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Socioeconomic demographics of patients referred to the Scottish Sacral Nerve Stimulation (SNS) Service for Urinary Dysfunction

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INTRODUCTION

Sacral nerve stimulation (SNS), also known as sacral neuromodulation, has become a well-established treatment modality for patients with refractory lower urinary tract dysfunction[1]. This is currently offered in tertiary referral urology centres across the United Kingdom with the Scottish Service being based in NHS Greater Glasgow and Clyde. With a relatively novel and technology based therapy such as SNS the doubt is present that the service might be more commonly offered to patients who have a higher socioeconomic status (SES) or higher level of education as the treatment does require patients to show understanding of the implant and the technology used. Mackenbach, for example, found that studies of the diffusion of innovations have observed that people with a higher socioeconomic position often tend to be early adopters, only later to be

followed by those with a lower social position[2]. Other studies support the possibility that unconscious factors may bias the treatment offered on a socioeconomic basis [3,4].

The Scottish Service, being a National Service is funded from top slicing each health board. Funding is available for a limited number of implants per annum and thus it is incumbent on the professionals delivering the service to appropriately select patients. This study was performed to attempt to allay any fears of bias on a socioeconomic basis by analysing our results to assess if this inadvertent discrimination was in fact present within our service. In order to do this we compared the SES of our referrals, of patients who were accepted for testing and also those who proceeded to permanent implantation.

METHODS

A retrospective review was performed of the electronic database containing records of all patients referred to the service since April 2010 to February 2013. Each patient's postcode was matched for its datazone rank and quintile based on the 2012 Scottish Index of Multiple Deprivation (SIMD) which assigns a number from 1 to 5 in descending order of deprivation[5].

The SIMD is constructed using a spectrum of domains (income, employment, health, crime, geographic access to services, and education, skills and training); it identifies area concentrations of multiple deprivation across Scotland according to postcode, and then ranks each area (called datazone) by deprivation level. Quintiles split the datazones into 5 groups, each containing 20% of Scotland's datazones – Quintile 1

contains Scotland's 20% most deprived datazones, Quintile 2 the next 20% most deprived and so on.

In addition, the gender, age and eventual outcome post-referral of each patient were noted.

Comparisons between patient proportions in each quintile were made using the two-proportion Z-test[6]. Ninety five percent confidence intervals are shown in the figures 1-3.

RESULTS

Since April 2010, 217 patients were referred to the Scottish SNS Service. Of the 217, 43 were inappropriate referrals and were rejected. Forty four referrals were in urinary retention and the others had storage symptoms.

One hundred and seventy eight patients were included in this study (3 were excluded due to incomplete data and 36 had not completed their pathways of care). Within our study population 30 were males and 148 were females, with a median age of 47.3 (range 16.7-81.1) years. The distribution of these patients by quintiles according to the SIMD is illustrated in Figure 1. Table 1 shows the comparison of patient proportions between quintiles and the resultant p-values. There were no significant differences in patient distribution between each quintile or against the expected population rate of 20% per quintile.

