

The learning curve of ministernotomy aortic valve replacement: a retrospective analysis of trainee and consultant outcomes

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Objectives

The steep learning curve of minimally invasive aortic valve surgery means that it is historically a procedure carried out by consultants as first operator (1). In recent years, specialist registrars (SpR) are performing more mini-sternotomies for aortic valve replacement (AVR). We sought to compare mini-sternotomy AVR outcome measures between consultants and SpRs to ascertain any differences.

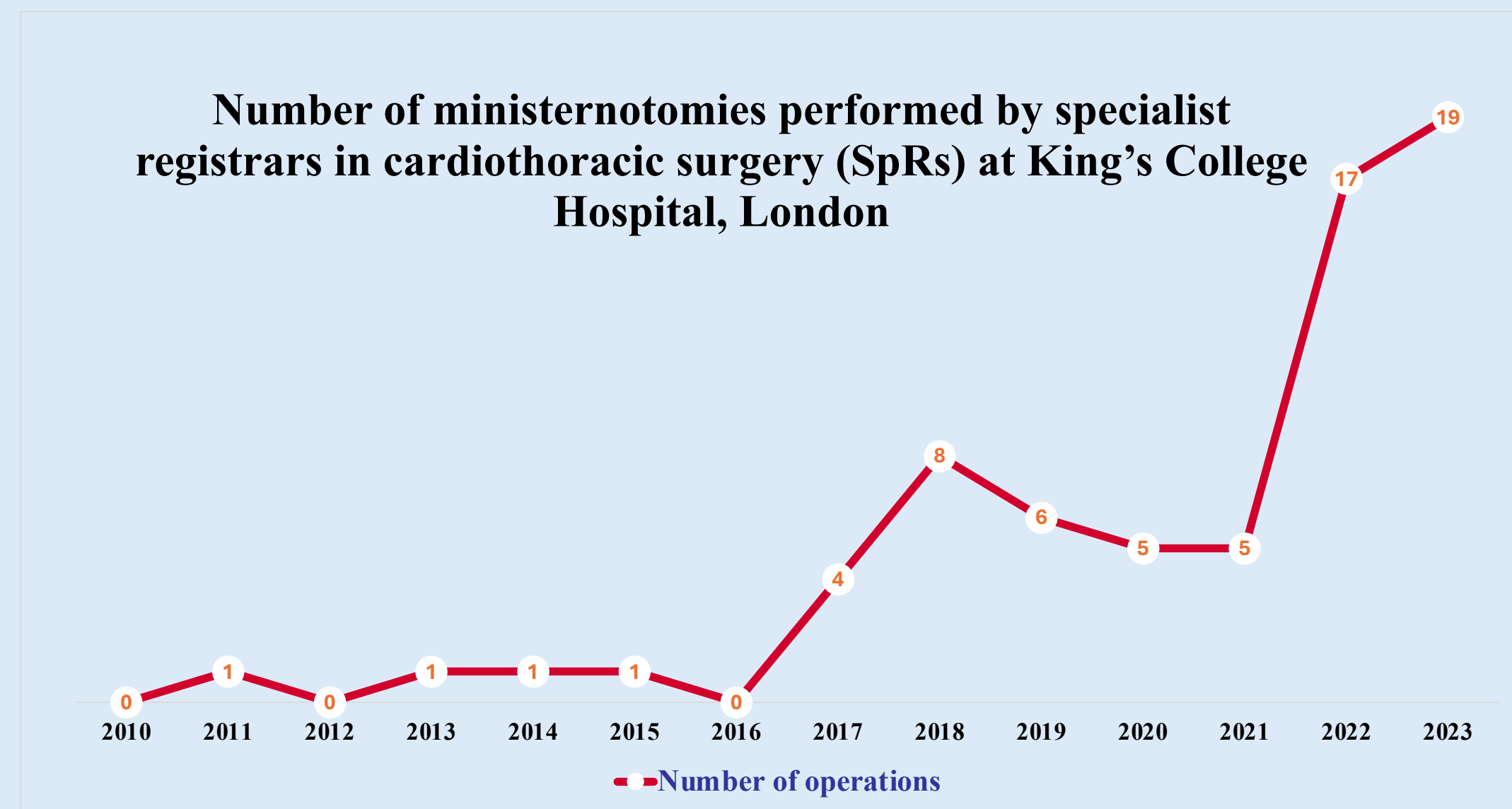
Methods

A retrospective cohort study was conducted using a prospectively maintained institutional database. All patients over 16 years old undergoing mini-sternotomy isolated aortic valve replacement at a single institution between December 2019 and September 2023 were included.

