The Safety of Electroconvulsive Therapy (ECT) in Patients with Preexisting Medical Conditions

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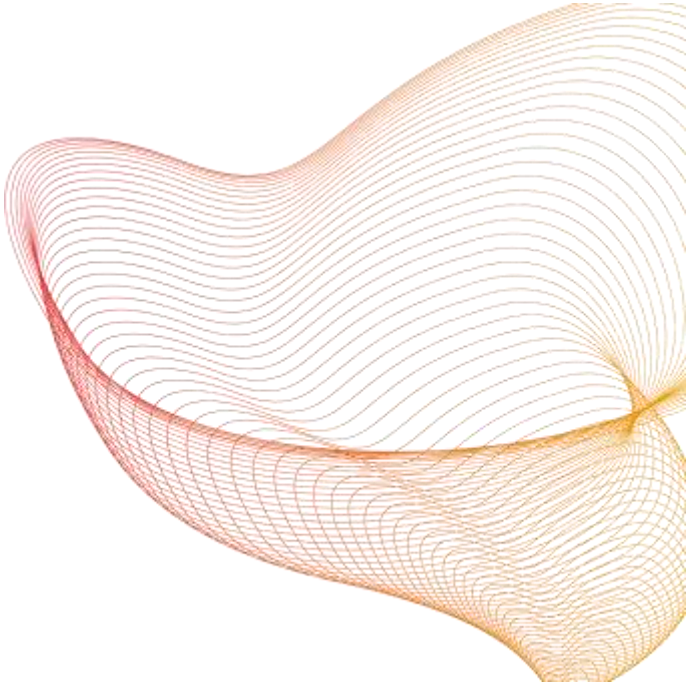
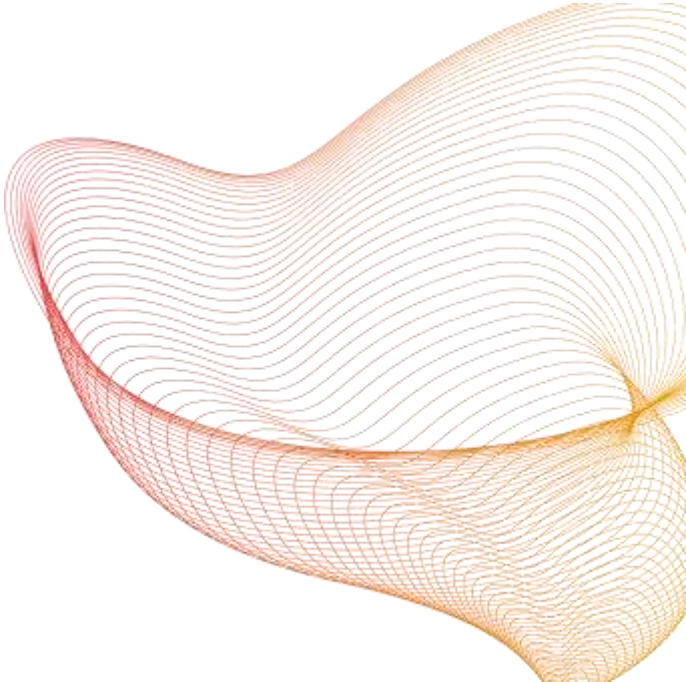
ECT as Effective Treatment

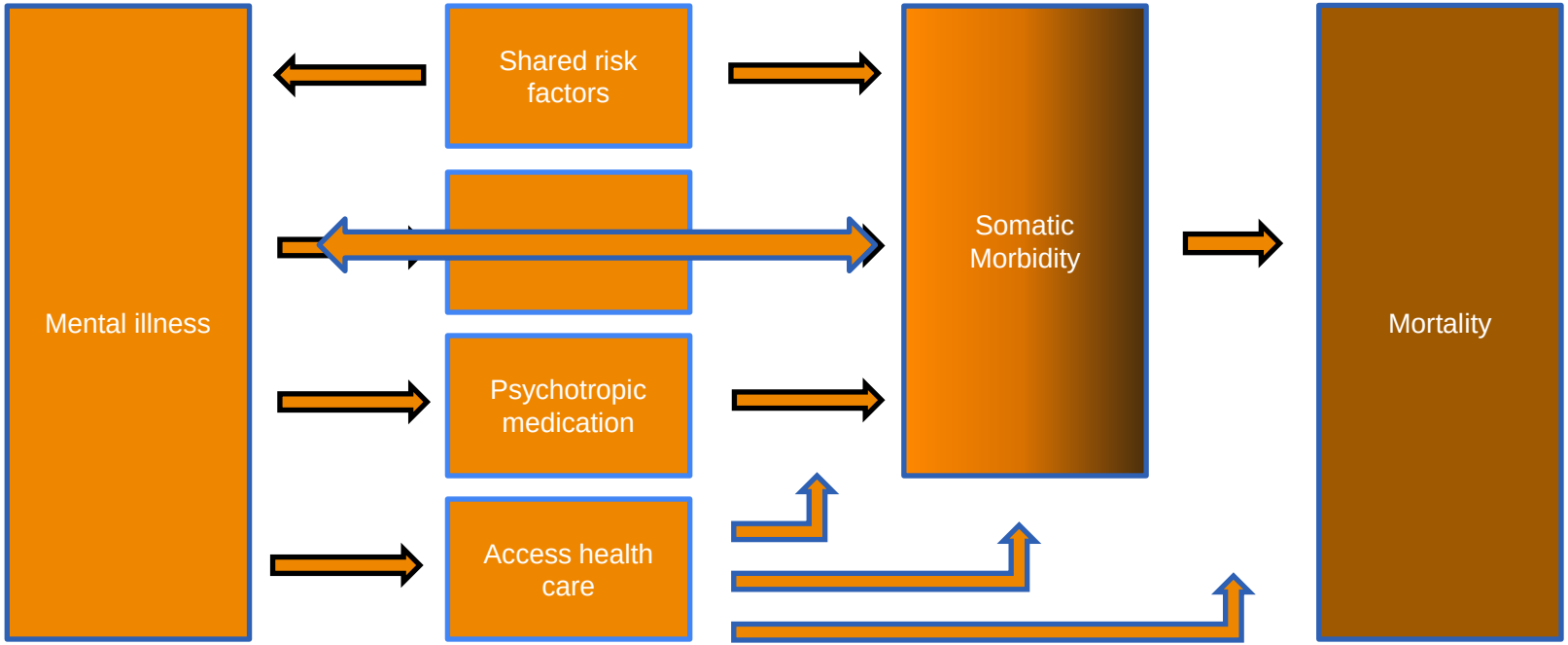
- ECT is the most effective treatment for severe unipolar and bipolar depression.
- ECT has an important place in the acute management of mania and mixed states.