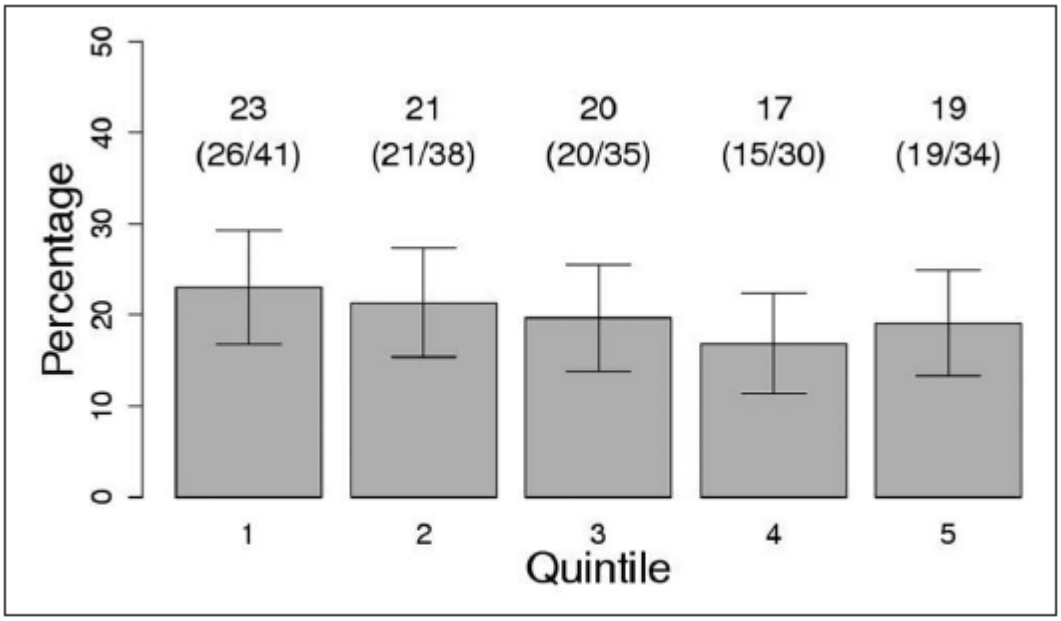

Figure 1. Percentage of referrals by quintile.

TABLE 1: Proportion of <u>referred</u> patients in each quintile compared with each other quintile. (largest difference highlighted in bold)

Quintile	**1** (41/178)	**2** (38/178)	**3** (35/178)	**4** (30/178)
1 (41/178)	—	—	—	—
2 (21/178)	p=0.702	—	—	—
3 (35/178)	p=0.438	p=0.694	—	—
4 (30/178)	**p=0.145**	p=0.281	p=0.493	—
5 (34/178)	p=0.363	p=0.363	p=0.893	p=0.581

Of the 178 referrals, 101 (56.7%) were subsequently accepted for SNS testing using either peripheral nerve evaluation (PNE) or tined lead test (TLT). Figure 2 illustrates the

percentage of referral patients in each quintile progressing to this stage. There were no significant differences in patient proportion between each quintile (see Table 2).

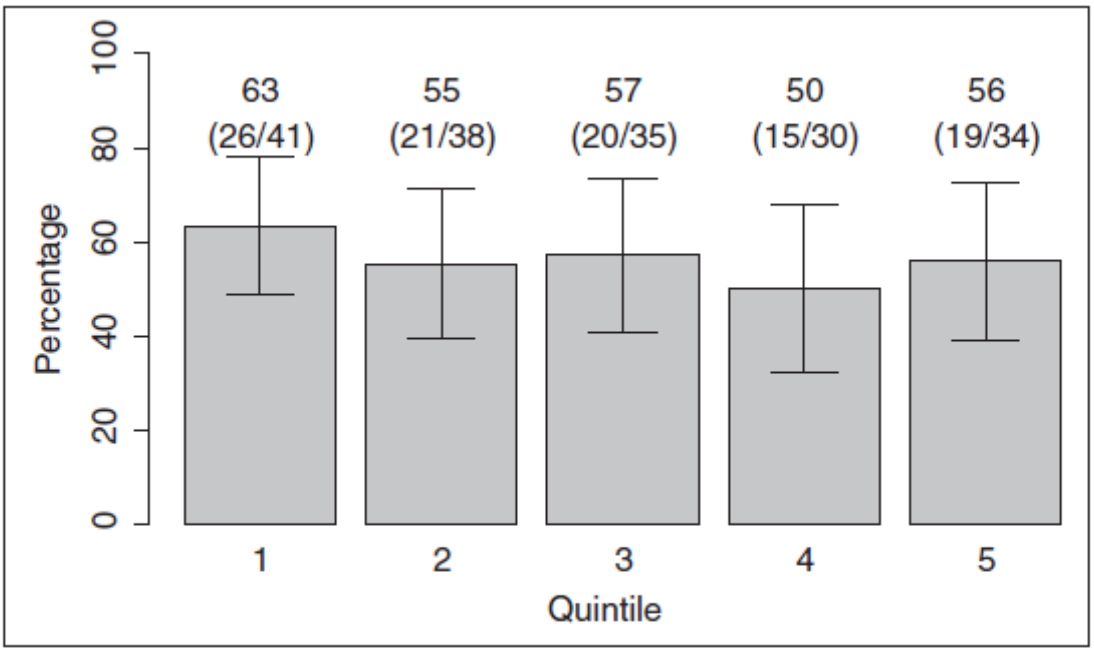

Figure 2. Percentage of patients tested by quintile.

