

Electroconvulsive therapy in Geriatric patients

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Financial Disclosure:

- None

Physiology of electroconvulsive therapy

- ECT uses an electrical stimulus to **induce a seizure in an anesthetized patient**. This seizure results in beneficial and adverse physiologic changes in the brain and other organs.
- Although the physiology of ECT in the elderly remains largely the same as in the general population, there are a few notable differences. - **age increases the seizure threshold (ST)**.
- The increased ST in the elderly may be caused by **several factors, including decreased excitability of the brain and increased skull**. (Meyer, 2020)

Physiology of electroconvulsive therapy

- Depolarization of cerebral neurons
- Acute systemic effects: Sympathetic tone increases during seizure development, whereas vagal tone increases at the time of the stimulus and at seizure termination.
- This autonomic shift **may strain the cardiovascular system**
- Specific attention must be paid to these concerns when evaluating geriatric patients for ECT.

Physiology of electroconvulsive therapy

- Increased ST requires **higher stimulus intensity** to elicit an adequate seizure.
- Older adults also tend to have **shorter seizure duration, shorter slow-wave-phase duration**.
- Overall weaker seizure strength, based on electroencephalogram morphology with less clear onset and offset of seizure.

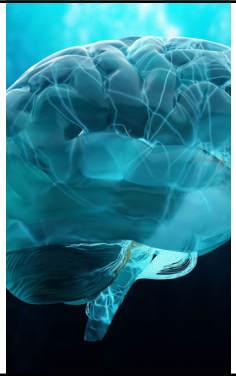


Indications:

- Electroconvulsive therapy (ECT) is a **well-established** treatment modality in the geriatric population, particularly for **severe and treatment-resistant psychiatric conditions**. (Meyer, 2020)
 - Major depressive disorder (MDD)
 - Mania
 - Psychosis
 - Catatonia in elderly patients
- ECT is indicated in patients with **psychotic depression, inability to respond or tolerate adequate treatment with antidepressants, severe non-psychotic depression**, and inability to receive nutrition (Taylor, 2014)

Indications:

- Behavioral symptoms of dementia, including agitation and aggression.
- Motor and mood symptoms in parkinson's disease (Borisovskaya, 2016)
- Catatonia from medical causes.
- Delirium (van den Berg, 2016)



Agitation in Dementia : A promising option

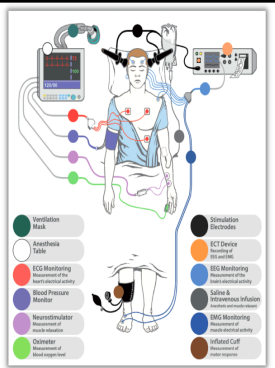
ECT is safe and effective in **LLD accompanied by Parkinsonism, dementia, and stroke** (Kerner, 2014).

Systematic review: Symptomatic benefits in treating behavioral symptoms in individuals with dementia/major NCD.

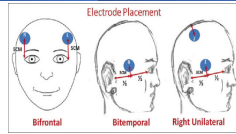
Transient confusion, short-term memory loss, and cognitive impairment were common side effects, **most studies found no serious side effects from ECT use.** (Bachu et al, 2023)

ECT Procedure – Key considerations

- Consents
- Physical exam
- Pre- ECT assessment – CXR, Imaging, CBC, EKG
- Medical Clearance
- Outpatient Vs Inpatient

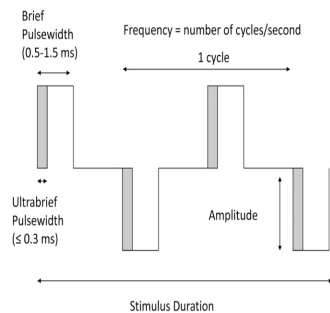


ECT Device and placements:



- In general, **BL ECT** is associated with higher remission rates, greater speed of response/remission, and greater cognitive effects.
- In contrast, **RUL**, although it may approach the efficacy of BL, is typically associated with fewer cognitive effects (McCormick, 2009)

Brief Pulse Vs Ultra Brief Pulse



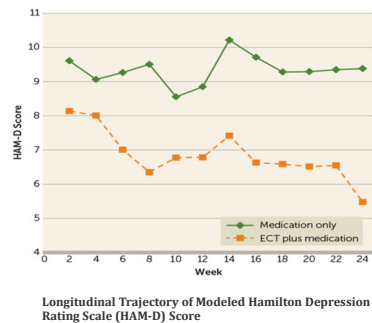
Geriatric Depression

- ECT may **reduce readmissions** of psychiatric in-patients with severe mood disorders. (Slade; 2017)
- The **mean number of ECT treatments** to remission was 7.3 (SD=3.1) (Kellner et al, 2016)
- Electroconvulsive therapy (ECT) is the most efficacious treatment for **late-life major depression, with a remission rate 60–80% in the case of TRD** (Alexopoulos, 2001).
- **Remission can be achieved even in 40–50% of patients** (Schoeyen et al, 2015).