Safety of ECT

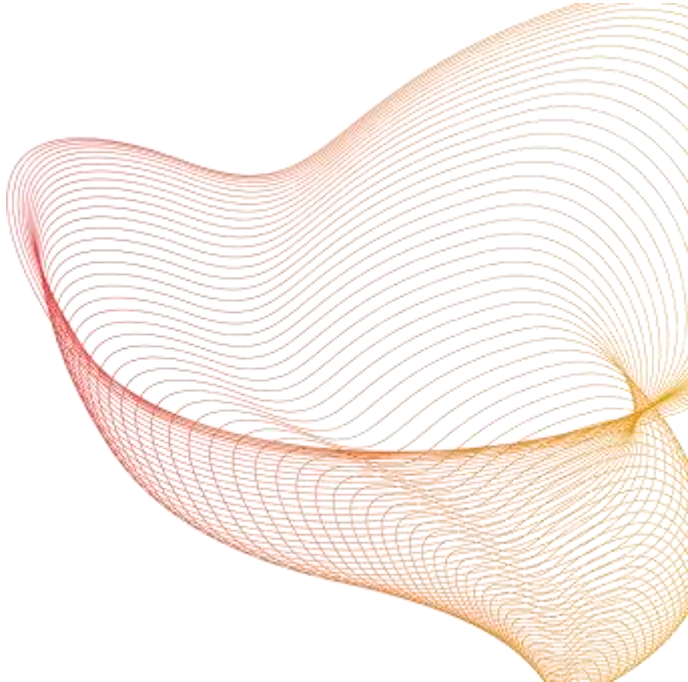
- ECT is generally considered safe, with a low short-term overall mortality.
- Caution must be taken when administering ECT to patients with preexisting somatic comorbidities such as cardiovascular, neurological disorders, lung disease, or diabetes.





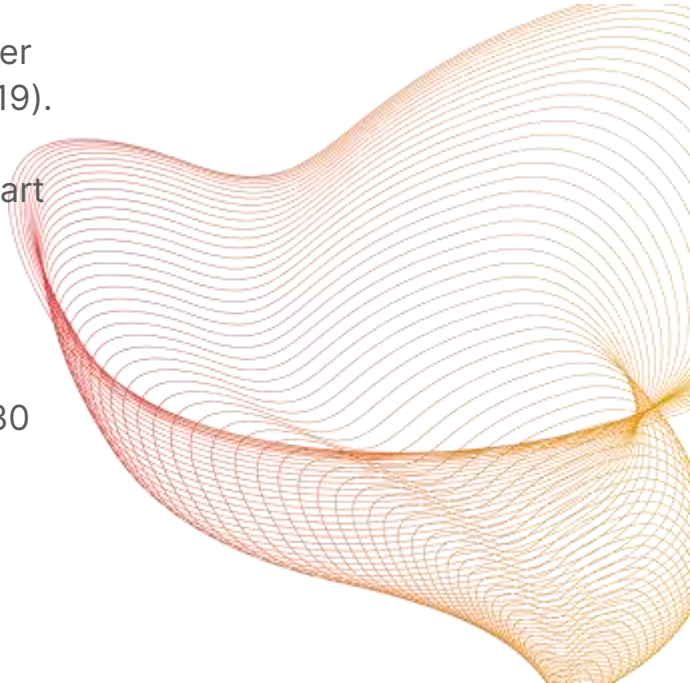
Risks of Treatment in Psychiatric Patients

- Patients with severe psychiatric disorders have a higher prevalence of somatic comorbidity and mortality risk.
- Pharmacological treatment of psychiatric disorders carries its own risks of medical adverse events, particularly in older persons.



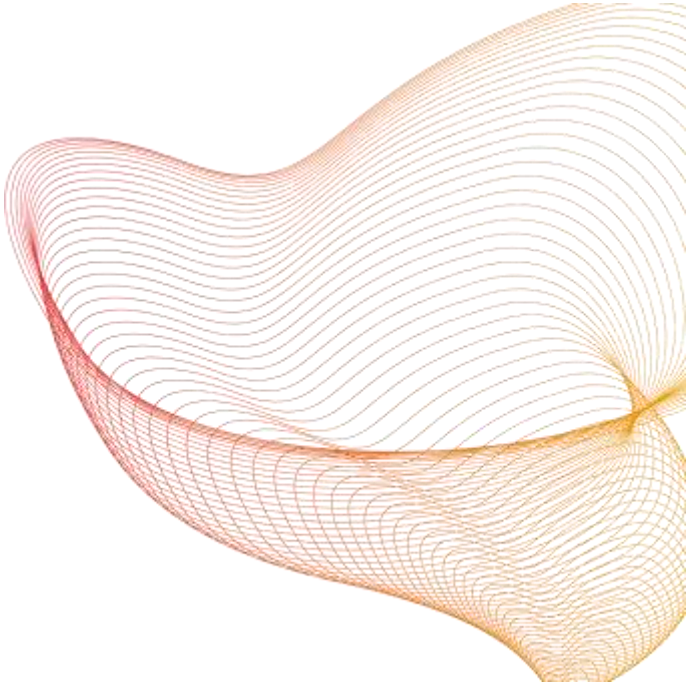
Risk of ECT in Patients with Preexisting Cardiac Disease

- Meta-analysis showed a range of major adverse cardiac events after ECT, but no clear conclusions on potential higher risk for patients with preexisting cardiac disease (Duma, 2019).
- One cohort study showed advanced age, an ASA physical status score of four and above, and preexisting ischemic heart disease as predictive of acute somatic events (Blumberger, 2017).
- Charlson Comorbidity Index of 1 or more, atrial fibrillation, kidney disease, reflux disease, dementia, and cancer were associated with increased risk of death by medical causes 30 days post ECT. (Lindblad, 2023)



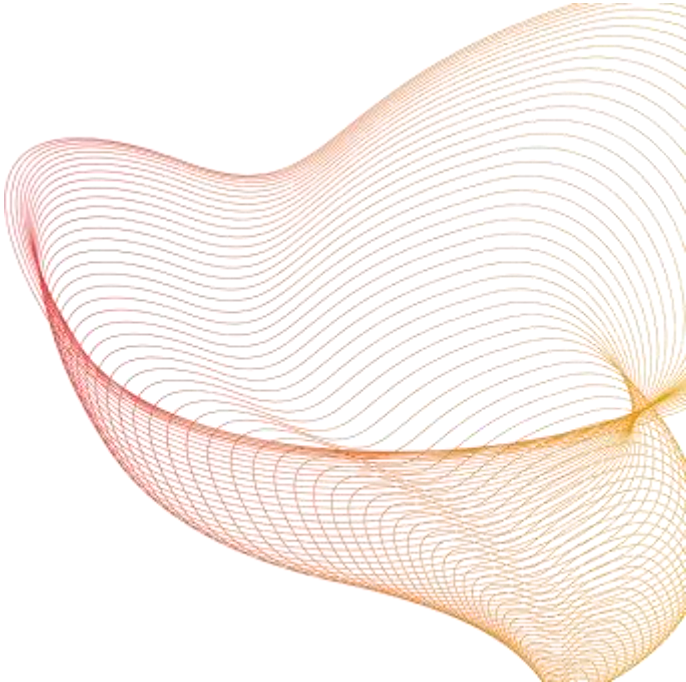
Safety of ECT in Patients with Specific Somatic Comorbidities

- Case series have suggested ECT treatment in patients with specific somatic comorbidities, including cardiovascular, pulmonary, and neurological disorders, is relatively safe. (E.g. Nutall, 2004)
- Non-controlled study designs remain a limitation of these studies.



