

Regional Variation in Electroconvulsive Therapy Use

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Abstract

Although electroconvulsive therapy (ECT) is the most powerful treatment for depression, substantial variability in use has been described in Ireland. The Mental Health Commission collects usage data from approved centres but does not include home addresses or independent sector patients. Therefore, estimates of regional variation cannot be accurate, e.g. 145 (35% of total) independent sector patients were omitted from their 2008 analysis. When public and independent sector patients are combined inter-regional variation for 2008 is more than halved (chi-squared decreased from 83 to 30), with Western region contributing most to variation (chi-squared=43). Ratio of ECT programmes to depressed admissions correlated negatively with rate for depressed admissions ($r=-0.53$, $p=0.01$), while depressed admission numbers correlated with acute beds per area ($r=0.68$, $p=0.001$). Regional variation in ECT is less than previously reported; service factors probably account for much of this with smaller centres admitting severely ill patients more likely to require ECT.

Introduction

Electroconvulsive therapy (ECT) is one of the most powerful treatments available for severe psychiatric illness, especially depression and catatonia¹⁻³. It is a medically safe procedure involving deliberate induction of a brief modified tonic-clonic seizure by applying a small electrical charge across the brain of an anaesthetised patient given muscle relaxant⁴. A usual course of ECT is 6-8 such treatments given twice weekly. As in most western industrialized nations, the majority of Irish patients who have ECT are treated for depression. In Ireland, 90% of patients seek treatment with fully informed consent, often after many failed therapies⁵.

ECT in Ireland is regulated by the Mental Health Commission (MHC)^{6,7}. Further voluntary accreditation under stricter criteria is offered by the ECT accreditation service (ECTAS) of the Royal College of Psychiatrists (UK)⁸. The MHC 2008 report is the most recent data available⁵. Based on these and previous reports, the psychiatric profession has been criticized for inconsistent use of ECT throughout Ireland⁹. The MHC report discusses regional variations in ECT use between centres and between Health Service Executive (HSE) administrative regions (Dublin/North-East, Dublin/Mid-Leinster, South and West)⁵. For example, they illustrate a large difference between centres in the South and West regions and independent service providers. However, these analyses were performed without reference to numbers of admissions per centre. Additionally, the MHC data collection does not include patients' home addresses. Reports of regional ECT use are thus treatment centre-focused rather than patient-focused. Our aim was to collate both publicly available and independent sector data to estimate the regional rate of ECT use by the whole Irish population.

Methods

To construct a patient-centred estimate of contemporary regional use of ECT in Ireland, we extracted data from the Report of the MHC on ECT use in Approved Centres in 2008⁵. This report is released annually and data are collected quarterly using a mandatory register at all approved centres. We also used the Health Research Board (HRB) annual report on Activities of Irish Psychiatric Units and Hospitals 2008¹⁰. The HRB data is collected by quarterly voluntary return from all treating psychiatric units, public and independent. Data include numbers of admissions and are classified according to admission diagnosis. The 2006 census figures from the Central Statistics Office (CSO)¹¹ were used to calculate catchment area populations where these were not available from the MHC or HRB reports. Population figures, including all age groups, have been used to maintain consistency. Bed numbers and catchment area populations for individual centres were obtained from the HSE website¹² and the 2008 MHC report^{5,13}. These data were not sourced if the MHC reported centres had not used ECT in 2008.

We then conducted a chart review to locate addresses for all patients treated with ECT in 2008 at St. Patrick's University Hospital (SPUH).

