT) in _____ (name of hospital) as follows:

☐ **ACUTE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval of 2 or 3 sessions per week.

OR

☐ **CONTINUATION** or **MAINTENANCE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval determined by the ECT Prescribing Psychiatrist.

Dr. _____ has explained that the patient has the following condition: _____ (principal diagnosis to be treated by ECT), and that:

1. The doctor has recommended Electroconvulsive Therapy (ECT) to be an appropriate treatment for the patient's condition.
2. The doctor has explained ECT and why it is an appropriate treatment for the patient's condition. The explanation has included information about the expected benefits of ECT and the likely consequences if the patient does not have ECT.
3. The doctor has explained the likely discomforts and risks associated with ECT.
4. The doctor has informed me of the benefits and risks of other alternative treatment(s).
5. I understand that the patient will have a general anaesthesia and muscle relaxant administered before being given ECT.
6. I have been given the ECT Information Sheet and explained on it by the doctor.
7. I have been given the opportunity to ask questions about ECT and the patient's condition, and I have understood the answers.
8. I understand that I am free to refuse ECT for the patient or to withdraw my consent and have the ECT stopped at any time.
9. I understand that an assurance has not been given that the treatment will be administered by a specific practitioner; however, it will be administered by a privileged practitioner in ECT from _____ _____ (name of hospital).

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

RELATIVE'S / GUARDIAN'S CONSENT FORM FOR ELECTROCONVULSIVE THERAPY (ECT)

Relative's / Guardian's statement

I am the _____ (state nature of relationship) of the abovenamed patient.

I consent _____ (patient's name),
(patient's I.C. No.: _____) to being treated with ECT.

This consent is valid from the day I sign this consent form for **ACUTE** OR **CONTINUATION** or **MAINTENANCE** ECT (delete whichever is not applicable) from _____ to _____ for a period of up to four (4) weeks.

I've also read and understood the ECT Information Sheet as provided.

Signature: _____ Date: _____

Witness' statement

I, _____ (name of witness) bear witness to the process of obtaining informed consent on ECT from the abovenamed relative / guardian.

The relative / guardian signed this consent form voluntarily in my presence.

(The witness should be a fully registered medical practitioner or staff nurse or assistant medical officer, who is not directly involved in the management of the abovenamed patient nor related to the patient, to attest to the consent-taking process from the relative / guardian).

Signature & official stamp: _____ Date: _____

ECT Prescribing Psychiatrist's statement

I, Dr. _____
hereby certify that I am the ECT Prescribing Psychiatrist for the abovenamed patient.

I am of the opinion that ECT is an appropriate treatment for the abovenamed patient. The relative / guardian has understood the above explanation on ECT and agrees to give informed consent for the patient to undergo the proposed course of ECT. This consent form is complete and correctly filled in.

Signature & official stamp: _____ Date: _____

KEMENTERIAN KESIHATAN MALAYSIA
JABATAN PSIKIATRI DAN KESIHATAN MENTAL
HOSPITAL _____ **(nama hospital)**

BORANG KEIZINAN SAUDARA / PENJAGA BAGI PESAKIT MENJALANI TERAPI ELEKTROKONVULSIF (ECT)

Saya, _____

No. K/P: _____ yang merupakan _____

(nyatakan hubungan dengan pesakit) kepada pesakit bernama _____

_____ (nama pesakit), (No. K/P pesakit: _____) dengan ini memberi keizinan untuk pesakit menjalani Terapi Elektrokonvulsif (ECT) di _____ (nama hospital) seperti yang tertera:

☐ Fasa ***ACUTE***: dari _____ (tarikh sesi rawatan pertama) hingga _____ (tarikh sesi rawatan terakhir) untuk tempoh sehingga empat (4) minggu pada selang waktu rawatan 2 atau 3 sesi seminggu.

ATAU

☐ Fasa ***CONTINUATION*** atau ***MAINTENANCE***: dari _____ (tarikh sesi rawatan pertama) hingga _____ (tarikh sesi rawatan terakhir) untuk tempoh sehingga empat (4) minggu pada selang waktu rawatan yang ditetapkan oleh pakar psikiatri yang mempreskripsi ECT.

Dr. _____ telah menerangkan bahawa pesakit menghidapi penyakit berikut: _____

(diagnosis utama yang perlu dirawat menggunakan ECT), dan:

1. Doktor telah menyarankan Terapi Elektrokonvulsif (ECT) merupakan rawatan yang wajar untuk keadaan penyakit pesakit ini.
2. Doktor telah menerangkan tentang ECT dan mengapa rawatan ini wajar bagi merawat keadaan penyakit pesakit. Penerangan doktor telah meliputi manfaat yang dijangka akan diperolehi oleh pesakit jika menjalani ECT dan akibatnya jika tidak menjalani ECT.
3. Doktor telah menerangkan tentang kemungkinan pesakit akan mengalami ketidakselesaan dan risiko-risiko berkaitan ECT.
4. Doktor telah memberitahu saya tentang manfaat dan risiko pilihan rawatan lain.
5. Saya memahami bahawa ubat bius dan penenang otot akan diberikan kepada pesakit sebelum ECT dimulakan.
6. Saya telah diberi Lembaran Maklumat ECT berserta penerangannya oleh doktor.
7. Saya telah diberi peluang untuk bertanya tentang ECT serta keadaan penyakit pesakit dan saya telah memahami penerangan yang diberikan.
8. Saya memahami bahawa saya bebas untuk tidak bersetuju pesakit menjalani ECT atau menarik semula keizinan saya dan pesakit berhenti menjalani ECT pada bila-bila masa.
9. Saya memahami tiada jaminan bahawa ECT akan dijalankan oleh pengamal yang tertentu; walau bagaimanapun, rawatan ini akan dijalankan oleh pengamal yang diberi hak keistimewaan untuk rawatan ECT di _____ (nama hospital).

KEMENTERIAN KESIHATAN MALAYSIA
JABATAN PSIKIATRI DAN KESIHATAN MENTAL
HOSPITAL _____ **(nama hospital)**

BORANG KEIZINAN SAUDARA / PENJAGA BAGI PESAKIT MENJALANI TERAPI ELEKTROKONVULSIF (ECT)

Kenyataan Saudara / Penjaga Pesakit

Saya, _____ (nyatakan hubungan dengan pesakit) kepada pesakit yang bernama seperti di atas.

Saya memberi keizinan ke atas _____ (nama pesakit), (No. K/P pesakit: _____) untuk menjalani rawatan ECT.

Keizinan ini sah bermula daripada tarikh borang keizinan ini ditandatangani untuk ***ACUTE*** ATAU ***CONTINUATION*** atau ***MAINTENANCE*** ECT (potong yang mana tidak berkenaan) dari _____ hingga _____ untuk tempoh sehingga empat (4) minggu.

Saya juga telah membaca dan memahami Lembaran Maklumat ECT yang disediakan.

Tandatangan: _____ Tarikh: _____

Kenyataan Saksi

Saya, _____ (nama saksi) telah menyaksikan proses pengambilan keizinan termaklum berkenaan ECT daripada saudara / penjaga pesakit bernama seperti di atas.

Saudara / Penjaga pesakit telah menandatangani borang keizinan ini secara sukarela di hadapan saya.

(Saksi mestilah merupakan seorang pengamal perubatan atau jururawat atau pembantu pegawai perubatan yang mempunyai pendaftaran penuh, tidak terlibat secara langsung dalam perawatan pesakit, dan tidak mempunyai hubungan dengan pesakit, bagi tujuan memperakui proses pengambilan keizinan daripada saudara / penjaga pesakit).

Tandatangan dan cap rasmi: _____ Tarikh: _____

Kenyataan Pakar Psikiatri Yang Mempreskripsi ECT

Saya, Dr. _____ memperakui bahawa saya adalah pakar psikiatri yang mempreskripsi ECT untuk pesakit bernama seperti di atas.

Saya berpendapat bahawa ECT merupakan rawatan yang wajar untuk pesakit bernama seperti di atas. Saudara / Penjaga pesakit telah memahami penerangan berkenaan ECT di atas dan menyetujui memberi keizinan termaklum untuk pesakit menjalani rawatan ECT seperti yang telah dibincangkan. Borang keizinan ini adalah lengkap dan diisi dengan betul.

Tandatangan dan cap rasmi: _____ Tarikh: _____

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

CONSENT BY TWO PSYCHIATRISTS* FOR ELECTROCONVULSIVE THERAPY (ECT)

ECT Prescribing Psychiatrist:

I, Dr. _____ (name of registered psychiatrist),

from _____ (name of hospital), hereby certify that I am the ECT Prescribing Psychiatrist responsible for treating _____

(name of patient) _____ (I.C. No.) at the abovenamed hospital.

1. The abovenamed patient has the following psychiatric illness for which I consider Electroconvulsive Therapy (ECT) to be an appropriate treatment: _____
   (principal diagnosis to be treated by ECT).
2. I am satisfied that:
   a. The patient is incapable of giving informed consent for ECT.
   b. ECT has therapeutic effects and is an appropriate treatment for the patient's psychiatric illness.
   c. ECT should be performed after weighing the discomforts, benefits or risks.
   d. Any benefits and risks of other alternative treatment(s) have been considered.
   e. Unless ECT is performed, the patient is likely to suffer a significant deterioration in his or her physical or psychiatric condition.
3. I therefore authorize ECT to be performed on the abovenamed patient.
4. The reasons for my decision are: _____
   _____
5. This authority is for:

☐ **ACUTE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval of 2 or 3 sessions per week.

OR

☐ **CONTINUATION** or **MAINTENANCE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval determined by the ECT Prescribing Psychiatrist.

I am the ECT Prescribing Psychiatrist responsible for treating the abovenamed patient. The patient's treatment plan has been reviewed, revised and discussed with the patient, to the best of his or her understanding.

Signature & official stamp: _____ Date: _____

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

CONSENT BY TWO PSYCHIATRISTS* FOR ELECTROCONVULSIVE THERAPY (ECT)

Independent ECT Prescribing Psychiatrist:

I, Dr. _____ (name of registered psychiatrist), from _____ (name of hospital), hereby certify that I am the independent ECT Prescribing Psychiatrist for _____ (name of patient) _____ (I.C. No.) at the abovenamed hospital.

1. The abovenamed patient has the following psychiatric illness for which I consider Electroconvulsive Therapy (ECT) to be an appropriate treatment: _____ (principal diagnosis to be treated by ECT).
2. I am satisfied that:
   a. The patient is incapable of giving informed consent for ECT.
   b. ECT has therapeutic effects and is an appropriate treatment for the patient's psychiatric illness.
   c. ECT should be performed after weighing the discomforts, benefits or risks.
   d. Any benefits and risks of other alternative treatment(s) have been considered.
   e. Unless ECT is performed, the patient is likely to suffer a significant deterioration in his or her physical or psychiatric condition.
3. I therefore authorize ECT to be performed on the abovenamed patient.
4. The reasons for my decision are: _____
5. This authority is for:

☐ **ACUTE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval of 2 or 3 sessions per week.

OR

☐ **CONTINUATION** or **MAINTENANCE** phase: from _____ (date of first treatment session) to _____ (date of last treatment session) for a period of up to four (4) weeks at a treatment interval determined by the ECT Prescribing Psychiatrist.

I am the independent ECT Prescribing Psychiatrist. The patient's treatment plan has been reviewed, revised and discussed with the patient, to the best of his or her understanding.