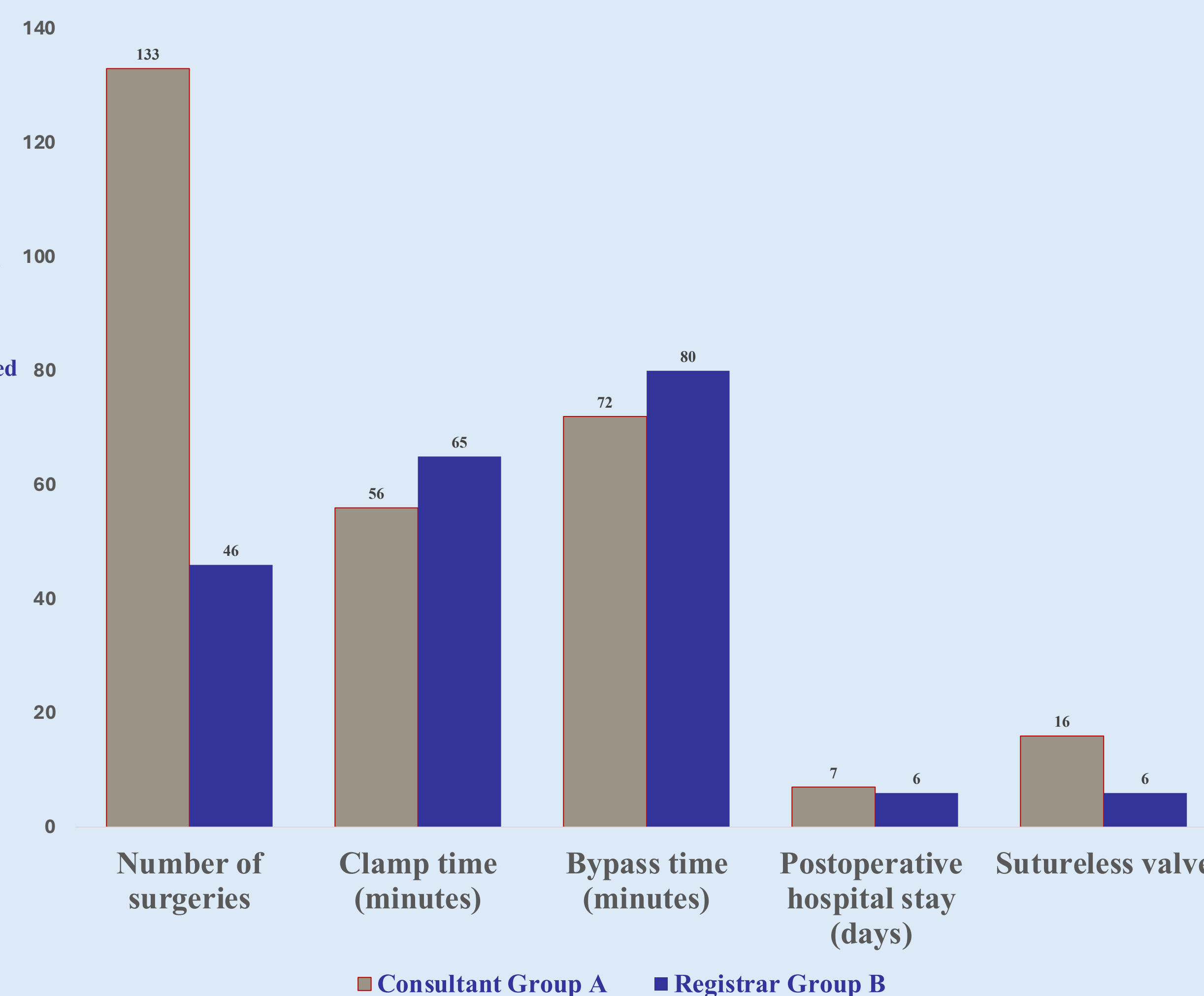