Depression is the main indication for ECT. To compare ECT practice between treatment centres, we therefore generated an index of rates of ECT use by dividing each centre's number of ECT courses in 2008 by its number of admissions for depression in 2008. We also examined size of individual HSE ECT centres as measured by number of acute beds per 100,000 catchment area population. The independent sector treats patients from all over Ireland who have health insurance and thus provides a national service not confined to specific catchment areas. In 2007 about 49% of the adult Irish population had private health insurance⁴. We analysed data using "R"¹⁵. We calculated absolute numbers of ECT programmes in each administrative region, including all patients resident in that region irrespective of in what centre they received ECT, and divided by the region population to calculate the rate of use of ECT per capita in each region. These and the above indices were compared across the four HSE regions using chi-squared tests for homogeneity of proportions. We determined total contributions to chi-square in each region and carried out post hoc tests for homogeneity of proportions⁶. Data were tested for normality using Shapiro-Wilk's test. Correlation coefficients were

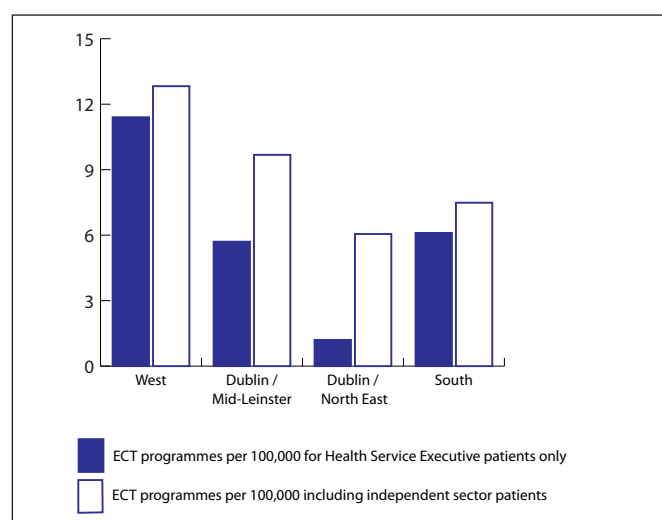


Figure 1 Rates of ECT use per 100,000 of population in the four Health Service Executive (HSE) administrative areas: West, South, Dublin/North-East and Dublin/Mid-Leinster. Rates reported by the MHC are shown in black. Revised rates after re-allocation of patients treated in the independent sector are shown in grey.

calculated using Pearson's product-moment correlation coefficient where data were normalized by transformation. These were tested for robustness by removal of outlying data points and repeat analysis.

Results

In 2008, 407 people were treated with ECT in Ireland and ECT was administered in 24 of 64 approved centres⁵. Two of these were independent centres. Based on the number of persons treated with ECT, the largest centre was St Patrick's University Hospital (SPUH), a large independent Dublin teaching hospital providing a national service. 124 patients (30%) were treated in SPUH, accounting for 84% of independent sector ECT; 10 of these were public sector HSE patients who did not have access to a local ECT service. None of these patients were included in the MHC's report of regional differences⁵.



Figure 2 Scatterplot of ratio of inpatients treated with ECT to depressed admissions versus depressed admissions per 100,000 of catchment population during 2008. Inset box shows the same data with outliers Ballinasloe and St. Michael's Tipperary removed.

The next three largest centres were St. Brigid's Hospital Ballinasloe (n=47), Waterford Regional Hospital (n=27) and University College Hospital Galway (n=22). Figure 1 shows that there was large and significant variation in ECT use per 100,000 of population between the four administrative regions (chi square = 83, $p < 0.001$). However, on including independent sector patients based upon home address, this variation is substantially reduced (chi squared = 30, $p < 0.001$). The greatest difference was between the West and other regions (contribution to chi square = 41.32). The difference between the West and Dublin/North-East regions decreased from 8-fold to 2-fold on inclusion of independent sector patients.

To better determine any variability in practice between individual treating centres during 2008, the number of patients receiving ECT was expressed as a ratio of the number of depression admissions to each centre (Table 1). Most Irish university teaching centres with an established ECT department used ECT proportionate to 1 in 7 to 1 in 10 depressed inpatients. There was a notably increased rate of ECT use per depressed inpatient in two units. During 2008, the Mater Misericordiae Hospital in Dublin north central received referrals for ECT from nearby St. Vincent's Hospital Fairview. When depressed inpatients from Fairview are accounted for, the rate of prescription falls to 1 in 14 depressed

inpatients between the two hospitals. The increased rate of use (1 in 3 depressed admissions) in Ballinasloe, Co. Galway, cannot be attributed to referrals between hospitals. There were several centres where there was only very occasional ECT use.