Signature & official stamp: _____ Date: _____

***one of whom shall be the ECT Prescribing Psychiatrist responsible for treating the patient, if no relative or guardian of the patient is available or traceable and the patient himself or herself is incapable of giving consent.**

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

LEMBARAN MAKLUMAT ECT / ECT INFORMATION SHEET / ECT 资讯单 / ECT நோயாளி தகவல் ஏடு

Sejak bertahun lamanya, ECT telah terbukti merupakan rawatan yang berkesan dan selamat untuk penyakit kemurungan, mania serta penyakit mental lain yang teruk. Ia digunakan apabila doktor merasakan gejala penyakit anda perlu dikawal dengan kadar segera, ubat-ubatan tidak berkesan atau mengalami kesan sampingan ubat yang membahayakan. Doktor anda akan berbincang dengan lebih lanjut sebab-sebab mengapa anda perlu menjalani rawatan ECT. Sila pastikan anda memahami rawatan ini dan bertanya dengan staf perubatan kami sekiranya terdapat sebarang kemusykilan.

Kesan sampingan ECT yang biasa adalah sakit kepala, loya dan sakit otot disebabkan oleh kesan ubat bius atau sawan. Kesan sampingan yang lain ialah masalah ingatan jangka pendek yang akan pulih dalam masa yang singkat. Walau bagaimanapun, anda tidak akan mengingati sawan yang berlaku semasa ECT. Risiko kehilangan ingatan yang berkaitan dengan perihal masa dulu adalah kurang berbanding dengan ingatan jangka pendek. ECT tidak merosakkan otak atau mengubah perangai seseorang. Anda dinasihatkan supaya tidak melakukan sebarang keputusan penting, memandu kenderaan atau mengendalikan mesin dalam masa 24 jam selepas ECT.

Anda masih boleh makan malam pada malam sebelum rawatan ECT. Walau bagaimanapun, anda tidak dibenarkan untuk makan atau minum selepas pukul 12 tengah malam. Merokok tidak dibenarkan sekurang-kurangnya 24 jam sebelum rawatan ECT. Sarapan pagi akan dihidangkan selepas rawatan ECT. Sila beritahu staf perubatan sekiranya anda termakan, terminum atau merokok selepas 12 tengah malam. Anda dibenarkan mengambil ubat waktu pagi bersama sedikit air.

ECT merupakan suatu rawatan perubatan yang dikendalikan oleh doktor yang berkelayakan. Doktor bius pula akan memberikan anda ubat bius dan ubat untuk merehatkan otot. Pada masa yang sama, tekanan darah, kadar denyutan jantung dan paras oksigen dalam darah akan dipantau sepanjang rawatan. Sebaik sahaja kesan bius telah bermula dan otot anda telah berehat sepenuhnya, doktor akan mengalirkan arus elektrik yang terkawal dan singkat melalui elektrod-elektrod yang dipasangkan pada kepala anda. Kedudukan elektrod ini mungkin berubah bergantung kepada tindak balas anda kepada rawatan ECT dan kesan rawatan ECT ke atas anda. Rangsangan elektrik tersebut adalah amat singkat dan ia akan mencetuskan sawan yang tidak melebihi 2 minit. Anda akan sedar selepas 5 hingga 10 minit dan mungkin akan mengalami pening sebentar disebabkan oleh ubat bius atau sawan. Anda akan bersedia untuk makan lebih kurang 30 minit selepas rawatan.

Selepas ECT, anda masih perlu meneruskan rawatan ubatan, psikoterapi, ataupun ECT lanjutan supaya penyakit anda tidak kembali. Doktor akan mengadakan perbincangan lanjut dengan anda berkenaan pilihan rawatan yang ada.

For many years, ECT has been an effective and safe procedure for treating depression, mania and some other severe mental illnesses. It is used when the doctor needs to improve your illness fast, or medications do not work or may cause too much harmful effects on you. Your doctor will discuss with you in more details the reason that you need this treatment. Please make sure you are well informed about this treatment and ask the medical staff if you have any concerns about ECT.

Common side effects of ECT are headache, nausea and muscle ache due to the anaesthetic drugs or seizure. The other side effect is short-term memory difficulty that will recover with time. However, you will not remember the seizure during the ECT procedure. Memories for events in the past are less likely to be affected than your short-term memories. ECT does not cause brain damage or change your personality. You are advised not to make any important decision or drive a vehicle or operate any machine within the first 24 hours after ECT.

The night before the ECT you may still take your dinner. However, you must not take any food or drink from 12 midnight onwards. You are not to smoke any cigarettes at least 24 hours before ECT. Breakfast will be served after ECT. Please inform any medical staff if you have accidentally taken any food or drink or smoked. You may take your morning medication with tiny sips of water.

ECT is a medical procedure performed by qualified doctors. You will be given general anaesthesia and muscle relaxant by the anaesthetic doctor. At the same time, your blood pressure, heart rhythm and blood oxygen level will be monitored throughout the treatment. When you are well sedated and relaxed, your brain will be stimulated with a brief, controlled series of electrical charges through the metal electrodes placed at precise locations on your scalp. These electrode locations may change depending on how you respond to ECT and the effect of ECT on you. The electric charges will cause a brief seizure of not more than 2 minutes. You will wake up after 5 to 10 minutes. After you wake up, the anaesthetic drug and seizure will make you groggy for a while. You will usually be ready for a meal about 30 minutes after the treatment.

After the ECT, you will still need to continue the medication, psychotherapy or maintenance ECT so that your illness will not come back. Your doctor will discuss further these treatment options with you.

LEMBARAN MAKLUMAT ECT / ECT INFORMATION SHEET / ECT 资讯单 / ECT நோயாளி தகவல் ஏடு

多年来 ECT（电休克治疗）已经被证实是安全和对忧郁症、狂躁症和一些严重精神疾病有效的治疗方法。ECT 除了适用于精神状况需要迅速改善的病人之外，病情对药物无效或有严重药物副作用的病人也同样适用。您的医生将与您讨论关于这项治疗的更多细节和需要 ECT 的原因。在您选择以 ECT 为治疗方式前，请确保您对 ECT 有充分的了解。如您有任何疑虑，请务必向我们的医务人员查询更多的资讯。

常见的 ECT 副作用是头痛、恶心、肌肉疼痛以及短期性记忆困难。值得一提的是，ECT 对于久远记忆的影响会远少于短期记忆，并可随时间逐渐恢复。由于麻醉剂量或癫痫作用的影响，任何关于癫痫的记忆将不存在，您也不会有任何疼痛的感觉。除此之外，ECT 不会导致大脑的损伤，也不会造成性格上的改变。ECT 治疗后的 24 小时内，您不被鼓励做任何重大决定、驾驶或操作任何危险或者重型机器。

在 ECT 前一晚您可以如常享用晚餐。禁食将在凌晨 12 点过后开始，包括任何的食物或饮料。请不要在 ECT 前 24 小时内抽烟。我们将会在 ECT 完成后为您提供早餐。如果您不小心食用任何食物或饮料，请务必告知医务人员。在治疗当日早上，您可以饮用少量清水来服用一些平时的药物。

ECT 是由拥有专业资格的医生操作的医疗程序。麻醉科医生会为您提供全身麻醉和肌肉松弛剂，并会在整个治疗过程中确保您的血压、心率和血氧保持在最佳水平。当您已经处于完全麻醉的状况后，安全控制且极短暂的电脉将会通过精确放置于头皮上的金属电极板去刺激特定的大脑部位。这些电极板的位置会随着您对 ECT 的治疗反应和疗效而有所改变。电脉刺激会带来极短暂且不超过 2 分钟的癫痫反应。并会在此后的 5–10 分钟内苏醒，虽然您仍可能在苏醒后经历短暂的昏沉。正常情况下，如您没有任何不适的感觉，您可以在治疗完成后的 30 分钟进食。

在 ECT 治疗后，您仍然需要继续服药、心理治疗或进行維持性 ECT 以确保病情或症状受到控制。您的医生将与您讨论未来的治疗方案。

Electroconvulsive Therapy (ECT) சிகிச்சை என்பது பல வகை கடுமையான மனநல நோய்களுக்கும் பயன்தரும் மற்றும் பாதுகாப்பான சிகிச்சை முறையாகும். ECT சிகிச்சை எந்த காரணத்திற்காக வழங்கப்படுகிறது என்ற தெளிவான விளக்கத்தை / ஆலோசனையை தங்கள் மருத்துவர் வழங்குவார். இந்த ECT சிகிச்சை பற்றிய முழு விவரங்களையும் தாங்கள் அறிந்திருக்க வேண்டும். மேலும் சந்தேகங்கள் இருப்பின் எங்கள் மருத்துவ அதிகாரியிடம் விபரங்கள் பெறலாம்.

ECT சிகிச்சையில் சாதாரணமாக ஏற்படும் பக்க விளைவுகள் தலைவலி, தலை சுற்றல் மற்றும் தசை வலி போன்றவையாகும். இவை மயக்க மருந்து அல்லது வழுப்பு மருந்து எடுப்பதன் அறிகுறியாகும். அடுத்த பக்க விளைவு யாதெனில், சிறிதளவு ஞாபக சக்தி குறைபாடு ஏற்படும். ஆனால், இது சில காலத்தில் சரியாகி விடும். முக்கியமாக ECT சிகிச்சைக்குப் பின் உடனடியாக 24 மணி நேரத்தில் முக்கியமான முடிவுகள் எடுத்தல், கார் ஓட்டுதல், எந்த இயந்திரங்களையும் இயக்கக் கூடாது என வலியுறுத்தப்படுகிறது.

ECT சிகிச்சைக்கு முன் உங்கள் இரவு உணவை உண்ணலாம். இருப்பினும் உங்கள் ECT சிகிச்சைக்குக் குறைந்தது 6 மணி நேரத்திற்கு முன் சாப்பிட அனுமதிக்கப்பட மாட்டாது. ECT சிகிச்சை முடியும் வரை காலை உணவு அருந்த உங்களுக்கு அனுமதி இருக்காது. நீங்கள் தவறுதலாக சாப்பிட்டு விட்டாலோ அல்லது தண்ணீர் அருந்தி விட்டாலோ மருத்துவப் பணியாளரிடம் தெரிவிக்க வேண்டும். நீங்கள் காலை நேரத்தில் சிறிதளவு தண்ணீருடன் மருந்து எடுக்க அனுமதிக்கப்படுவீர்கள்.

ECT சிகிச்சை தகுதி பெற்ற மருத்துவ நிபுணரால் வழங்கப்படுவதாகும். பொதுவாக உங்களுக்கு மயக்க மருந்து மற்றும் தசை தளர்வு பெற செய்யும் மருந்து மயக்க மருந்து நிபுணரால் கொடுக்கப்படும். அதே வேளையில், சிகிச்சை முழுவதும் இரத்த அழுத்தம், இதயத் துடிப்பு மற்றும் இரத்தத்தில் உள்ள பிராணவாயுவும் கண்காணிக்கப்படும். முதலில் மயக்க மருந்தின் அறிகுறி காணப்பட்டவுடன் மற்றும் தாங்கள் முழுமையான தளர்வு நிலைக்கு வந்தவுடன் மருத்துவர் மின்னோட்டத்தை பாதுகாப்புடனும் கட்டுப்பாட்டுடனும் கட்டம் கட்டமாக தங்கள் தலையில் பொருத்தப்பட்டுள்ள மின்முனை வழியாக செலுத்துவார். இந்த மின் தூண்டுதல் குறுகிய நேரத்திற்கு மட்டுமே கொடுக்கப்படும் அது சுமார் 2 நிமிடம் உடலில் வழுப்பை ஏற்படுத்தும். தாங்கள் மயக்க மருந்தை எடுத்ததன் காரணமாக மயக்க நிலையிலும், தளர்வு நிலையிலும் இருப்பதால் தங்களுக்கு வழுப்பு ஏற்பட்டதின் எந்த வித வலியும் இருக்காது. பின்னர், 5-10 நிமிடங்களில் விழித்து எழ முடியும். ஆனால், சில வேளைகளில் மயக்க மருந்து மற்றும் வழுப்பு காரணமாக தலைச் சுற்றல் சிறிது நேரம் ஏற்படலாம். 15-20 நிமிடங்களில் உங்களால் சாப்பிட முடியும் ECT சிகிச்சை உங்கள் மூளையை பாதிக்காது மற்றும் உங்கள் செயற்பாடுகளிலும் மாற்றம் ஏற்படாது.