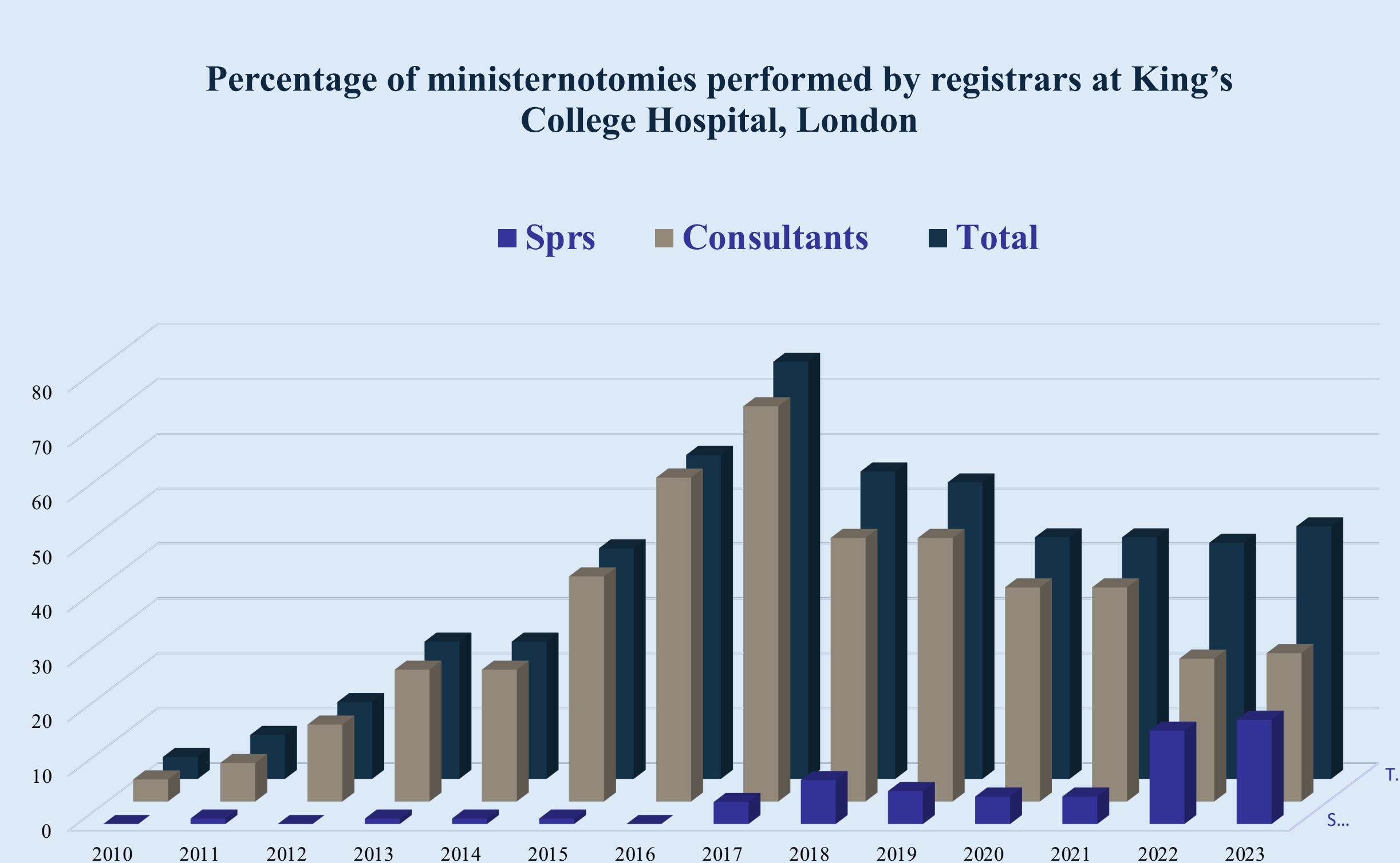