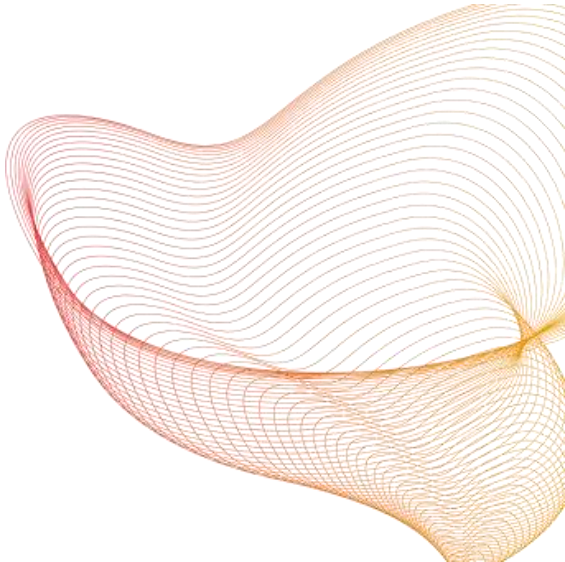
Investigating Risks of ECT in Patients with Preexisting Conditions

- Study aimed to investigate short and long-term risk of mortality and acute somatic events in patients with and without preexisting somatic comorbidity who received ECT.
- Data from a large cohort of patients with first-time affective disorders diagnosed between 2005-2015 was used.



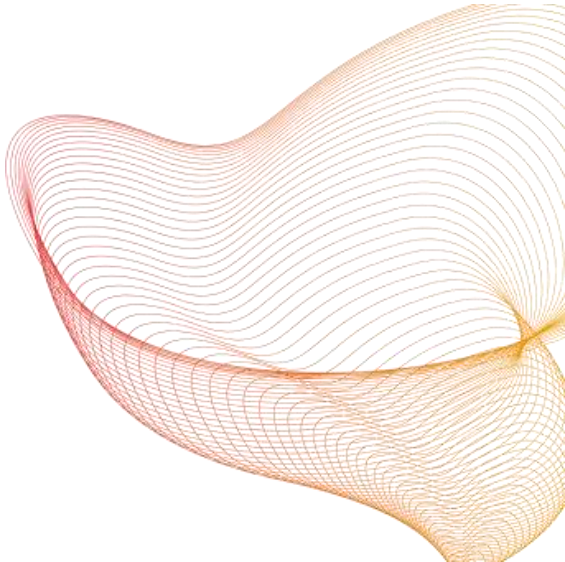
Study Population

- Denmark is a high-income, North European country with tax-funded healthcare services.
- ECT treatment rates in Denmark are around 35 per 100,000 inhabitants.
- All Danish citizens with a first-time hospital contact due to an affective disorder from January 2005 through December 2015 were included in the cohort study.
- Data was obtained from the Danish National Patient Registry using ICD-10 codes.
- 174,495 patients were included in the study population after exclusions.



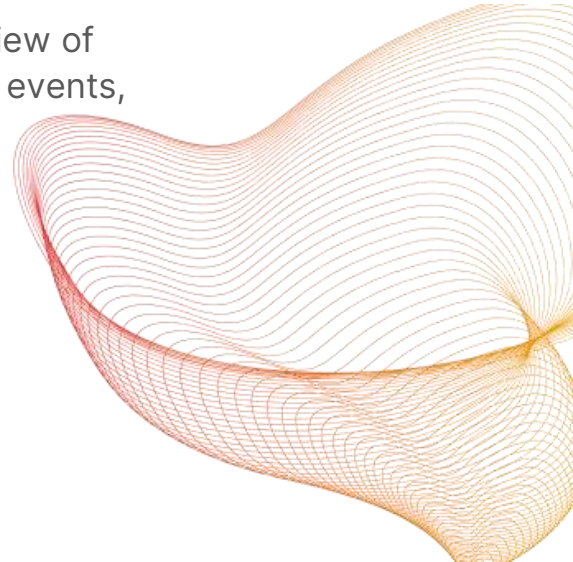
ECT Exposure

- Information on all ECT treatments registered between 2005 and 2018 was retrieved from the Danish National Patient Registry.
- Data included information on electrode placement and whether the treatment was involuntary or voluntary.
- Treatment with ECT was defined at the time of first registration.



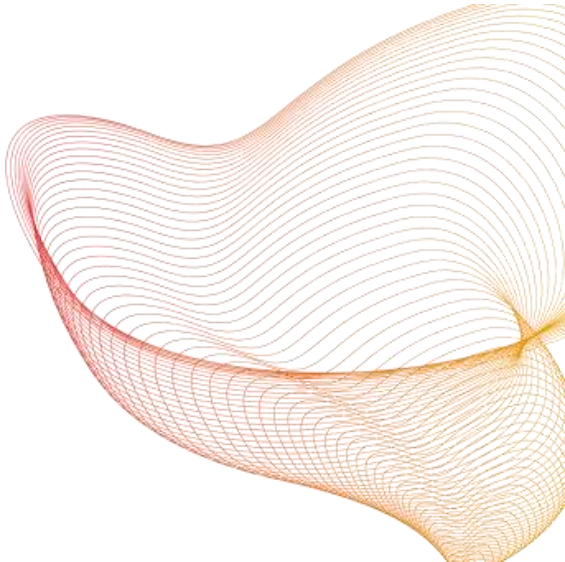
Mortality and Acute Somatic Events

- Study aimed to examine the safety of ECT by analyzing mortality and acute somatic events as proxy measures.
- Unnatural deaths (suicide and accidents) were not included in the main mortality analyses.
- Diagnoses of acute somatic events were chosen based on the review of literature and a biologically plausible mechanism, i..e acute cardiac events, stroke, intracranial hæmorrhage, seizures, pneumonia, pulmonary embolisms/oedema, hip fractures.



Analyzing the Association

- Used Cox proportional hazard regression to analyze association between first ECT treatment and mortality/acute somatic events.
- Time since first ECT or admission used as underlying time scale.
- ECT entered as a time-dependent variable to account for potential immortal time bias.



ECT and Somatic Comorbidity

- Of the 174,495 patients with affective disorders, 41% had at least one somatic comorbidity and 6943 (4.0%) patients were treated with ECT.
- ECT was less often administered in patients with a somatic hospital diagnosis as compared to the total study population.
- ECT was prescribed less often with an increasing number of somatic diagnoses.