Geriatric Depression

- In remitted patients, adding four ECT treatments over 1 month to continuation treatment with venlafaxine and lithium led to better 24-month outcomes than venlafaxine and lithium alone (Kellner, 2016)
- In geriatric depression, ECT is highly effective, with **remission rates around 61.7%** when combined with venlafaxine, as shown in the PRIDE study. (Kellner, 2016)

A Novel Strategy for Continuation ECT in Geriatric Depression: Phase 2 of the PRIDE Study



Geriatric Depression

- The reason for the improved response in the elderly is unclear.
- Likely multifactorial, including lower rates of comorbid personality disorder, higher rates of medication intolerance, and perhaps earlier referral to ECT. (Greenberg, 2005)

Geriatric Depression

• Predictors of response:

- Psychotic depression respond better to ECT.
- Increased depressive episode length and chronicity of illness have a less robust response to ECT
- Severe medial temporal lobe atrophy seen on MRI may be inversely correlated to ECT response.
- White matter disease in other regions may not be associated with this change (Oudega, 2011)

Geriatric Depression

- Acute, continuation, and maintenance electroconvulsive therapy
- Acute course of ECT, administered 2 or 3 times per week, total of 6-12.
- Continuation/maintenance ECT is the administration of single ECT sessions (usually on an outpatient basis) at intervals to prevent relapse or recurrence of symptoms.

Unipolar Vs Bipolar depression (Bailine et al , 2010)

Both UP and BP depressions remit with ECT.

Polarity is not a factor in the response rate.

ECT did not precipitate mania in depressed patients.

Safety and Efficacy

- It is *not the efficacy of ECT but its safety* that has been consistently called into question, particularly in the elderly population

What are the most common side effects of ECT in elderly patients?
Cognitive Impairments:

Transient cognitive side effects are the most frequently reported.

Confusion and short-term memory loss, which are generally temporary and resolve after the treatment course.

Retrograde amnesia, particularly for autobiographical memory, can also occur but is less common

Cardiovascular Effects:

Transient increases in blood pressure and pulse, leading to increased myocardial oxygen demand.

Hypertension, ischemic heart disease and cardiac arrhythmias, were also significantly more common in the over-65 population compared to the younger population.

The higher prevalence of cardiovascular side effects in this group therefore seems to be a logical consequence of a higher baseline burden of somatic diseases.

Side effects:



Headache and Myalgia: These are common acute side effects that are usually self-limiting and can be managed symptomatically



Nausea: This is another common acute side effect that is typically transient and manageable

Side effects:

- **Delirium:** Particularly in cognitively impaired older adults
- **Electrolyte Disturbances:** Although rare, electrolyte disturbances, particularly related to sodium and potassium, can occur and should be monitored liriium, although this is generally transient (Gędek, 2023)
- ECT may be an independent risk factor for falls, making fall precautions even more important in the post-ECT period.

Efficacy of Electroconvulsive Therapy in Relation to Age (Dominiak, 2021)

Mean energy charge and number of ECT treatments by age.

	<65 Years Old (n = 62)		≥65 Years Old (n = 29)		<i>t</i>	<i>p</i>	95% <i>CI</i>		<i>d</i> Cohen
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>	
Charge (mC)	405.64	194.19	539.9	213.20	2.978	0.003	-223.8	-44.68	0.706
Number of ECT treatments	11.03	2.03	10.31	2.87	1.379	0.171	-0.473	1.916	0.310

Safety of Electroconvulsive Therapy in Relation to Age (Dominiak, 2021)

Adverse effects of ECT by age groups.

Adverse Effects	<65 Years Old (n = 62)	≥65 Years Old (n = 29)	p-Value
Blood pressure elevation	11.3% (n = 7)	24.1 % (n = 9)	0.044
Cardiac arrhythmias	4.8% (n = 3)	20.7 % (n = 6)	0.047
Disturbance of consciousness	6.4% (n = 4)	10.3% (n = 3)	0.820
Headaches	11.3% (n = 7)	10.3% (n = 3)	0.821

Tolerability of Electroconvulsive Therapy in Relation to Age

- It is a very safe method of treatment, irrespective of age.
- Although transient increases in blood pressure and cardiac arrhythmias were significantly more common in the older group, they were mild and transient and did not require any particular treatment.
- Contrary to historical concerns, overwhelming evidence indicates that **ECT does not cause structural damage** to the brain. (Andrade, 2016)
- Recent neuroimaging evidence shows remarkable neurotrophic effects of ECT.

Specific cognitive assessments performed before and after ECT in elderly patients?