ECT சிகிச்சைக்கு பிறகு, உங்கள் நோய் மீண்டும் வராமல் இருக்க, நீங்கள் மருந்து, உளவியல் சிகிச்சை அல்லது பராமரிப்பு ECT சிகிச்சையை தொடர வேண்டும். இந்த சிகிச்சை முறைகளை உங்கள் மருத்துவர் உங்களுடன் மேலும் விவாதிப்பார்.

LEMBARAN MAKLUMAT ECT / ECT INFORMATION SHEET / ECT 资讯单 / ECT நோயாளி தகவல் ஏடு

PENGESAHAN

Saya, _____ (nama pesakit / saudara / penjaga) telah membaca lembaran maklumat ini, diberikan penjelasan oleh doktor, dan memahami maklumat yang disampaikan.

Tandatangan: _____ Tarikh: _____

AFFIRMATION

I, _____ (name of patient / relative / guardian) have read this information sheet, been explained on it by the doctor and understood the information.

Signature: _____ Date: _____

声明

我，_____ (病人 / 家属 / 监护人) 已阅读此资讯单，并经由医生解释和了解单里所呈献的资讯。

签名：_____ 日期：_____

ஒப்புதல்

நான், _____ (நோயாளி / உறவினர் / பாதுகாவலரின் பெயர்) இந்த தகவல் தாளைப் படித்தேன், மருத்துவரால் விளக்கப்பட்டு தகவலைப் புரிந்து கொண்டேன்.

கையொப்பம்: _____ தேதி: _____

ANAESTHESIA DISCLOSURE AND CONSENT

Ministry Of Health Malaysia

Patient Details

Name .....

I/C No. .....

Gender .....

Address .....

.....

RN .....

Name Of Surgery/Procedure .....

.....

Parent / Guardian

Name .....

I/C No. .....

Anaesthetists stress on safety during anaesthesia and endeavour to prevent any complications arising from anaesthesia.
Anaesthesia affects the patient's breathing and circulation, while the operation itself also causes changes to the patient's body. The anaesthetist uses special skills and equipment to monitor and manage the patient to ensure their safety during anaesthesia and the operation. Death or permanent disability related to anaesthesia is rare.

General Anaesthesia

Involves rendering a patient unconscious before an operation. This ensures the patient is not aware of events and does not feel pain during the operation. It is produced by drugs given through a vein and/or breathed from an anaesthesia machine.

Regional Anaesthesia

Involves using a local anaesthetic to numb a specific area of the body for surgery. Prolonged pain relief without numbness can be achieved by infusing weak solutions of local anaesthetics and narcotic drugs to particular parts of the body after surgery or injury.

Risks

Common risks for ALL patients include :-

- Bruising at the site of injections or intravenous line
- Nausea or vomiting
- Sore throat from the gases and/or the breathing tube. You may notice temporary difficulty in speaking. This should improve after some hours
- Temporary muscle pains
- Temporary headache or blurred vision

Uncommon risks for ALL patients include :-

- Awareness of activity in the operating room during anaesthesia, particularly during certain operations and in some emergency situations
- Eye abrasions causing pain and requiring treatment with medication and patching
- Damage to teeth or dental work, lips or tongue

Extremely rare risks for ALL patients. These may cause brain damage or death and include :-

- Obstructions in the breathing passages that cannot be readily controlled. These can lead to severe difficulty with breathing
- Allergy to drugs causing wheezing and rash and in rare cases, severe swelling, low blood pressure and poor circulation
- Inherited muscle sensitivity to particular anaesthetic drugs (malignant hyperthermia). This can cause a rapid rise in temperature, heart rate and breathing with high blood pressure and muscle rigidity
- Heart attacks, strokes and pneumonia. While these are uncommon, the risks are higher for patients with diseases of the arteries or lungs and in smokers.

Risks

Common :-

- Muscle weakness in the anaesthetised limb, or difficulty passing urine for a lower body block, while the anaesthetic is working. While this returns to normal as the drugs' effect wear off, a temporary urinary catheter may be necessary
- Headache, which is usually short-lived but can be severe and last some days

Uncommon :-

- Damage the nearby blood vessels or organs eg lungs
- Backache may follow spinal or epidural anaesthesia. This usually improves quickly, but occasionally can be lasting
- There is a very small risk of infection or bleeding at the injection site, which may require antibiotic or surgical treatment

Extremely rare :-

- Rarely, nerves may be damaged resulting in long-term weakness, pain, altered sensation or paralysis

Note **

There may be other unusual risks that have not been listed here. Please ask your anaesthetist if you have any general or specific concerns.

RISK CONTINUED OVER ⟶

INDIVIDUAL RISKS (to be completed by the anaesthetist completing this form)

The following are examples of possible risks and complications specific to this patient:

.....

.....

.....

.....

.....

.....

DECLARATION BY PATIENT / GUARDIAN / PROXY

I acknowledge the anaesthetist has informed me about the anaesthetic procedure, alternative treatments and answered my specific queries and concerns about this matter. I understand that a different anaesthetist may give the anaesthetic.

I acknowledge that I have discussed with the anaesthetist significant risks and complications specific to my individual circumstances that I have considered in deciding to undergo anaesthesia.

Signature of patient ..... **I/C No.** .....

Print name ..... **Date** .....

Signature of person consenting if not the patient ..... **I/C No** .....

Print name ..... **Relation** .....

Date .....

DECLARATION BY THE ANAESTHETIST PROVIDING INFORMATION FOR THIS CONSENT

I declare that I have explained the nature of general and/or regional anaesthesia to be given and discussed the risks that particularly concern this patient.

I have given the patient an opportunity to ask questions and I have answered accordingly.

Doctor's signature ..... **I/C No** .....

Print name ..... **Date** .....

Signature of witness ..... **I/C No** .....

Print name ..... **Date** .....

REEXPLAINATION .....

.....

Doctor's signature ..... **I/C No.** .....

Print name ..... **Date** .....

Signature of witness ..... **I/C No.** .....

Print name ..... **Date** .....

BORANG PENERANGAN DAN KEIZINAN ANESTESIA

Kementerian Kesihatan Malaysia

Maklumat Pesakit

Nama .....

No. K/P .....

Jantina .....

Alamat .....

.....

No. Daftar /RN .....

Nama Pembedahan/Prosedur .....

.....

Ibubapa/Penjaga

Nama .....

No. K/P .....

Pembiusan memberi kesan terhadap pernafasan dan peredaran darah pesakit manakala pembedahan membawa perubahan kepada tubuh pesakit. Doktor Anestesiologi menggunakan kepakaran dan peralatan khusus untuk memantau dan mengurus pesakit bagi memastikan keselamatan pesakit semasa pembiusan dan pembedahan.
doktor Anestesiologi sentiasa menekankan tentang keselamatan semasa pembiusan. Kematian atau kecederaan kekal amat jarang berlaku.

Pembiusan Umum :
Menjadikan seseorang pesakit berada dalam keadaan tidak sedar sebelum pembedahan dimulakan. Ini bagi memastikan pesakit tidak menyedari apa yang berlaku dan tidak merasa sakit semasa pembedahan. Pembiusan umum dilakukan dengan memasukkan ubat bius ke dalam salur darah dan/atau melalui gas bius yang disedut dari mesin bius. Tiub pernafasan akan dimasukkan ke dalam mulut atau hidung pesakit untuk membantunya bernafas dengan mesin.

Pembiusan Setempat :
Melibatkan penggunaan ubat bius setempat untuk melalikan bahagian badan tertentu yang akan dibedah. Pesakit sedar tetapi tidak merasa apa-apa sewaktu pembedahan. Kelegaan sakit tanpa kebas boleh di lanjutkan selepas pembedahan atau kecederaan dengan menggunakan ubat bius setempat yang tidak begitu kuat yang telah di campurkan dengan ubat narkotik.

Risiko Pembiusan Umum

Risiko yang biasa terjadi :-

Kesan lebam di tempat suntikan atau pemasangan tiub aliran darah
Loya atau muntah
Sakit tekak disebabkan oleh gas pembiusan dan/atau tiub pernafasan. Pesakit akan mungkin mengalami kesukaran bercakap tetapi ini akan pulih seperti sediakala dalam masa beberapa jam
Kesakitan otot yang sementara
Sakit kepala atau kabur penglihatan buat sementara

Risiko yang mungkin tetapi jarang berlaku :-

Menyedari aktiviti yang berlaku di dewan bedah ketika di bawah pembiusan umum terutama semasa pembedahan tertentu dan dalam beberapa situasi kecemasan
Luka di mata yang menyebabkan kesakitan dan mungkin memerlukan rawatan
Kecederaan kepada gigi, gusi, bibir dan lidah

Risiko yang sangat jarang sekali berlaku tetapi mungkin boleh mengakibatkan kerosakkan otak atau kematian :-

Saluran pernafasan tersumbat dan tidak dapat dikawal menyebabkan pesakit sukar untuk bernafas
Alahan terhadap ubat yang boleh menyebabkan kesesakan nafas dan ruam dan kadang-kadang bengkak yang teruk, tekanan darah yang menurun dan peredaran darah menjadi lemah
Otot yang sensitif terhadap ubat bius tertentu (malignant hyperthermia). Ini akan menyebabkan suhu badan, degupan jantung, tekanan darah dan kadar pernafasan meningkat naik secara mendadak dan otot menjadi kejang
Serangan jantung, angin ahmar dan jangkitan paru-paru walaupun jarang berlaku, tetapi risikonya adalah lebih tinggi di kalangan pesakit yang mempunyai penyakit salur darah atau paru-paru dan penghisap rokok

Risiko Pembiusan Setempat

Risiko yang biasa terjadi :-

Kelemahan otot di bahagian anggota badan yang dibius. Bagi kes yang melibatkan pembiusan di bahagian bawah badan, kesukaran kencing mungkin dialami sewaktu kesan bius masih berjalan. Walaupun ini akan beransur pulih seperti biasa apabila kesan ubat bius habis, tetapi pesakit mungkin memerlukan bantuan tiub saluran kencing buat sementara waktu
Sakit kepala yang kebiasaannya akan baik dalam tempoh yang singkat tetapi boleh juga bertambah teruk dan berterusan selama beberapa hari

Risiko yang mungkin tetapi jarang berlaku :-

Kerosakan kepada salur darah dan organ yang berdekatan, seperti paru-paru
Sakit belakang mungkin dialami selepas pembiusan 'spinal' atau epidural. Kebiasaannya, ia akan baik dengan sendiri tetapi boleh juga berterusan untuk tempoh yang agak lama
Terdapat juga risiko kecil berlakunya jangkitan kuman atau pendarahan di tempat suntikan yang mungkin memerlukan rawatan antibiotik atau pembedahan

Risiko yang sangat jarang berlaku :-

Kerosakan urat saraf, walaupun jarang-jarang berlaku boleh mengakibatkan kelemahan anggota badan, sakit, gangguan sensasi atau lumpuh untuk tempoh yang berpanjangan

Nota **

Risiko-risiko lain yang agak luar biasa tidak di senaraikan di sini. Sila rujuk kepada pakar anestesiologi yang berkenaan sekiranya terdapat persoalan samada yang umum ataupun khusus.

