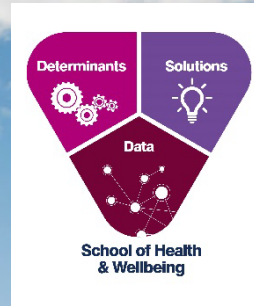




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# Electroconvulsive Therapy (ECT): A Scotland Wide Naturalistic Study of 4,826 treatment episodes

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## Background



Despite its apparent efficacy in the treatment of a range of psychiatric disorders including major depressive disorder (MDD), bipolar disorder, schizophrenia, post-partum psychosis and catatonia, electroconvulsive therapy (ECT) is viewed by some as a contentious treatment.

Although most clinicians and researchers consider ECT a safe and effective treatment, there are ongoing and significantly publicised concerns about potential side effects.



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## Scottish ECT Audit Network SEAN

SEAN was established in 1996 with the aim of improving ECT practice across Scotland to ensure safe, effective, patient centred care.

Data is collected centrally as part of one of ten Scottish National Audit Programmes (SNAP) delivered by Public Health Scotland.





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## Aims of the Study:

To explore use of ECT across Scotland in a large naturalistic clinical sample across an 11-year period from 2009 to 2019.

To consider the efficacy of ECT for a range of common psychiatric disorders including, depression, bipolar depression, schizophrenia, and mania.

To explore the side effects of ECT.





## Methods:

All adults who had received ECT in Scotland between 2009 and 2019 were included.

Variables included:

- Age,
- Sex,
- Scottish Index of Multiple Deprivation (SIMD) quintile,
- International Classification of Diseases, Tenth Edition (ICD-10) diagnosis,
- Indication for ECT,
- Mental Health Act status,
- Consent status,
- Entry and exit Montgomery-Asberg Depression Rating Scores (MADRS),
- Entry and exit Clinical Global Index Severity (CGI-S) scores and
- Reported side effects.

Classified using International Classification of Diseases, Tenth Edition (ICD-10) codes (WHO, 2010).

Mental Illness	ICD-10 Codes
Depression	F20.4, F32.X, F33.X and F41.2,
Bipolar Depression	F31.3, F31.4 and F31.5
Schizophrenia	F20, F20.2, F20.9 and F23.1
Schizoaffective disorder	F25, F25.0, F25.1, F25.2, F25.9
Mixed affective state	F31.6
Personality disorder	F34.0, F34.1, F60, F60.3 and F60.9
Post-Partum Disorders	F53, F53.0, F53.1 and F53.9
Other	F00, F06, F06.1, F06.3, F06.9, F22.0, F23, F29, F29.X, F31, F31.7, F31.8, F31.9, F34.8, F34.9, F38.0, F38.1, F38.8, F39, F40, F41, F41.1, F42, F43, F44, F44.9, F45, F45.2, F45.3, F50, F50.9 and Z.004.



## Response to ECT

Entry and exit CGI severity scores for all diagnoses were compared using paired t-tests.

For depression, bipolar depression and post-partum disorders, entry and exit MADRS were also compared using paired t-tests.



## Side Effects

Recorded as present if the side effect was reported at **any** point during the treatment episode. For example, headache occurring once after the second treatment of ten was recorded as present.

Side effects included:

- anaesthetic complications,
- cardiovascular complications,
- cerebrovascular complications,
- headache,
- manic switch,
- muscle aches,
- nausea, and
- prolonged seizure.





## Cognitive Side Effects

Recorded as present if the side effect was reported at **any** point during the treatment episode. For example, headache occurring once after the second treatment of ten was recorded as present.

Cognitive side effects were recorded including:

- rates of confusion (including acute confusion),
- cognitive side effects (including memory problems) and
- any cognitive side effects (including both confusion and memory problems).



## Results:

4826 ECT episodes were recorded between 2009 and 2019.

Majority of which were in women (68.4%, n=3,301).

Average age was 58.52 years (95% CI 58.01 – 58.98).

On average, males were slightly younger than females (m=58.24 vs f= 58.65, p= 0.20).

Mean number of treatments/episode was 9.59 (95% CI 9.32 – 9.85).

There was no difference in mean number of treatments received/episode by sex (m = 9.93, f = 9.42, p = 0.96).

Mean treatment dose delivered was 277.75mC (95% CI 272.88 – 282.63mC).

Most treatments were completed as planned (68%, n=3301).