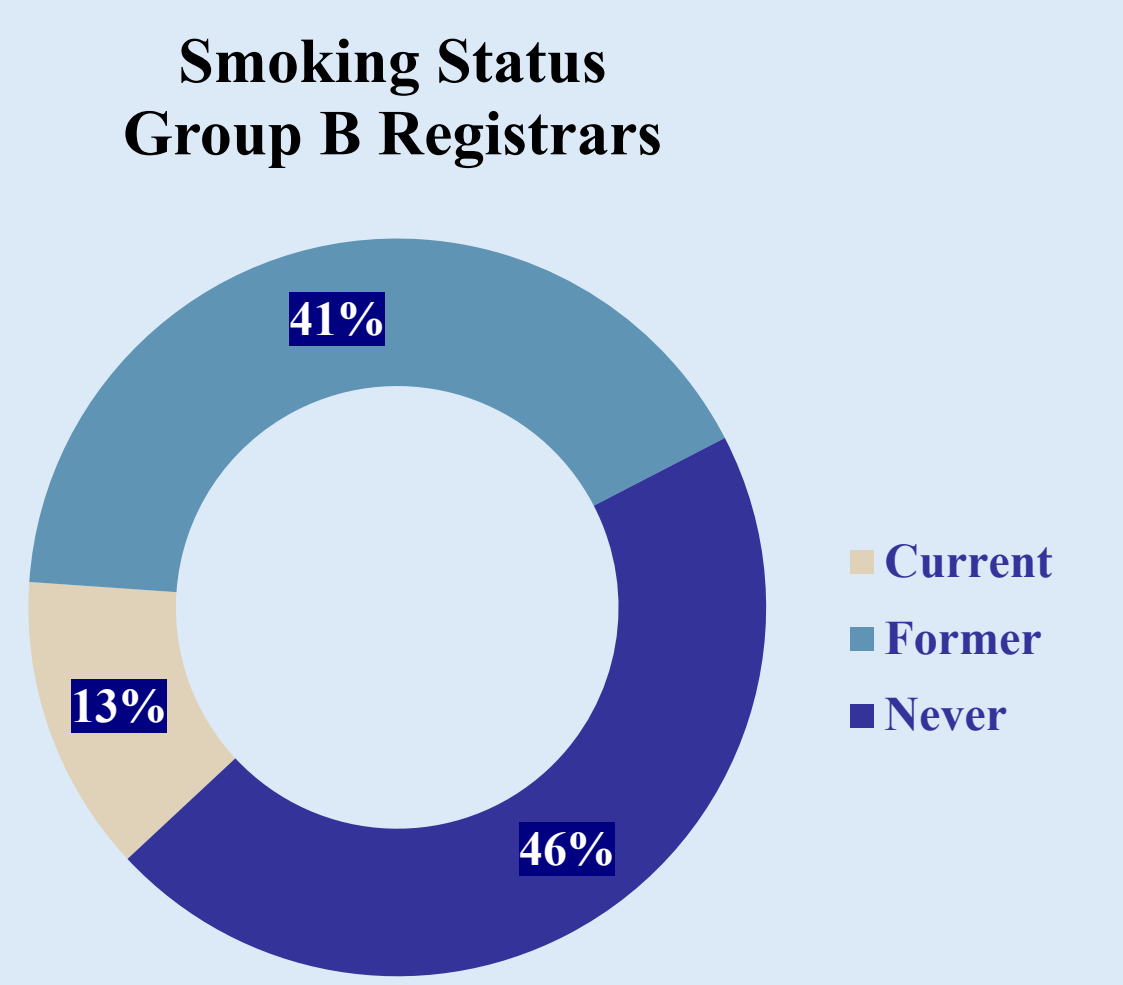