LIHAT SEBELAH ⟶

BORANG PENERANGAN DAN KEIZINAN ANESTESIA

RISIKO-RISIKO INDIVIDU (untuk diisi oleh Pegawai Perubatan/Pakar Anestesiologi)

Berikut adalah contoh-contoh risiko yang kemungkinan berlaku & komplikasi khusus terhadap pesakit ini :

.....

.....

.....

.....

.....

.....

PENGAKUAN OLEH PESAKIT / PENJAGA / WAKIL

Saya mengaku bahawasanya doktor Anestesiologi telah memaklumkan kepada saya mengenai prosedur pembiusan, rawatan alternatif dan menjawab semua persoalan & kemusykilan saya. Saya faham bahawa ada kemungkinan doktor Anestesiologi yang berbeza akan membius saya pada hari pembedahan.

Saya mengaku bahawasanya saya telah berbincang dengan doktor Anestesiologi mengenai risiko-risiko penting dan komplikasi khusus yang berkait rapat dengan saya dan saya telah memutuskan untuk menjalani pembiusan .

Tandatangan Pesakit ..... **No. K/P** .....

Nama (Huruf Besar) ..... **Tarikh** .....

Sekiranya penjaga / wakil yang memberi kebenaran

Tandatangan Penjaga / Wakil ..... **No. K/P** .....

Nama (Huruf Besar) ..... **Hubungan** .....

Tarikh .....

PENGAKUAN DOKTOR ANESTESIOLOGI YANG BERKENAAN

Saya mengaku bahawa saya telah menerangkan ciri-ciri pembiusan umum atau setempat yang akan diberikan dan telah membincangkan mengenai risiko-risiko yang mungkin dialami oleh pesakit. .

Saya telah memberi peluang kepada pesakit untuk bertanya dan telah menjawab soalan-soalan yang dikemukakan.

Tandatangan Doktor ..... **No. K/P** .....

Nama (Huruf Besar) ..... **Tarikh** .....

Tandatangan Saksi / Penterjemah ..... **No. K/P** .....

Nama (Huruf Besar) ..... **Tarikh** .....

PENERANGAN SEMULA .....

.....

Tandatangan Doktor ..... **No. K/P** .....

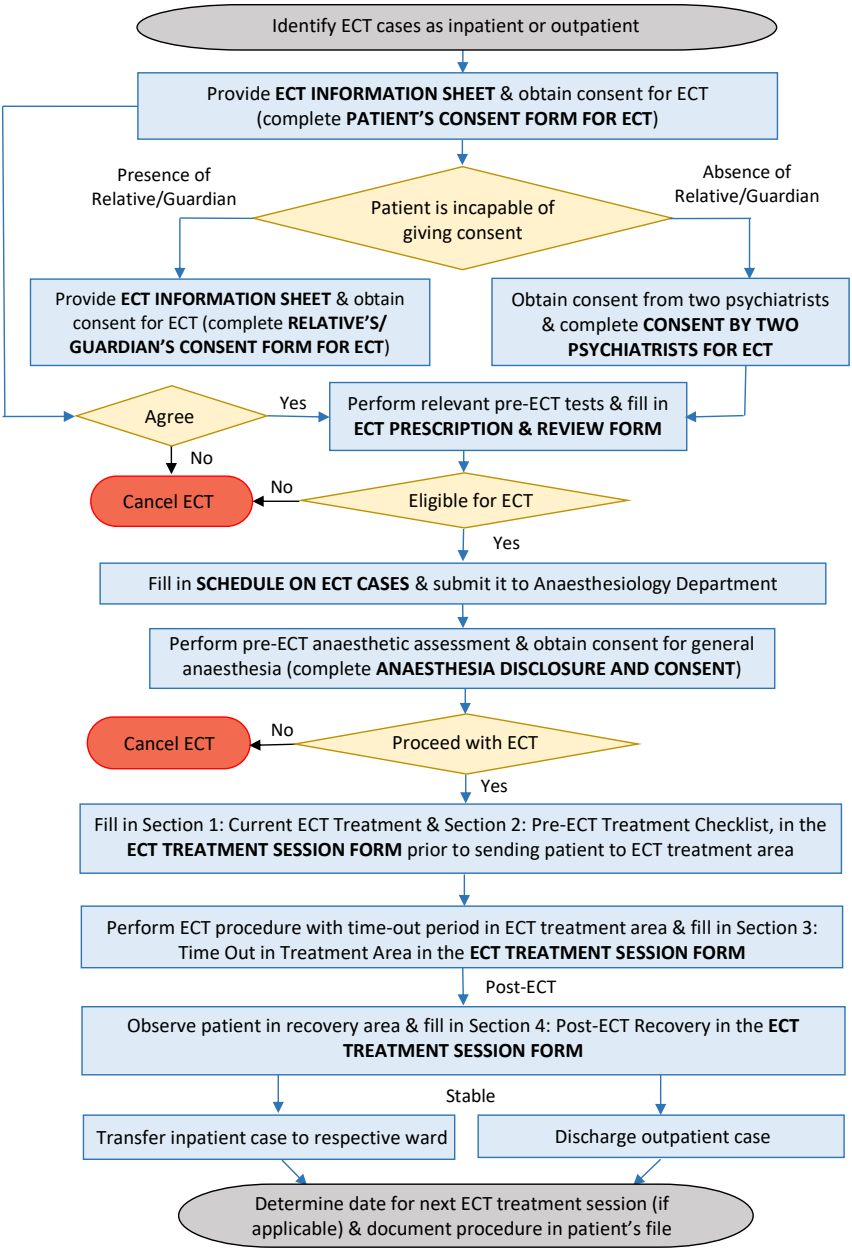
Nama (Huruf Besar) ..... **Tarikh** .....

Tandatangan Saksi / Penterjemah ..... **No. K/P** .....

Nama (Huruf Besar) ..... **Tarikh** .....

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

WORK PROCESS ON MANAGEMENT OF ELECTROCONVULSIVE THERAPY (ECT) CASES (INPATIENT & OUTPATIENT CASES)



MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

ECT PRESCRIPTION & REVIEW FORM (ECT-PRESCRIBE form)

INSTRUCTIONS: **(1) This ECT-PRESCRIBE form is to be filled in each time the relevant ECT consent form is required.**
(2) Please ensure information in this ECT-PRESCRIBE form is complete & correctly entered prior to certifying by the psychiatrist in-charge.

PATIENT'S NAME:	
RN / IC NO / AGE:	/ /
GENDER:	☐ Male ☐ Female

SECTION 1: CURRENT ECT COURSE

☐ **ACUTE** phase: From (Date of first treatment session) _____ to (Date of last treatment session) _____ for a period of up to four (4) weeks at a treatment interval of 2 or 3 sessions per week.

OR

☐ **CONTINUATION or MAINTENANCE** phase: From (Date of first treatment session) _____ to (Date of last treatment session) _____ for a period of up to four (4) weeks at a treatment interval determined by the ECT Prescribing Psychiatrist.

Principal indication(s) for ECT prescription

☐ Rapid definitive response is needed
☐ Previous good response to ECT
☐ Patient's preference
☐ Risks of other alternative treatment(s) outweigh risks of ECT
☐ Actively suicidal / Life-threatening situation
☐ Other(s): _____

Psychiatric diagnosis (based on DSM-5)

☐ Schizophrenia Spectrum & Other Psychotic Disorders
Specify: _____
☐ Bipolar & Related Disorders
Specify: _____
☐ Depressive Disorders
Specify: _____
☐ Obsessive-Compulsive & Related Disorders
Specify: _____
☐ Others
Specify: _____

Patient status

☐ Inpatient
(Date of admission: _____)
☐ Outpatient (Daycare)

Admission status

☐ Not applicable
☐ Form 1
☐ Form 3 & Form 4
☐ Form 5
☐ Other(s): _____

Provision of consent

☐ Patient
☐ Relative / Guardian
☐ Two Psychiatrists

Read & understood ECT Information Sheet

☐ Yes
☐ No, state reason: _____

Electrode placement

☐ Bilateral: ☐ Temporal **OR** ☐ Frontal
☐ Unilateral: ☐ Left **OR** ☐ Right

Stimulus pulse width

☐ Brief ☐ Ultra-brief
☐ Others: _____

Handedness

☐ Left ☐ Right

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ECT PRESCRIPTION & REVIEW FORM (ECT-PRESCRIBE form)

SECTION 2: PREVIOUS ECT COURSE

Date of previous ECT treatment: _____
☐ No previous ECT treatment

Summary of previous ECT course (including number of treatment sessions, dose issues, adverse effects):

Previous ECT CGI (Clinical Global Impression) Improvement Scale

☐ 0 – Not assessed
☐ 1 – Very much improved
☐ 2 – Much improved
☐ 3 – Minimally improved
☐ 4 – No change
☐ 5 – Minimally worse
☐ 6 – Much worse
☐ 7 – Very much worse

SECTION 3: MEDICAL REVIEW

Past medical history

Current medication(s)

Smoker ☐ Yes ☐ No

Pre-ECT systems review (√ if present)

☐ Shortness of breath
☐ Cough / sore throat
☐ Bleeding tendency
☐ Weakness / numbness
☐ Headache / dizziness
☐ Others, please state: _____
☐ Chest pain
☐ Fever
☐ Abdominal pain
☐ Seizure
☐ Dysuria
☐ None of the above

Medication allergies / sensitivities (state the medication, reaction & date)

Investigations (Summary of results)

Results	Findings
Full blood count Date: _____	☐ Normal ☐ Abnormal, please specify: ☐ Not done, reason:
Renal profile Date: _____	☐ Normal ☐ Abnormal, please specify: ☐ Not done, reason:
Chest X-Ray Date: _____	☐ Normal ☐ Abnormal, please specify: ☐ ☐ Not done, reason: ☐
Electrocardiogram Date: _____	☐ Normal☐ ☐ Abnormal, please specify:☐ ☐ ☐ Not done, reason: ☐

Physical examination (Date: _____)

Height:	_____ m
Weight:	_____ kg
Temperature:	_____ ^{0}C
Heart rate:	_____ bpm
Respiratory rate:	_____ BPM
Blood pressure:	_____ mmHg
SpO_2:	_____ %
Skull defect:	☐ Yes ☐ No
(if Yes, with metal implant):	☐ Yes ☐ No
Cochlear implant:	☐ Yes ☐ No
Dentures:	☐ Yes ☐ No
CIED (Cardiac implantable electronic device):	☐ Yes ☐ No
Examination findings:	☐ Normal ☐ Abnormal If abnormal, please describe:

ECT-PRESCRIBE form reviewed by:

(Signature & Name: ECT Prescribing Psychiatrist or Treating Psychiatrist)
Date & Stamp:

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Appendix 11

SCHEDULE on ELECTROCONVULSIVE THERAPY (ECT) CASES

Instructions: This form is to be filled in by the ECT Co-ordinator in-charge and submit to the Anaesthesiology Department / Anaesthesia Provider in-charge, according to the designated day and timing of the respective hospital.

ECT date:		ECT Administering Psychiatrist in-charge:	
ECT day:		ECT Medical Officer in-charge:	
ECT site:		ECT Co-ordinator in-charge:	
Total number of cases:		Anaesthesia Provider in-charge:	

No.	Patient's name	RN	Age	Diagnosis	Acute/Continuation/ Maintenance ECT	Notes
1.						
2.						
3.						
4.						
5.						
6.						
7.						