Lower ratios of in-patient beds to catchment area population may have an effect of limiting admissions to more severely ill patients, thus increasing apparent rates of prescription of ECT. We therefore compared the number of depressed admissions per 100,000 of catchment population to the percentage of depressed admissions receiving ECT and found a negative association (Figure 2; Pearson $r = -0.53$, $p = 0.01$) that was stable to removal of outliers. This suggests that some HSE centres admit fewer depressed patients per capita of catchment population and that this correlates positively with rate of ECT use. Therefore, some units may have a higher threshold for admission, only admitting more seriously ill or treatment-resistant depressed patients who are more likely to require ECT. To explore this possibility, we examined the number of acute psychiatry beds per 100,000 population and the number of depressed admissions per 100,000 in 2008 and found a positive correlation (Figure 3; Pearson $r = 0.68$, $p < 0.001$) that was robust to removal of outliers. Assuming a constant prevalence of severe depression in regional populations, this suggests lower threshold for admission in larger units.

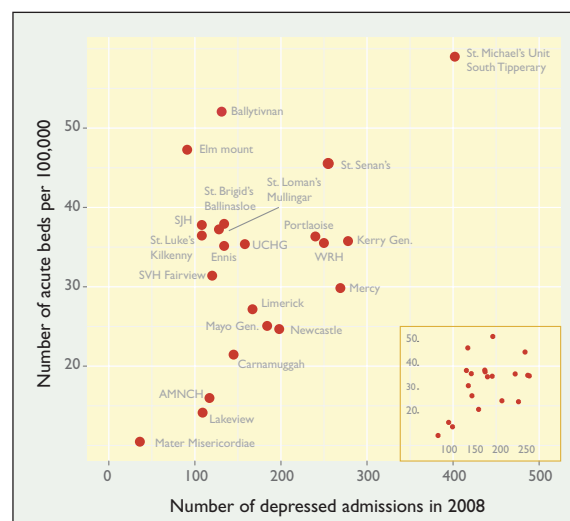


Figure 3 Scatterplot showing depressed admissions versus acute beds per 100,000 for each catchment population. Inset plot shows the same data without the outlier St. Michael's Tipperary

Discussion

Only 24 of 64 approved centres provided ECT in 2008. There is significant variation in the regional rate of prescription of ECT for a given number of depressed admissions. However, we demonstrate this is exaggerated by omitting independent-sector data from MHC reports. The remaining variation is mainly due to higher use of ECT in the West, possibly contributed to by the relatively greater ECT use in Ballinasloe. Variations between individual HSE centres are possibly due to local service factors. In catchment areas with less acute beds per capita, the threshold for admission with depression appears to be higher. This inflates the rate of ECT prescription per depressed admission in these centres.

9.6 per 100,000 Irish people were treated with ECT in 2008⁵. This is comparable to other countries such as Scotland (8.8 per 100,000)¹⁷, Canada (12.4 -15.6 per 100,000)¹⁸, and the state of Texas in the USA (7.2 per 100,000)^{19,20}. The higher rate of use of ECT in Irish university teaching hospitals is similarly reported for international centres. For example, Munich's University clinic

Table 1 ECT use in each approved centre in 2008. Centres administering ECT to less than 10 patients are shaded