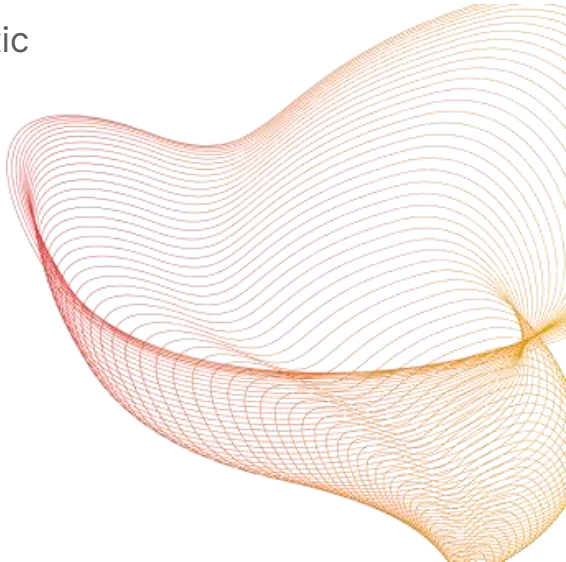


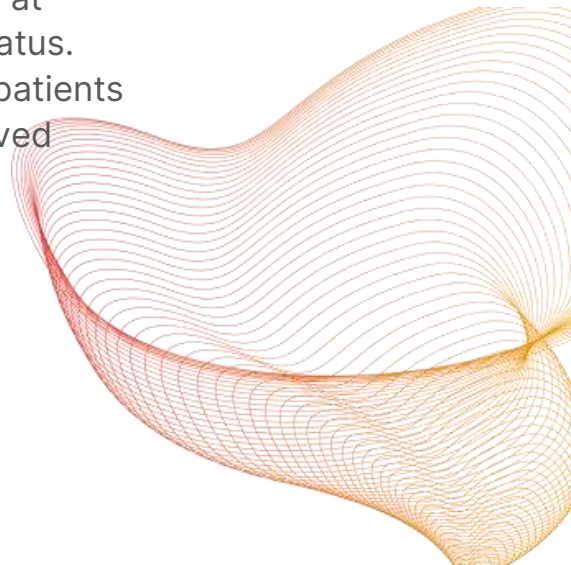
Table 1 of 2

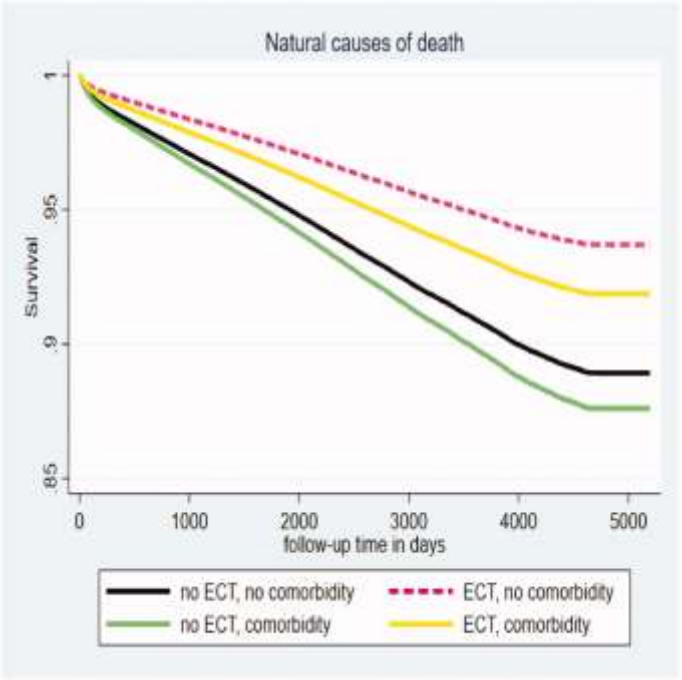
Table 1. Characteristics of patients with and without somatic comorbidity at first-time diagnosis of affective disorder, according to electroconvulsive therapy (ECT).

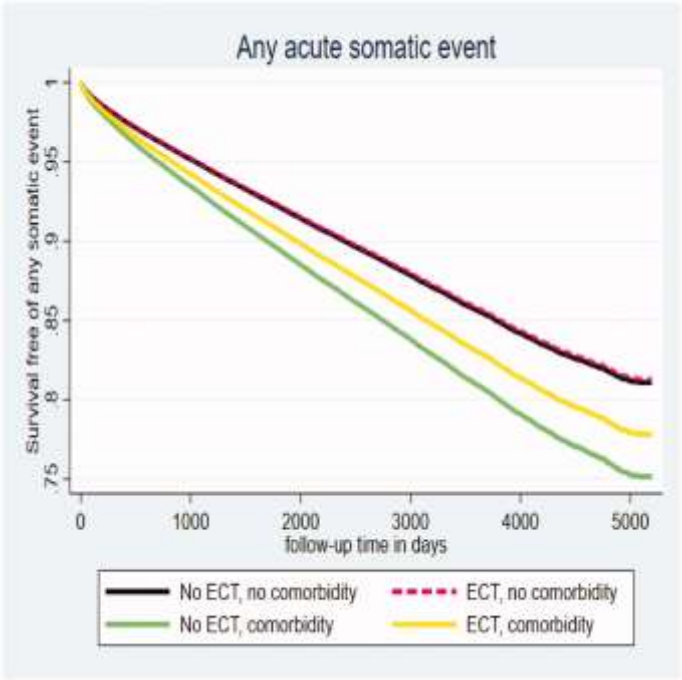
	Patients with somatic comorbidity		Patients without somatic comorbidity	
	Total	ECT treated	Total	ECT treated
	N	*N* (%)	*N*	*N* (%)
Total	72,213	2704 (3.7)	102,282	4239 (4.1)
Number of hospital diagnoses				
1	31,212	1063 (2.7)		
2	10,227	277 (2.7)		
3+	5032	79 (1.6)		
Type of hospital diagnosis				
Acute Coronary Syndrome	13,379	377 (2.8)		
Stroke	11,938	254 (2.1)		
Heart failure	3181	60 (1.9)		
Atrial fibrillation	4946	136 (2.8)		
Hypertension	8665	322 (3.7)		
Diabetes	6917	197 (2.9)		
Obesity	4180	122 (2.9)		
Chronic obstructive pulmonary disease	6834	148 (2.2)		
Asthma	7298	226 (3.1)		
Other chronic pulmonary disease	1346	29 (2.2)		
Medication 1 year before psychiatric admission				
Cardiovascular	44,905	1800 (4.0)		
Pulmonary	20,075	607 (3.0)		
Antidiabetics	10,136	338 (3.3)		

ECT and Mortality Rates

- During follow-up (median 6.7 years, corresponding to 1.12 million person years), 37,514 (21%) patients died from natural causes and 29,801 (17%) experienced at least one acute somatic event.
- ECT was associated with a lower risk of death from natural causes at both short and long-term follow-up, independent of comorbidity status.
- Patients with somatic comorbidity had higher mortality rates than patients without somatic comorbidity, regardless of whether they had received ECT or not.




Natural causes of death
Survival
1
.95
.9
.85
0
1000
2000
3000
4000
5000
follow-up time in days
no ECT, no comorbidity
ECT, no comorbidity
no ECT, comorbidity
ECT, comorbidity


Any acute somatic event
Survival free of any somatic event
1
.95
.9
.85
.8
.75
0
1000
2000
3000
4000
5000
follow-up time in days
No ECT, no comorbidity
ECT, no comorbidity
No ECT, comorbidity
ECT, comorbidity

ECT and Acute Somatic Events

- ECT was not associated with risk of developing any acute somatic events in patients with and without preexisting somatic comorbidity.
- Results did not materially differ for each of the eight outcomes, except for acute cardiac events.
- During the first 30 days of follow-up, ECT was associated with a higher risk of acute cardiac events in patients with no preexisting somatic comorbidity, however, the analysis was based on very few observations (n=27 events)