TABLE 2: Proportion of <u>tested</u> patients in each quintile compared with each other quintile. (largest difference highlighted in bold)

Quintile	**1** (26/41)	**2** (21/38)	**3** (20/35)	**4** (15/30)
1 (26/41)	—	—	—	—
2 (21/38)	p=0.461	—	—	—
3 (20/35)	p=0.577	p=0.871	—	—
4 (15/30)	**p=0.259**	p=0.666	p=0.564	—
5 (19/34)	p=0.994	p=0.502	p=0.612	p=0.297

Of the 178 referrals, 65 (36.5%) were eventually selected for permanent implantation, of whom 6 were males and 59 were females, with a median age of 44.4 (range 17.2-78.6) years. Figure 3 illustrates the percentage of referral patients in each quintile progressing to this stage. There were again no significant differences in patient proportion between each quintile (see Table 3).

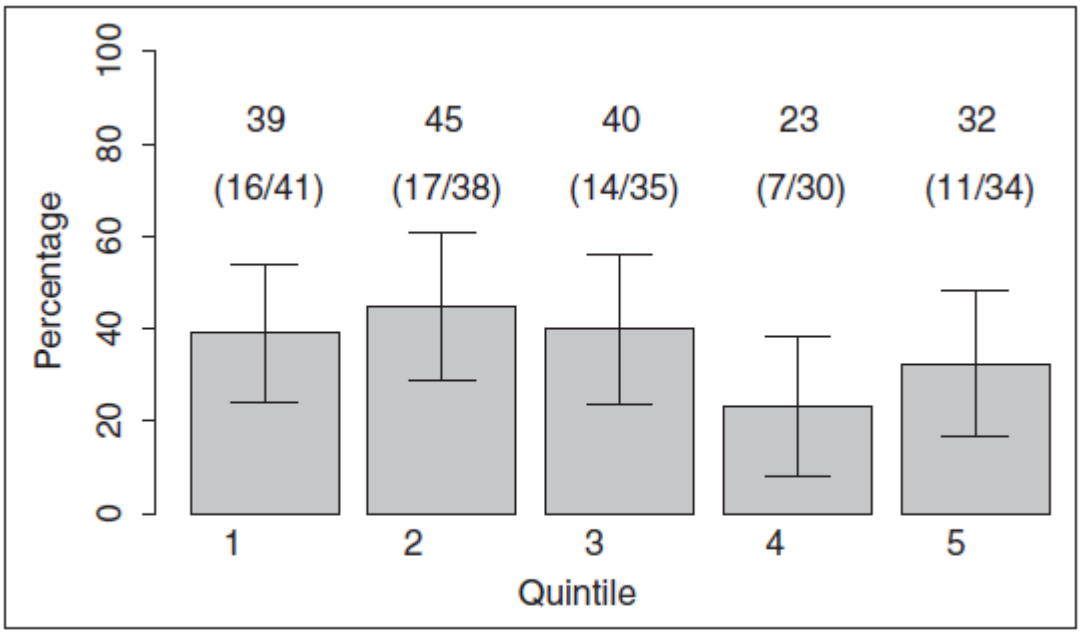

Figure 3. Percentage of patients implanted by quintile.

TABLE 3: Proportion of implanted patients in each quintile compared with each other quintile. (largest difference highlighted in bold)

Quintile	**1** (16/41)	**2** (17/38)	**3** (14/35)	**4** (7/30)

1 (16/41)	—	—	—	—
2 (17/38)	p=0.607	—	—	—
3 (14/35)	p=0.930	p=0.682	—	—
4 (7/30)	p=0.163	**p=0.067**	p=0.152	—
5 (11/34)	p=0.549	p=0.282	p=0.508	p=0.423

The difference between quintiles two and four might be speculated upon. It has not reached statistical significance, but a p value of 0.067 might be thought worth considering. It could be a random variation and this is likely, since there is no upward or downward trend in the data over the other quintiles.

DISCUSSION

Since its development in the 1980s, SNS has become an established option for treating patients with refractory lower urinary tract dysfunction. By using electrical pulses to activate or inhibit neural reflexes associated with lower urinary tract function via stimulation of the sacral nerves, SNS can modulate the control of bladder filling and emptying[1].