| Catchment area | Approved hospital centre | ECT programmes administered in 2008 | Depressed admissions in 2008 | Ratio of ECT programmes to depressed admissions |
|---------------------------|--|-------------------------------------|------------------------------|---|
| Ballinasloe, East Galway | St. Brigid's Hospital | 47 | 128 | 0.37 |
| Dublin North Central | Mater Misericordiae | 8 | 36 | 0.22 |
| National service provider | St. Patrick's University Hospital | 124 | 881 | 0.14 |
| West Galway | University College Hospital Galway | 22 | 158 | 0.14 |
| Dublin South East | Elm Mount St. Vincent's University Hospital | 12 | 91 | 0.13 |
| Dublin South City | Jonathan Swift Clinic (administered in St Patrick's University Hospital) | 14 | 108 | 0.13 |
| Limerick | Midwestern Regional Hospital | 21 | 167 | 0.13 |
| Kildare West / Wicklow | Lakeview Naas | 12 | 109 | 0.11 |
| Waterford | Dept. of Psychiatry, Waterford Regional Hospital | 27 | 250 | 0.11 |
| Dublin South West | Adelaide, Meath and National Children's Hospital Acute Psychiatric Unit | 12 | 117 | 0.10 |
| Carlow / Kilkenny | St. Luke's Kilkenny | 9 | 108 | 0.08 |
| Longford / Westmeath | St. Loman's | 11 | 134 | 0.08 |
| Mayo | Mayo General Hospital | 12 | 184 | 0.06 |
| Clare | Ennis MidWestern Regional Hospital | 8 | 134 | 0.06 |
| Wexford | St. Senan's Hospital | 13 | 255 | 0.05 |
| National service provider | St. John of God Hospital | 21 | 618 | 0.03 |
| Sligo/Leitrim | Ballytivnan Mental Health Service | 4 | 131 | 0.03 |
| Kerry | Acute Mental Health Admission Unit, Kerry General | 7 | 278 | 0.02 |
| Dublin North Central | St. Vincent's Hospital, Fairview | 3 | 120 | 0.02 |
| East Wicklow | Newcastle Hospital | 4 | 198 | 0.02 |
| South Tipperary | St. Michael's Unit, South Tipperary | 8 | 402 | 0.02 |
| Laois / Offaly | Dept. Psychiatry Portlaoise | 4 | 240 | 0.02 |
| Donegal | Carnamuggah, Letterkenny | 2 | 145 | 0.01 |
| North Lee, Cork | St. Michael's Unit, Mercy Hospital | 2 | 269 | 0.01 |

treated 10-15% of mood disordered inpatients with ECT between 1995 and 2002²¹. However, nearly half of the Irish centres provided a very limited ECT service, treating less than 10 patients in 2008 (Table 1). Of note, ECTAS recommends that a minimum of 10 patients per year is necessary to maintain competence and that clinics falling short should avail of ECT at an accredited neighbouring facility²³. Also, a recent survey of Irish postgraduate psychiatric trainees concluded that up to 30% of trainees did not feel adequately trained to give ECT²⁴. Thus, as with recent developments in other branches of Irish medicine, we would recommend that regional and national "centres of excellence" for ECT be established to concentrate expertise and maintain best practice.

Because the majority of Irish approved centres do not have an ECT service⁵, one cannot assume that all HSE patients are treated within their local catchment area. Also, independent sector ECT clinics provide a nationwide service. To develop an accurate

patient-centred picture of ECT use, it is therefore important that the MHC collected data incorporate some information on patients' home addresses. Inclusion of outpatient ECT is also required to improve accuracy of reporting. Additionally, for future reports it would be useful to meaningfully integrate data separately acquired by the MHC and the HRB as attempted in the present study and as previously suggested²⁵.

Our analyses are limited in a number of ways. The publicly available data are subject to error regarding true site-of-origin of patients treated with ECT. Data are missing from the second independent sector centre but these accounted for only 5% of all ECT courses in 2008. We also assumed a constant prevalence of depressive illness across regions and catchment areas. Although ECT is not solely used for depression, this is the major indication. As a rate comparison between centres is at issue, any small percentage excess at the regional level is not likely explained by treatment of other major psychiatric disorders. Only approved

centres which actually used ECT in 2008 have been included in beds and population comparisons. ECT is a powerful and evidence-based treatment in psychiatry. To inform developments in health service delivery, legislation⁶ and public attitudes on ECT, it is essential to have accurate and patient-centred information. This would help the most vulnerable and mentally unwell Irish patients to ensure they receive excellent standards of care.

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