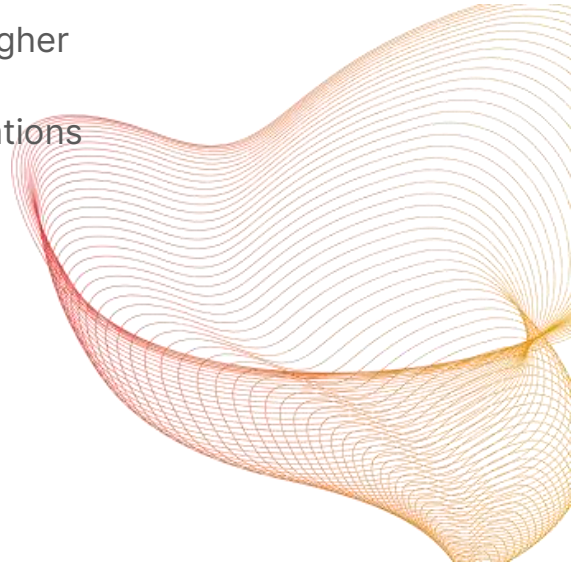
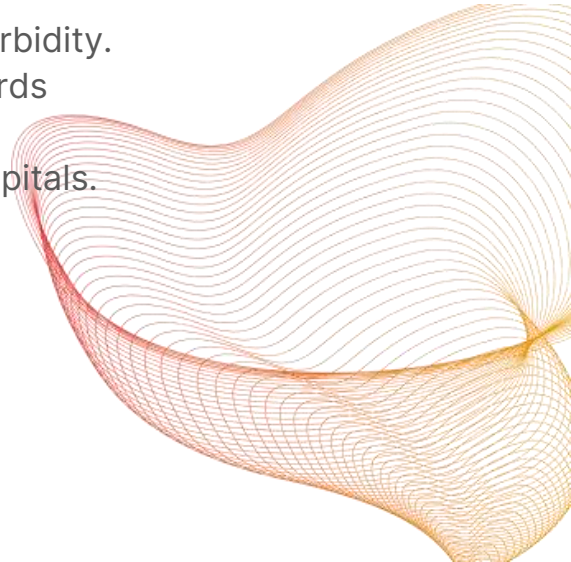


Table 2. Adjusted* hazard ratios (HR) and 95% confidence intervals (CI) for the association of electroconvulsive therapy (ECT) with mortality (from natural causes) and acute somatic events by somatic comorbidity status in a cohort of patients diagnosed with affective disorders from 2005 through 2015 in Denmark.

Follow-up time	0–30 days	30–365 days	365–5196 days	0–5196 days
Death from natural causes				
Comorbidity[§]	**0.25 (0.13–0.45)**	**0.59 (0.43–0.71)**	**0.78 (0.71–0.85)**	**0.71 (0.66–0.77)**
No comorbidity[§§]	**0.28 (0.13–0.61)**	**0.39 (0.28–0.53)**	**0.69 (0.61–0.75)**	**0.62 (0.55–0.69)**
Any acute somatic event				
Comorbidity[§]	1.27 (0.94–1.70)	0.96 (0.78–1.12)	**0.86 (0.78–0.94)**	**0.90 (0.84–0.97)**
No comorbidity[§§]	1.32 (0.86–2.03)	0.97 (0.78–1.21)	1.04 (0.91–1.12)	1.02 (0.93–1.12)
Acute cardiac events				
Comorbidity[§]	1.58 (0.95–2.64)	1.06 (0.78–1.43)	0.87 (0.73–1.01)	0.94 (0.79–1.08)
No comorbidity[§§]	**3.72 (1.86–7.43)**	1.09 (0.68–1.77)	1.09 (0.89–1.39)	1.15 (0.96–1.38)

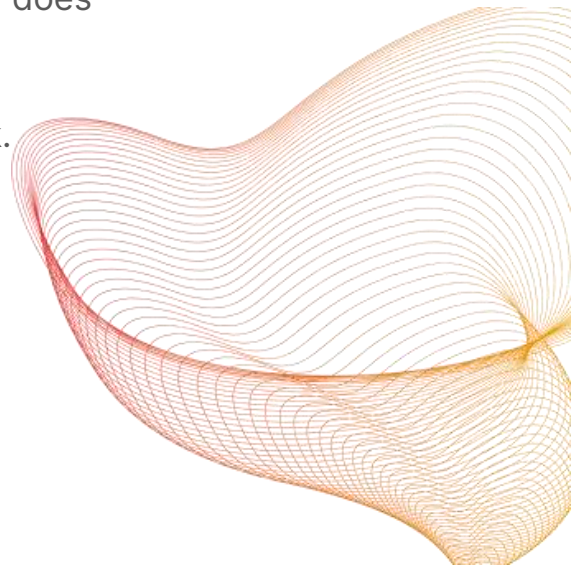
Findings and Implications

- ECT patients had a lower mortality risk compared to non-ECT treated patients, but likely due to selection bias.
- Patients who are offered ECT are, on average, somatically healthier than other patients.
- Less frequent administration of ECT in patients with somatic comorbidity.
- Selection bias might be due to a tendency among physicians towards prescribing ECT less frequently in somatically ill patients and/or a selection of ECT patients based on their proximity to university hospitals.



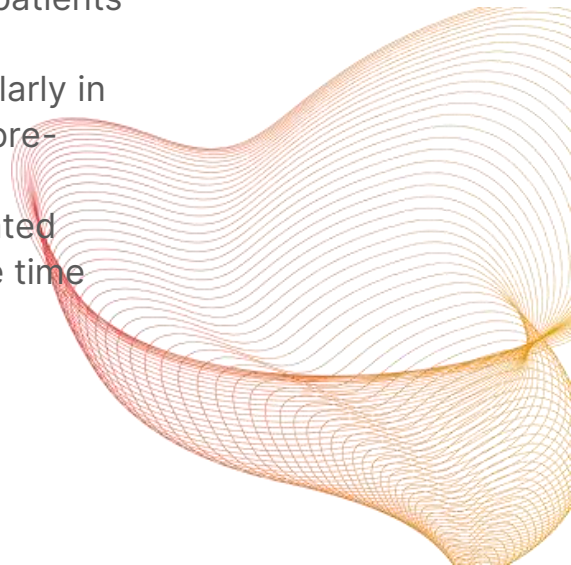
Mortality Risk in ECT Patients with Somatic Comorbidity

- ECT-treated patients with pre-existing somatic comorbidity at baseline have a higher overall mortality from natural causes during follow-up compared to comorbidity-free patients.
- The higher risk is only present from day 30 after ECT onwards and does not have an immediate temporal relation to ECT initiation.
- Non-ECT treated patients with affective disorders and somatic comorbidity show a comparable trend towards higher mortality risk.



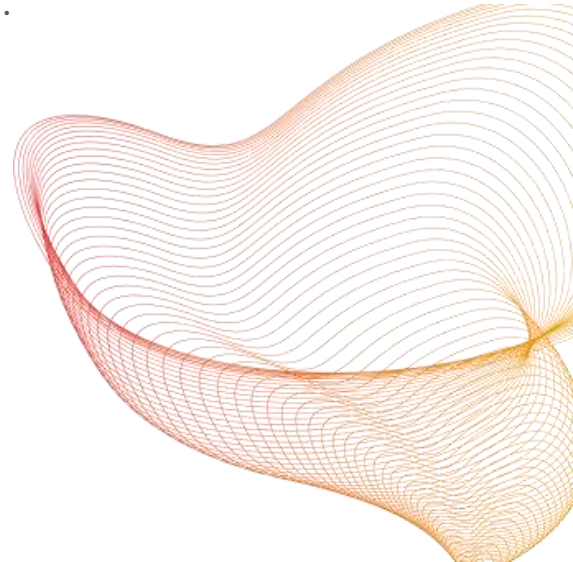
Acute Somatic Events and ECT

- No interaction between ECT and somatic comorbidity is observed with respect to total or each of the eight events.
- The risk of acute cardiac events from day 0-30 in patients without pre-existing somatic comorbidity is significantly higher in ECT-treated patients as compared to non-ECT patients.
- ECT may be associated with transient cardiac arrhythmias, particularly in patients who do not have an established and medically controlled pre-existing cardiac disorder.
- However, the observed higher risk of cardiac events is not associated with a corresponding higher mortality of natural causes in the same time period.