Established in April 2010, the Scottish SNS Service for Urinary Dysfunction is a designated national service based at the New Victoria Hospital, Glasgow for the population of Scotland[5]. The procedure is only considered in patient groups which benefit from SNS – firstly, those who have intractable detrusor overactivity with symptoms of urinary frequency, urgency and urge incontinence, and secondly, those

who have non-obstructive urinary retention. Patients should also have been refractory to conservative treatment options including bladder re-training, anti-cholinergic medication and intra-vesical botulinum toxin.

Patient selection for SNS is very stringent, as illustrated in the patient pathway of care in Figure 4. Permanent SNS implantation is reserved for patients who have been filtered through the initial stages and have proven benefit during stimulation testing (i.e. PNE and/or TLT). The permanent implant has a wireless external programmer and it is expected that with adequate instruction, patients can control the device independently

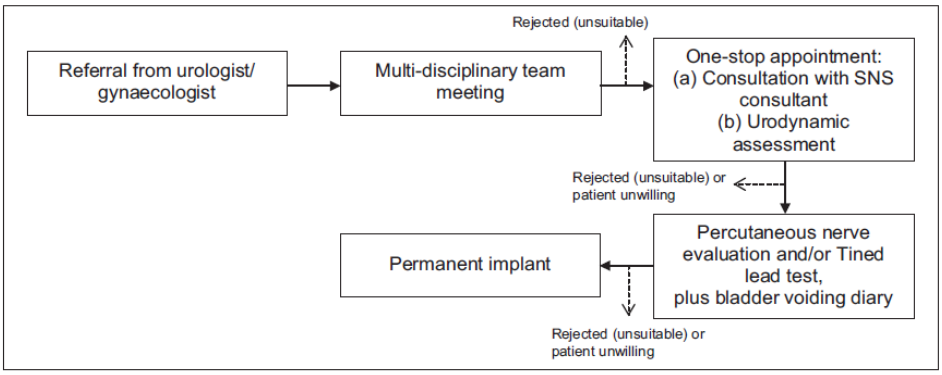

Figure 4. Patient pathway of care.
SNS: sacral nerve stimulation.

In addition to patient selection being based purely on medical reasons, patients selected for permanent implantation need to have shown a minimum level of literacy and maturity, to have complied with the pre-implantation investigations and also shown facility with the implant technology.

In this study we used the SIMD 2012 to measure deprivation. NHS Scotland currently recommends the use of the SIMD for point in time data analysis instead of the previous

Carstairs Index as the SIMD has the advantage of being a measure of multiple deprivation[7].

Census data allows a best available estimate of the deprivation level of individuals residing there. Ideally, each individual's material deprivation would be measured using information on points such as income and employment or occupation. In practice, however an area-based measure is used such as the SIMD, as individual data collection is impractical.

The SIMD is based on the patient's postcode. The postcode is used to determine which datazone each area matches to depending on which areas are deemed most deprived. A potential drawback to using this method is that postcodes are owned by the Royal Mail and can be geographically unstable. Over time as buildings are demolished or built the postcode may become a less reliable proxy for deprivation.

Our hypothesis for this study was that that the Scottish SNS service unknowingly selected patients from a higher socioeconomic class as this group may be more likely to manage the technology. SES may be regarded as an indicator of education levels as research has linked lower SES to lower academic achievement and slower rates of academic progress as compared with higher SES communities[8].

Lower urinary tract dysfunction is not associated with any risk factor related to deprivation. In this study we show that equal numbers of referrals arise from each quintile. We believe this to be due to the fact that referral to the Scottish SNS service is

made by a Urologist or Gynaecologist rather than by a General Practitioner. It is therefore not dependent on patients' knowledge of SNS but rather on a specialist being aware of the service availability.

Although this study shows no difference in referral according to SES, we are aware that there is a significant difference in referral depending on geography and whether or not the referrer has a specialist interest in urinary dysfunction. Although our results are reassuring we must continue to monitor SES as part of our service analysis to ensure no discrimination develops over time.

CONCLUSIONS

In a clinical service, decisions are by necessity made on a case by case basis. The overall provision of service may never be analysed for bias or implicit assumptions.

We have analysed our patient pathway via a well validated and convenient indicator of deprivation and the hypothesis that we somehow discriminate has been rejected as our results show that patients referred, tested and treated by the Scottish SNS Service were equally distributed among all socioeconomic classes.

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