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SCHEDULE on ELECTROCONVULSIVE THERAPY (ECT) CASES

No.	Patient's name	RN	Age	Diagnosis	Acute/Continuation/ Maintenance ECT	Notes
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						

Schedule prepared by:

Signature & Name of ECT Co-ordinator: _____ Date & Stamp: _____

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ECT TREATMENT SESSION FORM (ECT-SESSION form)

INSTRUCTIONS: (1) Please complete this ECT-SESSION form for each treatment session.
(2) ECT performed by ECT Medical Officer is to be supervised by ECT Administering Psychiatrist in the treatment area.

PATIENT'S NAME:	
RN / IC NO / AGE:	/ /
GENDER:	☐ Male ☐ Female

SECTION 1: CURRENT ECT TREATMENT (to be completed by treating team)

ECT schedule	Treatment date	Treatment session number
☐ Acute		
☐ Continuation / Maintenance		

Electrode placement	☐ Bilateral: ☐ Temporal **OR** ☐ Frontal ☐ Unilateral: ☐ Left **OR** ☐ Right
Stimulus pulse width	☐ Brief ☐ Ultra-brief ☐ Others: ____
Patient status	☐ Inpatient (Date of admission: ____) ☐ Outpatient (Daycare)
Admission status	☐ Not applicable ☐ Form 1 ☐ Form 3 & Form 4 ☐ Form 5 ☐ Other(s): ____
Provision of consent	☐ Patient ☐ Relative / Guardian ☐ Two Psychiatrists

Pre-ECT treatment status
CGI Severity Scale
- ☐ 0 – Not assessed
- ☐ 1 – Normal, not at all ill
- ☐ 2 – Borderline mentally ill
- ☐ 3 – Mildly ill
- ☐ 4 – Moderately ill
- ☐ 5 – Markedly ill
- ☐ 6 – Severely ill
- ☐ 7 – Among the most extremely ill

Medication regime change
- ☐ No
- ☐ Yes, please describe:

ECT treatment reviewed by	_____ **(Signature & Name: ECT Prescribing Psychiatrist / Treating Psychiatrist / Treating Medical Officer)** **Date & Stamp:**

SECTION 2: PRE-ECT TREATMENT CHECKLIST (to be completed by ward / daycare staff in-charge)

Please check the following as stated:	CHECKED
Patient fasted from 12 midnight	
Patient not smoking cigarettes at least past 24 hours	
Documents to accompany patient to treatment area:	
• Medical record / file (with any previous ECT-EEG tracings)	
• Medication chart (check any pre-medication given & signed)	
• Consent form: valid, completed & signed	
• ECT-PRESCRIBE form: completed & signed by psychiatrist in-charge	
Pre-ECT observation in ward:	
Orientation: time, place, person	☐ Yes ☐ No
Temperature (°C):	
Heart rate (bpm):	
Respiratory rate (BPM):	
Blood pressure (mmHg):	
SpO_2 (%):	

Please check the following is done:	CHECKED
Personal hygiene attended	
Patient in proper hospital attire	
Hair dry & clean	
Face clean & makeup removed	
Contact lenses & spectacles removed	
Hearing aids removed	
Dentures removed	
Fingernails clean & nail polish removed	
Jewellery removed	
Patient encouraged to use the toilet	

Pre-ECT treatment checklist done by:	_____ **(Signature & Name: Staff In-charge)** **Date & Stamp:**

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ECT TREATMENT SESSION FORM (ECT-SESSION form)

SECTION 3: TIME OUT IN TREATMENT AREA
(to be performed by ECT Administering Psychiatrist / ECT Medical Officer, ECT Co-ordinator & Anaesthesia Provider; completed prior to general anaesthesia)

Pre-ECT treatment observation (by ECT Co-ordinator)

Date:	Time:	
Orientation: time, place, person	☐ Yes ☐ No	_____ (Signature & Name: ECT Co-ordinator) Date & Stamp:
Temperature (°C):		
Heart rate (bpm):		
Respiratory rate (BPM):		
Blood pressure (mmHg):		
SpO_2 (%):		

TIME-OUT ITEMS

☐ **Correct patient** ☐ **Dentures out** ☐ **Bite block ready** ☐ **Correct electrode placement (stimulus & recording)** ☐ **Consent form valid, completed & signed** ☐ **ECT-PRESCRIBE form completed & signed** ☐ **Pre-ECT treatment observation done** ☐ **Stimulus dose checked** ☐ **Pulse width checked** ☐ **Correct anaesthetic drugs (type & dose)**	To proceed ☐ **YES** ☐ **NO**	_____ (Signature & Name: ECT Administering Psychiatrist / ECT Medical Officer) Date & Stamp: _____ (Signature & Name: ECT Co-ordinator) Date & Stamp: _____ (Signature & Name: Anaesthesia Provider) Date & Stamp:

ECT-EEG QUALITY (based on NEURON ECT-EEG Algorithmic Rating Scale or NEARS)

- Recruitment : ≤ 5s prior to polyspike phase
- Amplitude : ≥ 1.5cm (3 boxes) & ≥ 10s in slow-wave complexes (bilateral)
- Symmetry : ≥ 50% from recruitment to slow-wave phase
- Duration : ≥ 15s from recruitment to termination phase
- Adequacy ≥ 50% or Post-ictal Suppression Index (PSI) ≥ 80%

1st STIMULUS DOSE ☐☐☐%		2nd STIMULUS DOSE ☐☐☐%	
DURATION (s)	☐ Adequate (4-5 / 5)	DURATION (s)	☐ Adequate (4-5 / 5)
Motor Seizure:	☐ Equivocal (3 / 5)	Motor Seizure:	☐ Equivocal (3 / 5)
EEG Seizure:	☐ Inadequate (0-2 / 5)	EEG Seizure:	☐ Inadequate (0-2 / 5)
3rd STIMULUS DOSE ☐☐☐%		4th STIMULUS DOSE ☐☐☐%	
DURATION (s)	☐ Adequate (4-5 / 5)	DURATION (s)	☐ Adequate (4-5 / 5)
Motor Seizure:	☐ Equivocal (3 / 5)	Motor Seizure:	☐ Equivocal (3 / 5)
EEG Seizure:	☐ Inadequate (0-2 / 5)	EEG Seizure:	☐ Inadequate (0-2 / 5)

Precaution or recommendation (e.g. post-ECT delirium, change in medication regime, stimulus dose for next treatment session):

ECT performed by: (ECT performed by ECT Medical Officer is to be supervised by ECT Administering Psychiatrist in the treatment area)	_____ **(Signature & Name: ECT Administering Psychiatrist / ECT Medical Officer)** **Date & Stamp:**

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HOSPITAL _____ (name of hospital)

ECT TREATMENT SESSION FORM (ECT-SESSION form)

SECTION 4: POST-ECT RECOVERY

RECOVERY in ECT SUITE / OPERATING THEATRE

POST-ECT OBSERVATIONS (every 15 minutes or 2 minutes for Drowsy / Confused / Delirious state)	OBSERVATION 1 (immediate transfer in from treatment area)	OBSERVATION 2	OBSERVATION 3	OBSERVATION 4	Prior to transfer out to Ward / Daycare
Time					
State of consciousness	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious
Temperature					
Heart rate					
Respiratory rate					
Blood pressure					
SpO_2					
Time taken to regain consciousness (minutes)		**Post-ECT recovery in ECT suite / Operating Theatre done by:**		_____ **(Signature & Name: ECT Co-ordinator / Recovery Nurse)** **Date & Stamp:**	
Issues / Intervention required (if any)					

RECOVERY in WARD / DAYCARE

POST-ECT OBSERVATIONS (to complete within 4 hours or more if required)
(½ hourly for first 2 hours then 1 hourly for next 2 hours)

Time						
State of consciousness	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious	☐ Alert ☐ Drowsy/ Confused/ Delirious ☐ Unconscious
Orientation	☐ Time ☐ Place ☐ Person	☐ Time ☐ Place ☐ Person	☐ Time ☐ Place ☐ Person	☐ Time ☐ Place ☐ Person	☐ Time ☐ Place ☐ Person	☐ Time ☐ Place ☐ Person
Temperature						
Heart rate						
Respiratory rate						
Blood pressure						
SpO_2						
Side effect(s) e.g. broken tooth, muscle ache	☐ Yes i.e. _____ ☐ No	☐ Yes i.e. _____ ☐ No	☐ Yes i.e. _____ ☐ No	☐ Yes i.e. _____ ☐ No	☐ Yes i.e. _____ ☐ No	☐ Yes i.e. _____ ☐ No
Tolerated orally	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Gait	☐ Stable ☐ Unstable	☐ Stable ☐ Unstable	☐ Stable ☐ Unstable	☐ Stable ☐ Unstable	☐ Stable ☐ Unstable	☐ Stable ☐ Unstable
Stable to cease observation	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Cannula removed	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Comments (if any):

Post-ECT recovery in ward / daycare done by:

_____
(Signature & Name: Staff In-charge)
Date & Stamp:

MANAGEMENT ON ANAESTHESIA CARE FOR ELECTROCONVULSIVE THERAPY DURING COVID-19 PANDEMIC

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) has become a pandemic involving millions of people and causing hundreds of thousands of deaths worldwide.[1] As modified Electroconvulsive Therapy (ECT) typically involves hyperventilation via mask ventilation (MV), this manoeuvre is considered an aerosol generating procedure (AGP) i.e. any medical procedure that can induce the production of aerosols of various sizes, including small (< 5μm) particles, and in this case respiratory droplets containing the SARS-CoV-2 virus. Precautionary measures are therefore required at all levels to minimise the risk of viral transmission and cross-contamination.

The anaesthesia recommendation below is adapted from Ministry of Health, Malaysia on Guideline on Management of Electroconvulsive Therapy During COVID-19 Pandemic (Version 3, April 2021) **(ANNEX 37)** [2] with incorporation of best practices from available literature.

1. Screening of patients prior to ECT procedure

- Perform screening prior to obtaining consent from the patient/relative/guardian with the COVID-19 Declaration Form (refer Appendix 2 in ANNEX 37). [2]
- For continuation or maintenance ECT, all patients must have a negative result for SARS-CoV-2 with Reverse Transcription Polymerase Chain Reaction (RT-PCR) test performed at least 72 hours prior to the procedure. [2]
- ECT is to be avoided for any COVID-19 positive patient or suspected COVID-19 case unless there is imminent risk for the patients e.g. life-threatening case of suicide or severe malnutrition and catatonia. [2]
- Adults who recovered from COVID-19 infection can continue to shed detectable but non-infectious SARS-CoV-2 RNA in upper respiratory specimens for up to 90 days after illness onset [3] (refer Appendix 14 on CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC) GUIDELINES ON ELECTIVE SURGERY FOR COVID-19 PATIENT).

2. In cases of suspected or confirmed positive COVID-19, preparation as follows is recommended:

(i) Location: as ECT is an aerosol generating procedure, it should be performed in a negative pressure room or Airborne Infection Isolation Rooms (AIIRs). [4] If not available, an adequately ventilated single room with at least a natural ventilation can be utilised with at least 160L/s/patient air flow, and with closed doors (use with high-efficiency particulate air or HEPA filter if possible).

(ii) The case is performed last in the list, so that the room and all equipment can be thoroughly disinfected after completion of treatment session.

(iii) Limited personnel on site to reduce risk of exposure among the healthcare workers: [2]
- 1 ECT Administering Psychiatrist
- 2 ECT Co-ordinators or 1 ECT Co-ordinator and 1 ECT Medical Officer
- 1 Anaesthesia Provider
- 1 Anaesthetist Medical Assistant

(iv) Use of Personal Protective Equipment (PPE): [4]
- OT cap
- N95 mask with fit check testing
- Head cover
- Shoe cover
- Long-sleeved isolation gown
- Gloves
- Face shield
- Single-use plastic apron

3. Recommended modified anaesthesia technique for ECT during COVID-19 pandemic:

(i) Application of standard monitoring as per routine prior to start of induction.