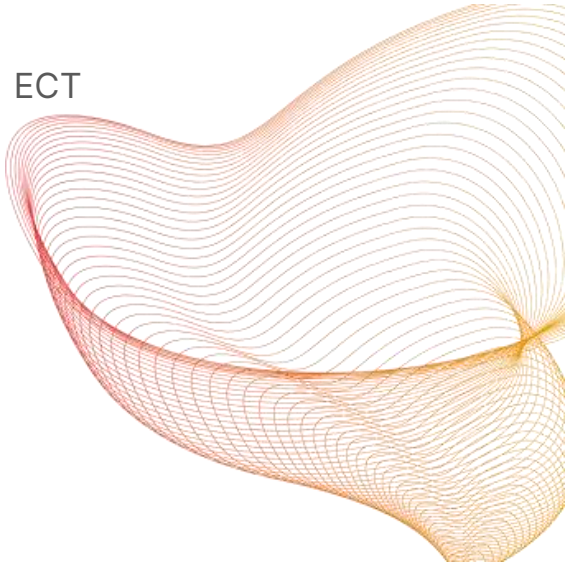
Literature

No evidence for a clinically significant increased risk for serious medical events with exposure to ECT, suggesting the benefits of electroconvulsive therapy for depression outcomes might outweigh its risks in this population (Kaster, 2021). Propensity-score matched control group.



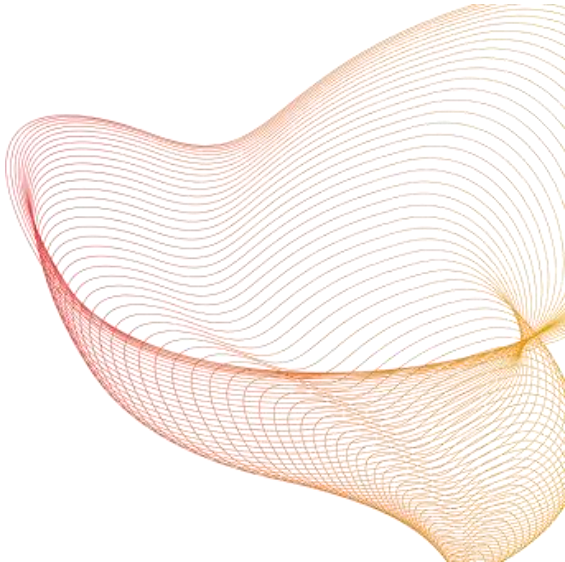
Strengths of the Study

- Completeness of data with almost 100% follow-up
- Possibility to study the incidence of acute somatic events after ECT with short and long-term follow-up
- Comparison to non-ECT treated individuals with similar psychiatric morbidity
- Data from real-world clinical ECT administration following standard ECT guidelines



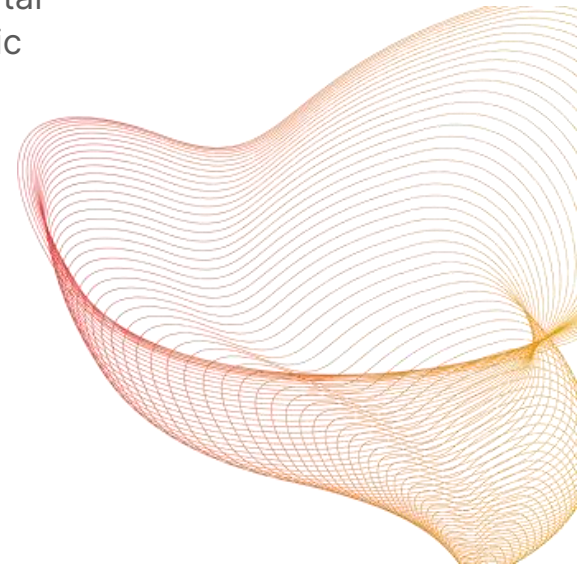
Limitations of the Study

- Observational design limits definite conclusions on causality
- Potential for residual confounding despite availability of a large number of covariates



Conclusions

- ECT is not associated with short or long-term higher mortality risk in patients with pre-existing somatic comorbidity.
- ECT is not associated with short or long-term risk of developing serious acute somatic events, except for a possible higher rate of non-mortal cardiac events in ECT-treated patients without pre-existing somatic comorbidity.



References

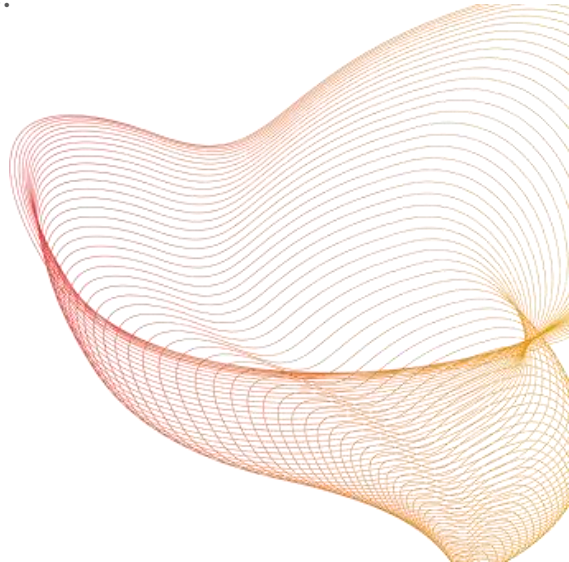
Osler M, Rozing MP, Jorgensen MB, Jorgensen A. Mortality and acute somatic events following electroconvulsive therapy in patients with pre-existing somatic comorbidity - A register-based nationwide Danish cohort study. World J Biol Psychiatry. 2022 Mar-Apr;23(4):318-326.

Rozing MP, Jørgensen MB, Osler M. Electroconvulsive therapy and later stroke in patients with affective disorders. Br J Psychiatry. 2019 Mar;214(3):168-170. doi: 10.1192/bjp.2018.150.

Thank you for your time

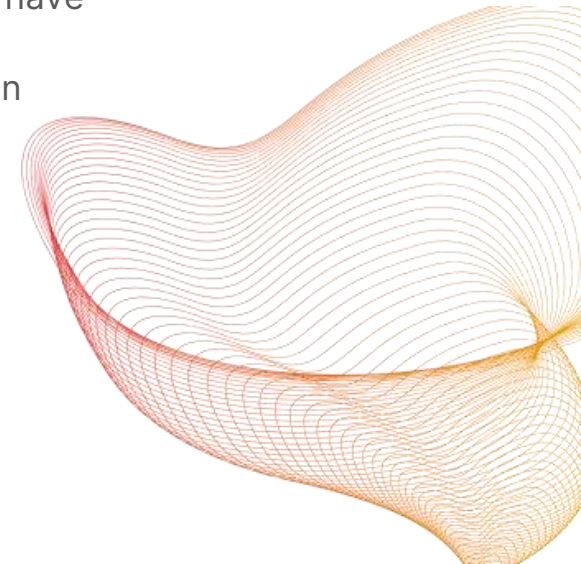
Introduction

- ECT is a well-tolerated and effective treatment for mood disorders.
- Most neurological adverse effects concern amnesia, headache, disorientation, and transient post-ictal neurological deficits.
- True cerebrovascular complications directly following ECT are rare.