## Results: 4826 ECT episodes

	All	Men (n=1523)	Women (n=3298)	p value
<b>Age at treatment onset (mean, 95% CI)</b>	58.53 58.07-58.98	58.24 57.49-59.00	58.66 58.10-59.22	0.202
<b>SIMD(n=3325, %)</b>				
<b>1-Most deprived</b>	709 (21.3)	238 (22.0)	471 (21.0)	
<b>2</b>	729 (21.9)	208 (19.2)	521 (23.3)	
<b>3</b>	663 (19.9)	238 (22.0)	425 (19.0)	
<b>4</b>	688 (20.7)	219 (20.2)	469 (20.9)	
<b>5- least deprived</b>	536 (12.1)	181 (16.7)	355 (15.8)	0.732
<b>Number of treatments (mean, 95% CI)</b>	9.59 9.32-9.85	9.93 9.44-10.41	9.43 9.12-9.74	0.956
<b>Mean Dose mC (mean, 95% CI)</b>	277.75 272.88-282.63	281.29 272.46-290.12	276.16 270.32-282.00	0.832
<b>Completed as planned (n,%)</b>	3301 (68.4)	1020 (66.9)	2280 (69.1)	0.129
<b>Informal treatment (n,%)</b>	3028 (62.7)	945 (62.0)	2083 (63.1)	0.448





## Results: 4826 ECT episodes

Most had an ICD-10 diagnosis recorded (96%, n=4633) .

The most common diagnosis for patients receiving ECT was Depression (76.9% men and 77.4% women),

Followed by Bipolar depression (men 9.6% and women 11.5%) then Schizophrenia (men 7.6% and women 2.9%) and Mania (men 1.4% and women 2.0%),

Overall, most recipients (62.4%, n= 2892) received ECT on an informal basis.

Rates of informal treatment varied by diagnosis, being highest in those with personality disorder (73.9%, n=17) and lowest in those with schizophrenia (17.7%, n=36).

# Results: 4826 ECT episodes

	Women n (%)	Men n (%)	Mean age 95% Confidence Interval (CI)	No of treatments 95% CI	Mean Dose (mC) 95% CI	Treatment Completed n (%)	Informal Status n (%)
<b>Depression</b>	2,454 (77.4)	1,123 (76.9)	60.36 (59.85-60.87)	9.63 (9.31-9.95)	273.58 (268.10-279.06)	2,500 (69.9)	2,386 (66.7)
<b>Bipolar Depression</b>	366 (11.5)	140 (9.6)	55.68 (54.40- 56.95)	9.60 (8.77-10.43)	311.11 (293.40-328.83)	326 (64.4)	343 (67.8)
<b>Mania</b>	62 (2.0)	21 (1.4)	55.73 (52.11-59.36)	9.63 (8.17-11.09)	<b>219.99</b> <b>(189.49-250.48)</b>	57 (68.7)	<b>19</b> <b>(22.9)</b>
<b>Schizophrenia</b>	93 (2.9)	111 (7.6)	45.15 (43.19- 47.12)	8.92 (8.32-9.51)	265.49 (243.65-287.33)	<b>115</b> <b>(56.4)</b>	<b>36</b> <b>(17.7)</b>
<b>Schizoaffective Disorder</b>	59 (1.9)	38 (2.6)	54.53 (51.36-57.71)	9.02 (7.86-10.18)	313.27 (270.65-355.84)	76 (78.4)	34 (35.1)
<b>Mixed Affective Disorder</b>	30 (1.0)	8 (0.6)	58.11 (53.07 – 63.14)	9.55 (5.50-13.60)	345.52 (280.02-411.02)	26 (68.4)	15 (39.5)
<b>Personality Disorder</b>	19 (0.6)	4 (0.3)	42.39 (37.25-47.53)	9.65 (8.34-10.96)	<b>360.41</b> <b>(275.47-445.34)</b>	16 (69.6)	17 (73.9)
<b>Post-Partum Disorders</b>	27 (0.9)	0 (0)	<b>29.89</b> <b>(27.19-32.59)</b>	9.37 (8.10-10.64)	268.92 (194.26-343.58)	19 (70.4)	13 (48.2)
<b>Other</b>	62 (2.0)	16 (1.1)	53.99 (49.65-58.33)	8.91 (7.36-10.46)	280.29 (246.59-314.00)	63 (80.8)	39 (50.0)

## Response to ECT: 2020 ECT episodes

2920 episodes of treatment had both CGI entry and exit information available.