ElectroConvulsive therapy Cognitive Assessment (ECCA) tool:

Montreal Cognitive Assessment (MoCA):

Mini-Mental State Examination (MMSE):

Trail Making Test (TMT):

ELECTROCONVULSIVE THERAPY COGNITIVE ASSESSMENT (ECCA)

IDENTIFICATION

TELEVISION

RECOGNITION

REGISTRATION

ATTENTION

FACTUAL KNOWLEDGE

RECALL

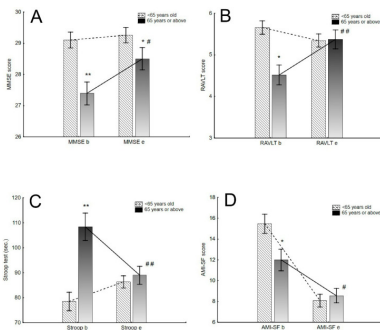
- ElectroConvulsive therapy Cognitive Assessment (ECCA) tool:

Concerns regarding cognitive impairment?

- It is worth noting that cognitive impairment is Prevalent at baseline in older patients—as one of the depressive symptoms, mild cognitive impairment or dementia.
- Acute confusional state, anterograde and retrograde amnesia.

- Thresholds for cognitive decline that necessitate altering or stopping electroconvulsive therapy (ECT) in elderly patients.
- A decrease of 2 or more points on the MMSE during the course of ECT is considered significant and may warrant a reassessment of the treatment protocol.
- MoCA detected more impairments than did the MMSE for visuo-executive, memory and language subscores (Moirand, 2018).
- Persistent and significant cognitive decline that does not improve with continued ECT, it may be necessary to alter the treatment.

Cognitive assessment in younger (<65 years old) and older (65 years and above) ECT groups (Dominiak, 2021)



- Most of the cognitive functions remain unchanged compared to baseline assessment.
- General cognitive performance, verbal auditory memory, working memory and executive functions **improved significantly more in older patients compared to younger ones.**
- Tolerability of ECT among elderly patients is well established.
- Older age groups showed a significantly greater improvement in MMSE score than younger age groups (Socci et al, 2018)

Mortality:

- Like any procedure under general anesthesia, ECT carries the risk of more serious adverse events, **including prolonged seizure and death.**
 - Mortality with ECT is extremely rare, occurring with an incidence of **2.1 in 100,000 treatments or about 1 in 10,000 patients**
 - In comparison, a recent analysis of the mortality of general anesthesia in relation to **surgical procedures reported a mortality rate of 3.4 per 100 000.**
- (Tørring, 2017)

Contraindications for ECT in elderly patients?

- **Severe Cardiovascular Conditions:** Conditions such as recent myocardial infarction, unstable angina, severe aortic stenosis, and uncontrolled hypertension are relative contraindications due to the cardiovascular stress induced by ECT.
- **Intracranial Pathology:** Increased intracranial pressure, recent stroke, or other significant intracranial lesions can pose a risk during ECT due to potential increases in intracranial pressure during the procedure

Contraindications for ECT in elderly patients?

- **Severe Pulmonary Conditions:** Severe chronic obstructive pulmonary disease (COPD) or other significant respiratory illnesses may increase the risk of complications during anesthesia and the ECT procedure.
- **Unstable Medical Conditions:** Any unstable or severe medical condition that could be exacerbated by the physiological stress of ECT, such as severe electrolyte imbalances or uncontrolled diabetes, should be stabilized before considering ECT

Unilateral ECT:

- Unilateral ECT is suggested to have **better cognitive outcomes** and was shown to be associated with greater improvement in some cognitive functions.
- **Brief pulse, right unilateral ECT** may be slightly more efficacious than ultrabrief pulse unilateral ECT and require fewer sessions, but may lead to greater cognitive side effects (Tor, 2015)

How should ECT be modified for elderly patients with cognitive impairment?

- **Right unilateral ECT with ultrabrief pulse width and individualized stimulus dosing** are key modifications to minimize cognitive side effects in elderly patients with cognitive impairment.

Association of ECT With Risks of All-Cause Mortality and Suicide in Older Medicare Patients.

- ECT was associated with **lower 1-year all-cause mortality and with short-lived protective effects on suicide risk.**
- These findings support greater consideration of ECT for inpatients with mood disorders at short-term risk of suicide.

(Rhee TG et al; 2021)

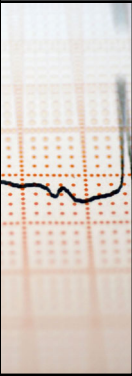
Clinical question:

An 86-year-old woman with moderate Parkinson disease and major neurocognitive disorder presents with a one-month history of markedly declining food and water intake, increasingly depressed mood, crying, and insomnia. The patient demonstrates minimal verbal responsiveness and will only repeatedly state, "My insides are rotting." Which of the following treatment options is likely to be most efficacious for this patient?

- Bupropion
- Venlafaxine
- Mirtazapine and donepezil
- Brief pulse unilateral
- Ultra brief pulse right unilateral

Answer:

- Ultra brief pulse right unilateral



Conclusions:

- It is found to be a **safe treatment as well, generally with only minimal transient side effects.**
- ECT **should not be considered a "last-resort" treatment** for geriatric patients suffering from psychiatric disorders.
- It has **historical and recent literature supporting its use** in many psychiatric disorders.

Questions:



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