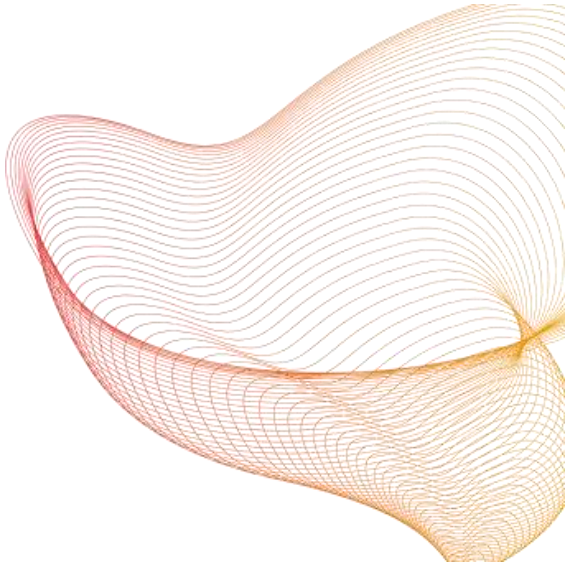
Study Findings

- Examined the association between ECT and long-term risk of incident stroke (including cerebrovascular accidents and transient ischemic attacks) in patients with affective disorder.
- Long-term effects of repeated ECT administration on stroke risks have not been investigated.
- Explored the frequency of ECT and associated risk of recurrence in patients with a history of stroke.



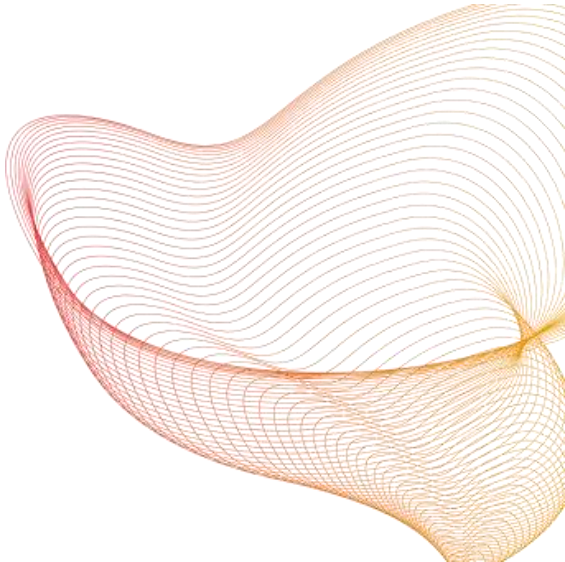
Cohort Study Overview

- Study conducted in Denmark from 2005 to 2015.
- Included patients with first-time hospital contact for an affective disorder.
- 174,534 in- or out-patients above 10 years were identified.
- 11,939 had been diagnosed with stroke before or at study entry.
- Approval obtained from Danish Data Protection Agency.



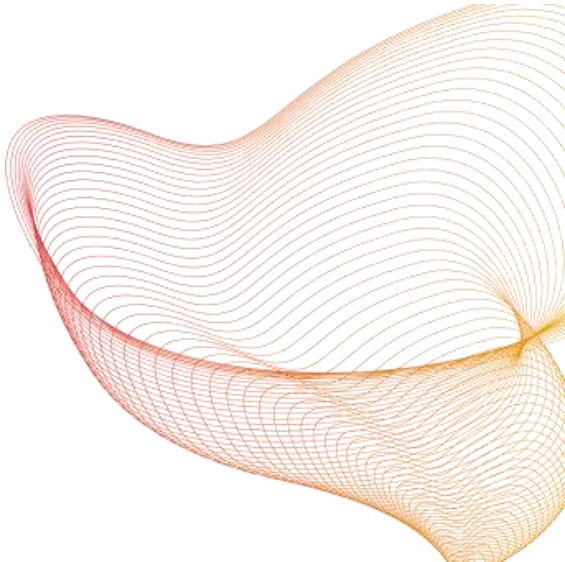
Electroconvulsive Therapy (ECT) Exposure

- Information on all ECTs registered for patients retrieved from the Danish National Patient Registry.
- Treatment defined at time of first ECT registration.
- Number of ECT sessions counted from study entry until censoring.
- Dichotomised as ≤10 or >10 sessions.



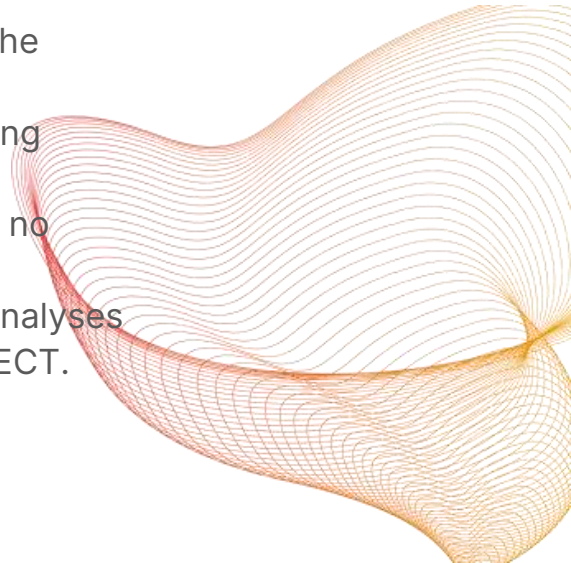
Subsequent Stroke Outcomes

- All patients followed for admissions with stroke as main diagnosis.
- Re-event defined as a new admission within at least 28 days after last event.
- Analyses repeated using less conservative definition counting all readmissions as a result of stroke occurring after 7 days.



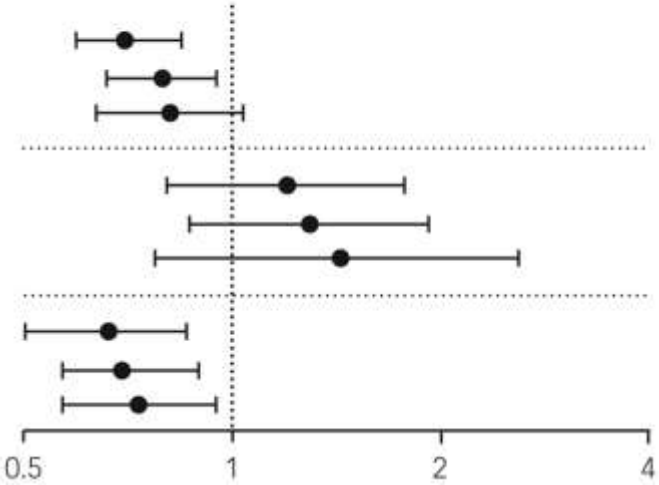
Statistical Analyses and Methods

- Simple chi-square test used to examine differences in distribution of ECT and cerebrovascular events.
- Cox proportional hazard regression used to analyze associations of first ECT with recurrent or incident strokes.
- Propensity-score calibration matching with one-to-one match on the nearest neighbor.
- Fine-Gray competing risks regression used to account for competing mortality risks.
- Proportional hazard assumption examined graphically and showed no signs of violation.
- Additional analyses performed to exclude TIA diagnoses, restrict analyses to in-patient diagnoses, and assess short-term risk of stroke after ECT.