(ii) Optional use of aerosol box during airway management, if available to prevent dispersion of droplets containing SARS-CoV-2 virus. [2] However, if intubation is intended, the aerosol box may not be useful, as a longer time is required for intubation with reduced first pass success of endotracheal tube and decreased laryngoscopic view. [5]

(iii) Rigorous preoxygenation with 100% oxygen for 3 to 5 minutes with a tight-fitting mask to reduce the need for subsequent MV. [6-12] However, it is important to note that oxygen flow of 6 L/min or greater is considered high-flow oxygen and may cause aerosolization of viral pathogens; though controversial, a tight-fitting mask is cautiously applied. [10];[13-14]

(iv) A closed circuit is optimal (e.g. anaesthetic circle breathing circuit) and a rebreathing circuit (e.g. Mapleson's C) if available is preferable to a bag-mask which expels virus-containing exhaled gas into the room. [12]

(v) A high-efficiency hydrophobic filter or heat and moisture exchange (HME) filter should be placed between the catheter mount and breathing circuit. [6-9];[11- 12]

(vi) Evidence on the benefits of apnoeic oxygenation via nasal prong during airway management remains conflicting, [12];[15] and use of high-flow nasal oxygen for airway management is not recommended. [12]

(vii) Patient positioning, including ramping in the obese and reverse Trendelenburg positioning, should be adopted to maximise safe apnoea time. [12]

(viii) After administration of induction agents, the practice of hyperventilating patients to prolong duration of seizure with the use of MV is to be avoided. [6-11]

(ix) In the event of desaturation requiring rescue MV, a 2-man 2-hand technique is adopted to ensure good mask seal to prevent leak of aerosolization droplets. [6-12] The lowest possible pressure and flow of oxygen is used with the aim of a much smaller tidal volume for rescue MV. [10-12]

(x) Alternatively, a second-generation supraglottic airway device (SGA) may be inserted, after loss of consciousness, to replace the role of bag-mask ventilation especially in patients with features of difficult MV. [12]

(xi) If intubation is unavoidable, the most experienced anaesthetist on site should perform laryngoscopy using a video laryngoscope while minimising MV. [8];[11];[12]

(xii) Practice of physical distancing between personnel in treatment area i.e. after applying the ECT electrodes, to step away at least 1 meter with positioning of ECT machine at least 1-meter away from the patient's airway. [2]

(xiii) Patient is advised to wear a 3-ply surgical mask before and after the procedure and is to be observed at the recovery area for at least 30 minutes before being discharged.

(xiv) At the end of each treatment session, the room and all airway equipment including general anaesthesia machine should be thoroughly disinfected.

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CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC) GUIDELINES ON ELECTIVE SURGERY FOR COVID-19 PATIENT

American Society of Anesthesiologists (ASA) and Anesthesia Patient Safety Foundation (APSF) Joint Statement on Elective Surgery and Anesthesia for Patients after COVID-19 Infection (December 8, 2020)

- If a patient was tested positive for COVID-19 infection, elective surgical procedures should be delayed until the patient is no longer infectious and has demonstrated recovery from COVID-19.

- Based on CDC non-test-based strategy, a patient's infectivity is based on the disease severity i.e.
  - **For mild to moderate disease i.e. absence of viral pneumonia with SpO_2 > 94%,** CDC recommends discontinuing transmission-based precautions when:
    - at least 10 days after the onset of symptoms, **AND**
    - at least 24 hours since resolution of fever without the use of fever-reducing medications, **AND**
    - improvement of respiratory symptoms (e.g. cough and shortness of breath).
  - **For severe / critical disease or in immunocompromised patients i.e. presence of viral pneumonia with hypoxemic respiratory failure (Peak Flow Rate of <300 litres per minute),** CDC recommends discontinuing transmission-based precautions when:
    - at least 20 days after the onset of symptoms, **AND**
    - at least 24 hours since resolution of fever without the use of fever-reducing medications, **AND**
    - improvement of respiratory symptoms (e.g. cough and shortness of breath).
  - **For asymptomatic disease and not severely immunocompromised**, transmission-based precautions may be discontinued at least 10 days from the date of first reverse transcription-polymerase chain reaction (RT-PCR) positive test.

- Duration of infectivity for immunocompromised patient is unknown. Severely immunocompromised patients may include those:
  - who are actively undergoing chemotherapy for cancer
  - who have within 1 year, been receiving haemopoietic stem cells or solid organ transplant
  - with untreated Human Immunodeficiency Virus (HIV) with a CD4 T lymphocytes count of < 200
  - who are receiving prednisolone > 20mg/day for more than 14 days
  - with primary immunodeficiency disorder

- **Timing of elective surgery after COVID- 19 infection**
  - Recommendation regarding the definition of sufficient recovery from the physiologic changes from Covid -19 infection cannot be made at this time, however evaluation should include an assessment of the patient's exercise capacity (metabolic equivalents or METS).
  - The timing for elective surgery after recovery from COVID-19 uses both symptom- and severity-based categories.
  - Based on ASA-APSF Joint Statement on Elective Surgery and Anesthesia for Patients after COVID -19 Infection, suggested wait times from date of COVID-19 diagnosis to surgery are as follows:

Wait time	4 weeks	6 weeks	8-10 weeks	12 weeks
Patient's symptoms and severity	Asymptomatic or recovery from mild, non-respiratory symptoms	Symptomatic patient who was not hospitalized	Symptomatic patient who is diabetic, immunocompromised or hospitalized	Severe or critical illness related to Covid-19

- **When to repeat COVID-19 testing**

≤ 90 days of symptom onset and remain asymptomatic	≤ 90 days of symptom onset but with recurrent symptoms	> 90 days of symptom onset
Not recommended (persistent or recurrent positive RT-PCR test is common after recovery)	Can repeat RT-PCR	Repeat RT-PCR nasal swab within 3 days prior to operation

- Recovered adults can continue to shed detectable but non-infectious SARS-CoV-2 RNA in upper respiratory specimens for up to 90 days from symptoms onset.
- If such an adult remains asymptomatic during this 90-day period, then any viral re-testing is unlikely to yield useful information, even if the adult had close contact with an infected person.
- If such an adult becomes symptomatic during this 90-day period, and an evaluation fails to identify a diagnosis other than SARS-CoV-2 infection (e.g. influenza), then the adult likely warrants evaluation for SARS-CoV-2 reinfection in consultation with an infectious disease physician or infection control expert. Isolation might be warranted before and during this evaluation, particularly if symptoms developed after close contact with an infected person or in association with an outbreak setting.

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Assessment Report on Practicality in Electroconvulsive Therapy (ECT) for Credentialing & Privileging of Clinical Psychiatrist

Instructions to assessor:

- Prior to this assessment, the Clinical Psychiatrist is required to have attended an appropriate ECT training course (at least over the preceding 3 years).
- For the purpose of this assessment, the Clinical Psychiatrist is to perform at least ten (10) ECT treatment sessions independently in the ECT treatment area.
- Only one assessment report is required for assessing the total ten (10) ECT treatment sessions.
- An assessor is an ECT privileged psychiatrist. If more than one assessor is involved, all assessors will determine the overall satisfactory standard of the Clinical Psychiatrist based on the performance of the assigned treatment sessions.

Name of Clinical Psychiatrist:			
I.C. No.:		MMC No.:	
Hospital of current practice:			
Date(s) of attended ECT training course:			
Date(s) of assessment:			
Hospital of assessment:			
Name of Assessor(s):			

Assessment domains

(1) Placement of Recording Electrodes

Competence	Satisfactory (Yes/No)	Comments
Prepare skin		
Placing recording electrodes		
Check baseline recording		
Adjust gain setting		

(2) Placement of Stimulus Electrodes

Competence	Satisfactory (Yes/No)	Comments
Placing stimulus electrodes		
Methods (hand-held, headband)		
Check impedance		

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Assessment Report on Practicality in Electroconvulsive Therapy (ECT) for Credentialing & Privileging of Clinical Psychiatrist

(3) Time-out Procedure

Competence	Satisfactory (Yes/No)	Comments
Communicate with anaesthetic team		
Conduct time out Items: • Patient identity • Dentures • Bite block • Electrode placement • Consent form • ECT-PRESCRIBE form • Pre-ECT observation • Stimulus dose • Pulse width • Anaesthetic drugs		

(4) Stimulus Dose Strategy

Competence	Satisfactory (Yes/No)	Comments
Dose strategy		
Dose relative to seizure threshold		
Seizure threshold determinants		
Determine stimulus dose change between different electrode placements		

(5) Interpretation of ECT-EEG Tracings

Competence	Satisfactory (Yes/No)	Comments
Identify ECT-EEG phases		
Determine quality of ECT-EEG tracings (NEARS criteria)		
Identify artefacts		
Identify prolonged seizure		
Identify stimulus parameters		

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Assessment Report on Practicality in Electroconvulsive Therapy (ECT) for Credentialing & Privileging of Clinical Psychiatrist

Evaluation Outcome

Based on the assessment on practicality in ECT, Dr. _____,

- ☐ fulfils an overall satisfactory standard for credentialing & privileging to prescribe and administer ECT.
- ☐ does not fulfil an overall satisfactory standard for credentialing & privileging to prescribe and administer ECT.

Comments:

_____
_____
_____
_____

_____ _____
Signature(s) & Name(s) of Assessors(s) Date & Stamp

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Credentialing & Privileging for Clinical Psychiatrist

Instructions: For Credentialing & Privileging purpose, the Clinical Psychiatrist is required to have:

(i) attended an appropriate ECT training course (at least over the preceding 3 years), and

(ii) performed at least ten (10) ECT treatment sessions independently in the ECT treatment area and fulfilled an overall satisfactory standard to prescribe and administer ECT.

Both this logbook and **Assessment Report on Practicality in ECT for Credentialing & Privileging of Clinical Psychiatrist** are to be submitted as supporting documents for Credentialing & Privileging application on ECT.

Name of Clinical Psychiatrist:			
I.C. No.:		MMC No.:	
Hospital of current practice:			
Date(s) of attended ECT training course:			
Date(s) of practicality assessment:			
Hospital of practicality assessment:			

List of ECT treatment sessions performed			
No.	Treatment session date	Patient Registration No.	Comments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Credentialing & Privileging for Clinical Psychiatrist

Declaration

I hereby confirm that I have,

(i) attended an appropriate ECT training course (at least over the preceding 3 years), and
(ii) performed at least ten (10) ECT treatment sessions independently in the ECT treatment area and fulfilled an overall satisfactory standard for credentialing and privileging to prescribe and administer ECT.

_____ _____
Signature & Name of Clinical Psychiatrist Date & Stamp

Certification on ECT Credentialing & Privileging

I hereby certify that Dr. _____
(MMC No.: _____) has been assessed and fulfilled an overall satisfactory standard for credentialing and privileging to prescribe and administer ECT.

_____ _____
Signature & Name of Head of Department / Hospital Director Date & Stamp

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Re-Privileging for Registered Psychiatrist

Instructions: (i) For re-privileging purpose, the registered psychiatrist is required to perform at least ten (10) ECT treatment sessions over a 1-year period for 3 consecutive years (or according to the criteria set by the respective hospital).
(ii) This logbook is to be submitted as a supporting document for re-privileging on ECT to the respective hospital of current practice.