In general, at entry ECT recipients were markedly ill (CGI 5.03 95% CI 4.99-5.07).

ECT recipients diagnosed with schizophrenia had the highest CGI score (5.45 95% CI 5.21-5.60), followed by those with post-partum disorders (5.38, 95% CI 4.61-6.14).

At exit, ECT recipients were borderline ill (CGI 2.07, 95% CI 2.03-2.11), with ECT recipients diagnosed with a mixed affective state having the lowest CGI score (1.72, 95% CI 0.99-2.47) followed by schizoaffective disorder (2.01, 95% CI 1.76-2.42).



## Response to ECT: 2920 ECT episodes

Diagnosis	CGI Entry	CGI Exit	p value
<b>All (n=2920)</b>	5.03 (4.99 – 5.07)	2.07 (2.03 – 2.11)	p< 0.001
<b>Depression (n=2249)</b>	5.00 (4.96 -5.05)	2.06 (2.02-2.11)	p< 0.001
<b>Bipolar Depression (n=302)</b>	5.02 (4.89-5.14)	2.02 (1.89 – 2.14)	p< 0.001
<b>Mania (n=42)</b>	5.04 (5.07 -5.74)	2.26 (1.95-2.57)	p< 0.001
<b>Schizophrenia (n=110)</b>	5.45 (5.21 – 5.60)	2.19 (1.98 – 2.40)	p< 0.001
<b>Schizoaffective Disorder (n=68)</b>	4.94 (4.57 – 5.31)	2.01 (1.76 – 2.42)	p< 0.001
<b>Mixed Affective Disorder (n=15)</b>	4.67 (3.74 – 5.59)	1.72 (0.99 – 2.47)	p< 0.001
<b>Personality Disorder (n=10)</b>	4.90 (4.18 – 5.61)	2.40 (1.63 – 3.17)	p< 0.001
<b>Post-Partum Disorders (n=8)</b>	5.38 (4.61 – 6.14)	2.13 (1.30 – 2.95)	p< 0.001
<b>Other (n=33)</b>	5.09 (4.64 -5.54)	2.27 (1.78 – 2.76)	p< 0.001



## Side Effects

Anaesthetic complications and prolonged seizures were rare (<1%).

Manic switch was also relatively rare occurring in just over 1% of treatment episodes.

Cardiovascular complications were reported in 2.2% of treatment episodes.

Nausea was more common (7.2%) as were muscle aches (12%).

Confusion was reported in 19% (n=879) of treatment episodes and cognitive side effects were reported in 26.2% (n=1212).

One third of treatment episodes reported confusion or cognitive side effects (33.1%, n=1545).



## Side Effects

ICD 10 Diagnosis	Anaesthetic complications n, %	Cardiovascular Complications n, %	Manic switch n, %	Muscle Aches n, %	Nausea n, %	Prolonged Seizure n, %	Confusion n, %	Cognitive Side Effect n, %	Confusion or Cognitive Side Effect n, %
<b>All (n=4633)</b>	34 (0.7)	102 (2.2)	60 (1.3)	560 (12.1)	334 (7.2)	38 (0.8)	879 (19.0)	1212 (26.2)	1545 (33.3)
<b>Depression (n=3577)</b>	30 (0.8)	87 (2.4)	43 (1.2)	445 (12.4)	262 (7.3)	31 (0.9)	708 (19.8)	962 (26.9)	1315 (36.8)
<b>Bipolar Depression (n=506)</b>	2 (0.4)	9 (1.6)	7 (1.4)	70 (13.8)	31 (6.1)	4 (0.8)	94 (18.6)	149 (29.5)	188 (37.2)





## Conclusion and Next Steps

From this large naturalistic clinical sample, ECT appears to be effective in improving illness severity as measured by CGI-S score.

While some side effects (such as prolonged seizures and cardiovascular complications) were rare, others (such as confusion or cognitive side effects) were relatively common.



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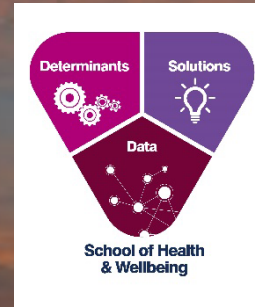
## Collaborators and Thanks

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Many thanks for listening  
Happy to take any questions or comments

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