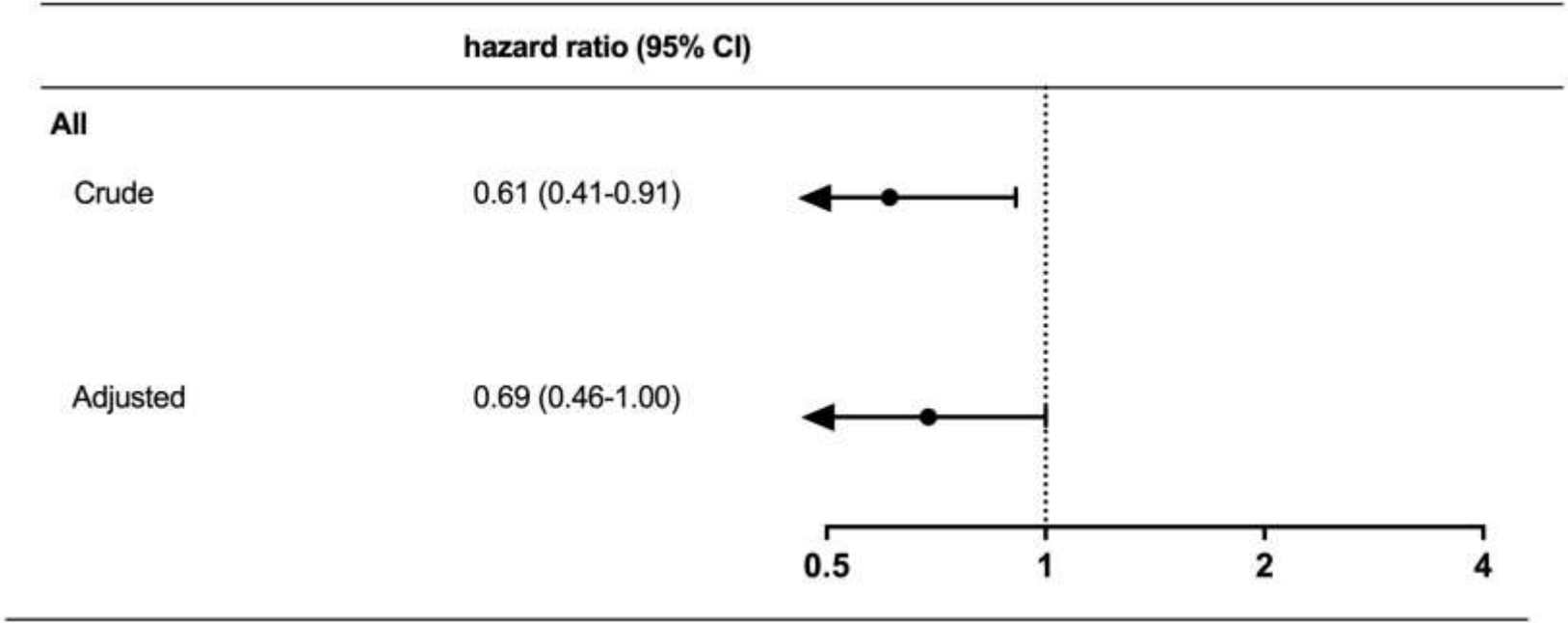


Risk for incident stroke

	Hazard ratio (95% cl)
All	
Crude	0.70 (0.60–0.84)
Adjusted[a]	0.79 (0.66–0.94)
Propensity-score matched	0.81 (0.64–1.03)
< Age 50	
Crude	1.20 (0.81–1.77)
Adjusted[a]	1.29 (0.87–1.93)
Propensity-score matched	1.43 (0.78–2.60)
≥ Age 50	
Crude	0.66 (0.50–0.86)
Adjusted[a]	0.69 (0.57–0.89)
Propensity-score matched	0.73 (0.57–0.95)

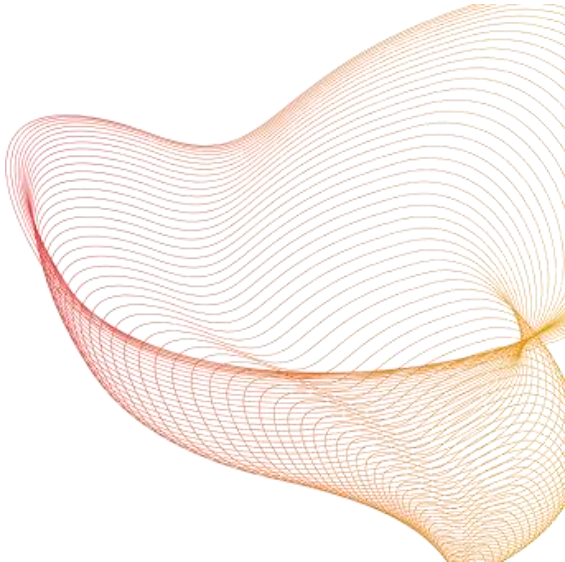


Risk for recurrent stroke



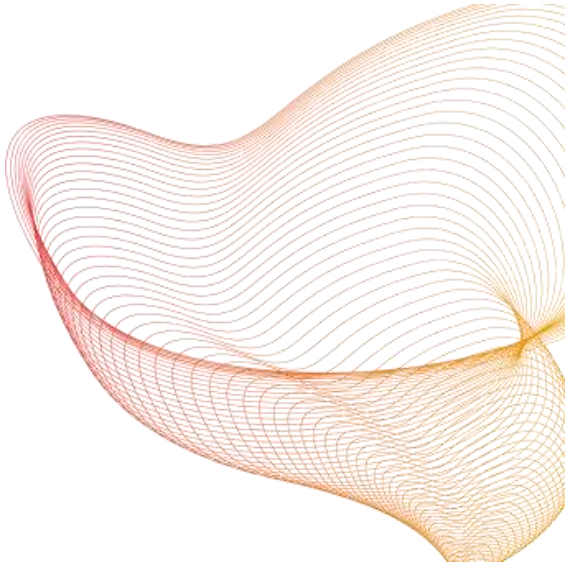
Results

- Study found no significant association between ECT and incident stroke in patients with a first-time hospital diagnosis of affective disorder.
- Study also found no significant association between frequency of ECT and risk of recurrence in patients with a history of stroke.



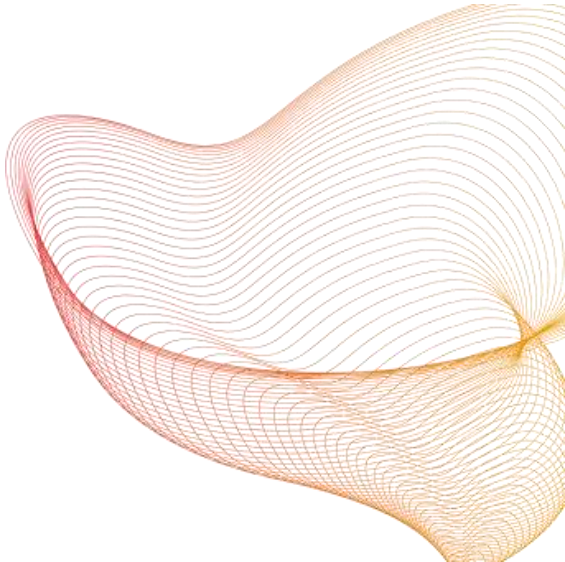
Conclusion

- No evidence to suggest that ECT is associated with an increased risk of stroke in patients with mood disorders.
- Long-term effects of ECT on stroke risk require further investigation.



Importance of ECT as Treatment Modality

- The study supports the safety of ECT in patients with severe affective disorders and medical illness.
- Underlines the continuing importance of ECT as a powerful and safe treatment modality for this patient population.



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