Name of Registered Psychiatrist:			
MMC No.:		NSR No.:	
Designation:			
Hospital of current practice:			
Hospital for re-privileging:			
Period of 3 consecutive years:	From _____ to _____		

List of ECT treatment sessions performed			
No.	Treatment session date	Patient Registration No.	Comments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Re-Privileging for Registered Psychiatrist

List of ECT treatment sessions performed			
No.	Treatment session date	Patient Registration No.	Comments
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			

Declaration

I hereby confirm that I have performed at least ten (10) ECT treatment sessions over a 1-year period for 3 consecutive years as listed.

_____ _____
Signature & Name of Registered Psychiatrist Date & Stamp

Certification on ECT Re-Privileging

I hereby certify that Dr. _____
(NSR No.: _____) has performed the required treatment sessions over a consecutive 3-year period from _____ to _____ for re-privileging on ECT.

_____ _____
Signature & Name of Head of Department / Hospital Director Date & Stamp

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Assessment Report on Practicality in Electroconvulsive Therapy (ECT) for Privileging of Medical Officer

Instructions to assessor:

- Prior to this assessment, the Medical Officer is required to have attended an appropriate ECT training course (at least over the preceding 3 years).
- For the purpose of this assessment, the Medical Officer is to assist at least ten (10) ECT treatment sessions under the supervision of the ECT Administering Psychiatrist (EAP) in the ECT treatment area.
- Only one assessment report is required for assessing the total ten (10) ECT treatment sessions.
- An assessor is an EAP. If more than one assessor is involved, all assessors will determine the overall satisfactory standard of the Medical Officer based on the performance of the assigned treatment sessions.

Name of Medical Officer:			
I.C. No.:		MMC No.:	
Hospital of current practice:			
Date(s) of attended ECT training course:			
Date(s) of assessment:			
Hospital of assessment:			
Name of EAP(s):			

Assessment domains

(1) Placement of Recording Electrodes

Competence	Satisfactory (Yes/No)	Comments
Prepare skin		
Placing recording electrodes		
Check baseline recording		

(2) Placement of Stimulus Electrodes

Competence	Satisfactory (Yes/No)	Comments
Placing stimulus electrodes		
Methods (hand-held, headband)		
Check impedance		

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Assessment Report on Practicality in Electroconvulsive Therapy (ECT) for Privileging of Medical Officer

(3) Time-out Procedure

(For the purpose of this assessment, ECT Administering Psychiatrist is responsible for initiating and performing the time-out session with ECT Co-ordinator and Anaesthesia Provider)

Competence	Satisfactory (Yes/No)	Comments
Communicate with anaesthetic team		
Conduct time out (with EAP) Items: • Patient identity • Dentures • Bite block • Electrode placement • Consent form • ECT-PRESCRIBE form • Pre-ECT observation • Stimulus dose • Pulse width • Anaesthetic drugs		

(4) Stimulus Dose Strategy

(For the purpose of this assessment, ECT Administering Psychiatrist is responsible for delivering the stimulus dose i.e. pressing the stimulus dose button on the ECT machine)

Competence	Satisfactory (Yes/No)	Comments
Dose strategy		
Dose relative to seizure threshold		
Seizure threshold determinants		

(5) Interpretation of ECT-EEG Tracings

Competence	Satisfactory (Yes/No)	Comments
Identify ECT-EEG phases		
Determine quality of ECT-EEG tracings (NEARS criteria)		
Identify artefacts		
Identify prolonged seizure		
Identify stimulus parameters		

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Assessment Report on Practicality in Electroconvulsive Therapy (ECT) for Privileging of Medical Officer

Evaluation Outcome

Based on the assessment on practicality in ECT, Dr. _____,

☐ fulfils an overall satisfactory standard for an ECT privileged Medical Officer.

☐ does not fulfil an overall satisfactory standard for an ECT privileged Medical Officer.

Comments:

_____
_____
_____
_____

_____ _____
Signature(s) & Name(s) of Assessors(s) Date & Stamp

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Privileging for Medical Officer

Instructions: For privileging purpose, the Medical Officer is required to have:

(i) attended an appropriate ECT training course (at least over the preceding 3 years), and

(ii) assisted at least ten (10) ECT treatment sessions under the supervision of an ECT Administering Psychiatrist (EAP) in the ECT treatment area and fulfilled an overall satisfactory standard for an ECT privileged Medical Officer.

Both this logbook and **Assessment Report on Practicality in ECT for Privileging of Medical Officer** are to be submitted as supporting documents for privileging application on ECT.

Name of Medical Officer:			
I.C. No.:		MMC No.:	
Hospital of current practice:			
Date(s) of attended ECT training course:			
Date(s) of practicality assessment:			
Hospital of practicality assessment:			

List of ECT treatment sessions assisted			
No.	Treatment session date	Patient Registration No.	Comments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Privileging for Medical Officer

Declaration

I hereby confirm that I have,

(i) attended an appropriate ECT training course (at least over the preceding 3 years), and
(ii) assisted at least ten (10) ECT treatment sessions under the supervision of an ECT Administering Psychiatrist (EAP) in the ECT treatment area and fulfilled an overall satisfactory standard for an ECT privileged Medical Officer.

_____ _____
Signature & Name of Medical Officer Date & Stamp

Certification on ECT Privileging

I hereby certify that Dr. _____
(MMC No.: _____) has been assessed and fulfilled an overall satisfactory standard for an ECT privileged Medical Officer.

_____ _____
Signature & Name of Head of Department / Hospital Director Date & Stamp

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Re-Privileging for Medical Officer

Instructions:
(i) For re-privileging purpose, the Medical Officer is required to assist at least ten (10) ECT treatment sessions over a 1-year period for 3 consecutive years (or according to the criteria set by the respective hospital).
(ii) This logbook is to be submitted as a supporting document for re-privileging on ECT to the respective hospital of current practice.

Name of Medical Officer:	
I.C. No.:	
MMC No.:	
Hospital of current practice:	
Hospital for re-privileging:	
Period of 3 consecutive years:	From _____ to _____

List of ECT treatment sessions assisted

No.	Treatment session date	Patient Registration No.	Comments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH

Logbook on Electroconvulsive Therapy (ECT) Re-Privileging for Medical Officer

List of ECT treatment sessions assisted			
No.	Treatment session date	Patient Registration No.	Comments
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			

Declaration

I hereby confirm that I have assisted at least ten (10) ECT treatment sessions over a 1-year period for 3 consecutive years as listed.

_____ _____
Signature & Name of Medical Officer Date & Stamp

Certification on ECT Re-Privileging

I hereby certify that Dr. _____
(MMC No.: _____) has assisted the required treatment sessions over a consecutive 3-year period from _____ to _____ for re-privileging on ECT.

_____ _____
Signature & Name of Head of Department / Hospital Director Date & Stamp

MINISTRY OF HEALTH, MALAYSIA

Logbook on Privileging Non-Anaesthetist Medical Officer Providing Sedation in Electroconvulsive Therapy (ECT)

- **Objectives**:

1. To privilege Non-Anaesthetist Medical Officer in providing sedation for ECT
2. To provide basic understanding regarding sedation for ECT, including vital sign monitoring and possible complications
3. To provide skills for obtaining patient medical history, physical examination, airway examination and risk assessment such as co-morbidity and potential difficult airway, as well as informed consent. The Non-Anaesthetist Medical Officer should be able to recognize those patients who can receive sedation by a non-anaesthetist or require sedation by a qualified anaesthetist
4. To provide basic knowledge regarding pharmacology of drugs being used for sedation which include:
   - all sedatives, analgesics, and muscle relaxant drugs
   - antagonist drugs to the sedative drugs
   - vasoactive and anti-arrhythmia drugs
5. To provide basic knowledge regarding post-sedation care and monitoring
6. To provide basic skills for sedation on procedures which include:
   (a) Pre-sedation assessment
   (b) Mask ventilation ± oropharyngeal airway insertion
   (c) Endotracheal intubation
   (d) Supraglottic airway device insertion
   (e) Peripheral venous cannulation
   (f) Oropharyngeal and endotracheal suctioning
   (g) Post-sedation care and monitoring

- **For privileging on providing sedation in ECT, Non-Anaesthetist Medical Officer is required to have**:
  (i) undergone a minimum of one (1) month training in an Anaesthesiology Department i.e. to observe or assist at least two (2) each, and perform satisfactorily at least ten (10) each for the abovementioned procedures, and
  (ii) attended Continuing Medical Education (CME) sessions on practical aspects of anaesthesia (refer Guideline on Electroconvulsive Therapy)

Name of Medical Officer:			
I.C. No.:		MMC No.:	
Hospital & Department of current practice:			
Hospital for privileging attachment:			
Date(s) of privileging attachment:	From _____ to _____		
Date(s) of attended CME sessions:			

List of procedures observed / assisted

(a) Pre-sedation assessment

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					

Logbook on Privileging Non-Anaesthetist Medical Officer Providing Sedation in Electroconvulsive Therapy (ECT)

List of procedures observed / assisted

(b) Mask ventilation ± oropharyngeal airway insertion

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					

(c) Endotracheal intubation

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					

(d) Supraglottic airway device insertion

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					

(e) Peripheral venous cannulation

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					

(f) Oropharyngeal and endotracheal suctioning

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					

(g) Post-sedation care and monitoring

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					

Logbook on Privileging Non-Anaesthetist Medical Officer Providing Sedation in Electroconvulsive Therapy (ECT)

List of procedures performed

(a) Pre-sedation assessment

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

(b) Mask ventilation ± oropharyngeal airway insertion

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Logbook on Privileging Non-Anaesthetist Medical Officer Providing Sedation in Electroconvulsive Therapy (ECT)

List of procedures performed

(c) Endotracheal intubation

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

(d) Supraglottic airway device insertion

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Logbook on Privileging Non-Anaesthetist Medical Officer Providing Sedation in Electroconvulsive Therapy (ECT)

List of procedures performed

(e) Peripheral venous cannulation

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

(f) Oropharyngeal and endotracheal suctioning

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Logbook on Privileging Non-Anaesthetist Medical Officer Providing Sedation in Electroconvulsive Therapy (ECT)

List of procedures performed

(g) Post-sedation care and monitoring

No.	Date	Patient Registration No.	Diagnosis	Comments	Signature & Name of Supervisor
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Declaration

I hereby confirm that I have,

1) attended and completed a minimum of 1 month training in the Anaesthesiology Department as a Medical Officer, and
2) performed the required procedures and fulfilled an overall satisfactory standard for a Non-Anaesthetist Medical Officer Providing Sedation in ECT.

_____ _____

Signature & Name of Medical Officer Date & Stamp

Certification on Completion of Training

I hereby certify that Dr. _____
(MMC No.: _____) has completed a minimum of 1 month training in the Anaesthesiology Department as a Medical Officer in Hospital _____
from _____ to _____ and fulfilled an overall satisfactory standard for a Non-Anaesthetist Medical Officer Providing Sedation in ECT.

_____ _____

Signature & Name of Supervisor (Anaesthesiologist) Date & Stamp

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

ELECTROCONVULSIVE THERAPY (ECT) TIME-OUT AUDIT REPORT

Instructions to auditor:

(i) Please ensure time out is performed by the ECT Administering Psychiatrist / ECT Medical Officer, ECT Co-ordinator and Anaesthesia Provider in the treatment area prior to administration of general anaesthesia.

(ii) Please √ in the appropriate ☐ for the respective time-out items that should be performed.

Date:	
Patient's Registration No.:	
ECT Administering Psychiatrist in-charge:	
ECT Medical Officer in-charge:	
ECT Co-ordinator in-charge:	
Anaesthesia Provider in-charge:	

Time-Out Items

(1) Patient Identity (ensure correct patient)

☐ Yes	☐ No	Ask for patient's name
☐ Yes	☐ No	Check patient's wrist band for identity
☐ Yes	☐ No	Check patient's file for identity

(2) Dentures (if applicable)

☐ Yes	☐ No	Taken out prior to procedure

(3) Bite Block

☐ Yes	☐ No	Readily placed next to patient's head

(4) Electrode Placement

☐ Yes	☐ No	Correct electrode placement (both stimulus and recording) before procedure

ELECTROCONVULSIVE THERAPY (ECT) TIME-OUT AUDIT REPORT

(5) Consent Form

☐ Yes	☐ No	Correct consent form is used
☐ Yes	☐ No	Valid for current treatment session
☐ Yes	☐ No	Complete and correctly filled in with signatures from patient / relative / guardian, witness and ECT Prescribing Psychiatrist in-charge, or two psychiatrists

(6) ECT Prescription & Review Form (ECT-PRESCRIBE form)

☐ Yes	☐ No	Complete and correctly filled in, and certified by ECT Prescribing Psychiatrist or Treating Psychiatrist in-charge

(7) Pre-ECT Treatment Observation (on ECT Treatment Session Form or ECT-SESSION form)

☐ Yes	☐ No	Done before procedure by ECT Co-ordinator
☐ Yes	☐ No	Signed and dated by ECT Co-ordinator

(8) Stimulus Dose (to be administered to patient)

☐ Yes	☐ No	Stimulus dose adjusted to lowest dose or % (e.g. 1% for spECTrum machine model) after completion of each ECT treatment session
☐ Yes	☐ No	Stimulus dose correctly written in the STIMULUS DOSE (%) boxes on ECT Treatment Session Form by treating team
☐ Yes	☐ No	Correct stimulus dose to be administered adjusted on ECT machine prior to procedure

(9) Pulse Width (to be administered to patient)

☐ Yes	☐ No	Correct pulse width given

(10) Anaesthetic Drugs (to be administered to patient)

☐ Yes	☐ No	Correct induction agent (type and dose) given
☐ Yes	☐ No	Correct muscle relaxant (type and dose) given

MINISTRY OF HEALTH, MALAYSIA
DEPARTMENT OF PSYCHIATRY & MENTAL HEALTH
HOSPITAL _____ (name of hospital)

ELECTROCONVULSIVE THERAPY (ECT) TIME-OUT AUDIT REPORT

Audit Conclusion: ECT Time-Out Compliance Status

☐ Comply (time out performed correctly i.e. YES to ALL items OR did not proceed with ECT due to problem(s) identified during time-out session)

☐ Non-compliance (time out not performed correctly i.e. NO for any of the time-out items, if applicable)

Audit Declaration

ECT Administering Psychiatrist / ECT Medical Officer, ECT Co-ordinator & Anaesthesia Provider: We hereby acknowledge that the above reported time out has been audited.	**Auditor:** I hereby certify that the above reported time out has been audited.
ECT Administering Psychiatrist / ECT Medical Officer: (Signature/Name/Date/Stamp)	Comments (if any):
ECT Co-ordinator: (Signature/Name/Date/Stamp)	Recommended action(s) (if any):
Anaesthesia Provider: (Signature/Name/Date/Stamp)	Auditor: (Signature/Name/Date/Stamp)

PER-RH 301
(Pin. 1/2016)

SISTEM MAKLUMAT KESIHATAN
KEMENTERIAN KESIHATAN MALAYSIA

BORANG DAFTAR PESAKIT RAWATAN HARIAN

1 GELARAN:
2 NAMA PENUH:
NAMA LAIN (jika ada) :

3 NOMBOR PENDAFTARAN:
4 NOMBOR PENDAFTARAN KLUSTER:
5 MEDICAL RECORD NUMBER (MRN):
6 KES POLIS: ☐ YA ☐ TIDAK

7 ALAMAT TERKINI:
ALAMAT SEPERTI DI KAD PENGENALAN:

8 JENIS PENGENALAN DIRI:
NOMBOR PENGENALAN DIRI:
HUBUNGAN DENGAN PEMILIK KAD (JIKA ADA) :
9 TARIKH LAHIR:
10 UMUR:

11 NO. TELEFON:
BIMBIT:
RUMAH:
PEJABAT:

12 JANTINA:
☐ LELAKI
☐ PEREMPUAN
☐ RAGU

13 TAHAP PENDIDIKAN:

14 PENDAPATAN BULANAN ISI RUMAH (RM):

15 WARGANEGARA (Nyatakan)
☐ YA (Kumpulan Etnik):
☐ TIDAK (Kerakyatan):
NEGARA ASAL:
NEGARA TEMPAT KEDIAMAN:
BANDAR NEGARA TEMPAT KEDIAMAN:

16 TARAF PERKAHWINAN:
☐ BUJANG
☐ BERKAHWIN
☐ DUDA/BALU
☐ JANDA
☐ LAIN-LAIN

17 AGAMA:

18 PEKERJAAN
SEKTOR:
NYATAKAN:

19 BERAT BANDAN: KG
20 TINGGI: CM
BMI:
21 EMAIL:

22 NAMA PENUH WARIS:
NAMA LAIN WARIS:

25 WARGANEGARA (Nyatakan)
☐ YA (Kumpulan Etnik):
☐ TIDAK (Kerakyatan):
NEGARA ASAL:
NEGARA TEMPAT KEDIAMAN:
BANDAR NEGARA TEMPAT KEDIAMAN:

26 HUBUNGAN KEKELUARGAAN:
MAKLUMAT KECEMASAN:
NAMA PENUH:
HUBUNGAN:
NO TELEFON WARIS
BIMBIT :
RUMAH:
PEJABAT:

23 JENIS PENGENALAN DIRI WARIS:
NOMBOR PENGENALAN DIRI WARIS:
HUBUNGAN DENGAN PEMILIK KAD (JIKA ADA):
24 ALAMAT TERKINI WARIS:
ALAMAT SEPERTI DI KAD PENGENALAN WARIS:
27 NO TELEFON WARIS:
BIMBIT:
RUMAH:
PEJABAT:

KATEGORI PESAKIT ATM:
☐ TENTERA
☐ KELUARGA TENTERA
☐ VETERAN ATM
☐ AWAM

28 PUNCA RUJUKAN:
(Jika Rujukan Dalaman)
☐ JABATAN KECEMASAN
☐ JPL HOSPITAL
☐ KLINIK PAKAR
☐ PAC/BERSALIN
☐ WAD

(Jika Rujukan Luar)
☐ KLINIK KESIHATAN:
TARIKH SURAT RUJUKAN:
☐ HOSPITAL KERAJAAN:
PINDAH: ☐ YA ☐ TIDAK
☐ HOSPITAL SWASTA:
☐ KLINIK SWASTA:
☐ LAIN-LAIN

29 JENIS DISCAJ:
☐ BALIK KE RUMAH
☐ ENGKAR NASIHAT DOKTOR (DAMA) / DENGAN RISIKO SENDIRI (AOR)
☐ TANPA KEBENARAN
☐ TUKAR KE HOSPITAL (Nyatakan Nama Hospital) _____
☐ STEP UP CARE
☐ SAME LEVEL CARE
☐ STEP DOWN CARE
☐ NOT APPLICABLE

☐ MATI
TARIKH:
MASA:

30 HEALTH FUNDING TYPE: _____
31 HEALTH FUNDING TYPE NUMBER (Jika ada): _____
32 BILING CATEGORY: _____

	KEMASUKAN	DISCAJ
33 TARIKH:		
34 WAKTU:		
35 a) DISIPLIN:		
b) KEPAKARAN:		
c) SUB-KEPAKARAN:		

36 a) PENGURUSAN RAWATAN:
☐ SATU KEPAKARAN ☐ PELBAGAI KEPAKARAN

b) PASUKAN YANG MERAWAT

i. _____ vi _____
ii _____ vii. _____
ii _____ viii. _____
iv _____ i _____
v _____ x _____

37 JANGKAMASA PESAKIT TINGGAL: _____

Rawatan Intensif (sth NICU/PICU/CCU/ICU dan lain-lain) ☐ hari

38 DIAGNOSA (DIAGNOSIS)

	39 NOMBOR KOD (ICD10):
i) DIAGNOSIS UTAMA *(Disease Or Condition Directly Leading To Death)*	i)
ii) SEBAB-SEBAB KEMATIAN *(Cause Of Death)*	ii)
III) SEBAB-SEBAB YANG MENYEBABKAN (UNDERLYING CAUSE) *(Disease or condition leading to death) DUE TO OR AS A CONSEQUENCES OF*	iii)
iv) DIAGNOSIS LAIN (CO-MORBIDITY, jika ada) *(Antecedent causes giving rise to the above cause) DUE TO OR AS A CONSEQUENCES OF*	iv)
v) DIAGNOSIS LAIN *(Antecedent causes giving rise to the above cause) DUE TO OR AS A CONSEQUENCES OF*	a)
a. DIAGNOSIS LAIN	
b. DIAGNOSIS LAIN	b)
c. DIAGNOSIS LAIN	c)
d. DIAGNOSIS LAIN	d)
e. DIAGNOSIS LAIN	e)
vi) DIAGNOSIS KOMPLIKASI (jika ada)	vi)
vii) SEBAB-SEBAB LUARAN KECEDERAAN & KERACUNAN (External Causes Of Injury & Poisoning)	vii)
viii) FAKTOR-FAKTOR LAIN YANG MEMPENGARUHI TAHAP KESIHATAN & KONTEK DENGAN PERKHIDMATAN KESIHATAN *(Other significant conditions contributing to the death, but not related to the disease or condition*	viii)

40 PEMBEDAHAN/ PROSEDUR:	41 JENIS PEMBEDAHAN	42 KELAS	43 NOMBOR KOD (ICD9CM):
i) PEMBEDAHAN/ PROSEDUR UTAMA			i)
ii) PEMBEDAHAN/ PROSEDUR LAIN			ii)
iii) PEMBEDAHAN/ PROSEDUR LAIN			iii)
iv) PEMBEDAHAN/ PROSEDUR LAIN			iv)

44 SURGICAL PROCEDURES

a PROCEDURE CANCELLED	☐ GA	☐ LA	REASON _____
b CASE CANCELLED	☐ GA	☐ LA	REASON _____
c UNPLANNED ADMISSION			REASON _____

45 NON SURGICAL PROCEDURES / MEDICAL PROCEDURES

ENDOSCOPY	☐	☐ PROCEDURE CANCELLED	REASON _____
CHEMOTHERAPY	☐	☐ CASE CANCELLED	REASON _____
TRANSFUSION SERVICES	☐	☐ UNPLANNED ADMISSION	REASON _____
HAEMODIALYSIS	☐		
TREATMENT	☐		
OTHER DIAGNOSTIC PROCEDURE	☐		
NON DIAGNOSTIC PROCEDURE	☐		

46 NAMA PEGAWAI PERUBATAN DAN NO. MMC

47 TANDATANGAN, TARIKH & COP JAWATAN

48 NAMA PAKAR YANG MERAWAT DAN NO. MMC

49 TANDATANGAN, TARIKH & COP JAWATAN

50 CATATAN

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LIST OF ABBREVIATIONS

ECT	Electroconvulsive Therapy
aECT	Acute Electroconvulsive Therapy
cECT	Continuation Electroconvulsive Therapy
mECT	Maintenance Electroconvulsive Therapy
BL	Bilateral
UL	Unilateral
BT	Bitemporal
BF	Bifrontal
SD	Seizure Duration
ST	Seizure Threshold
EEG	Electroencephalogram
ECG	Electrocardiogram
EMG	Electromyography
mC	millicoulombs
NEARS	NEURON ECT-EEG Algorithmic Rating Scale
PSI	Post-ictal Suppression Index

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