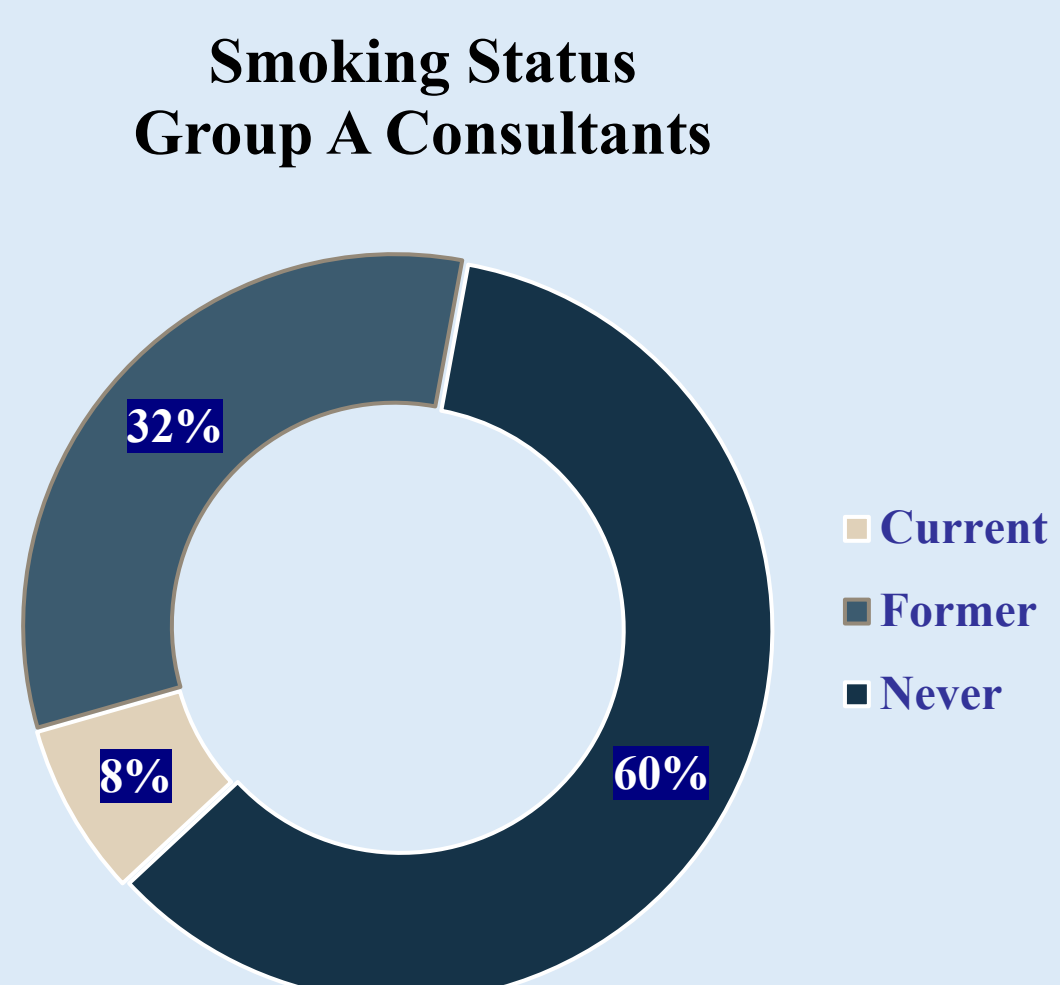
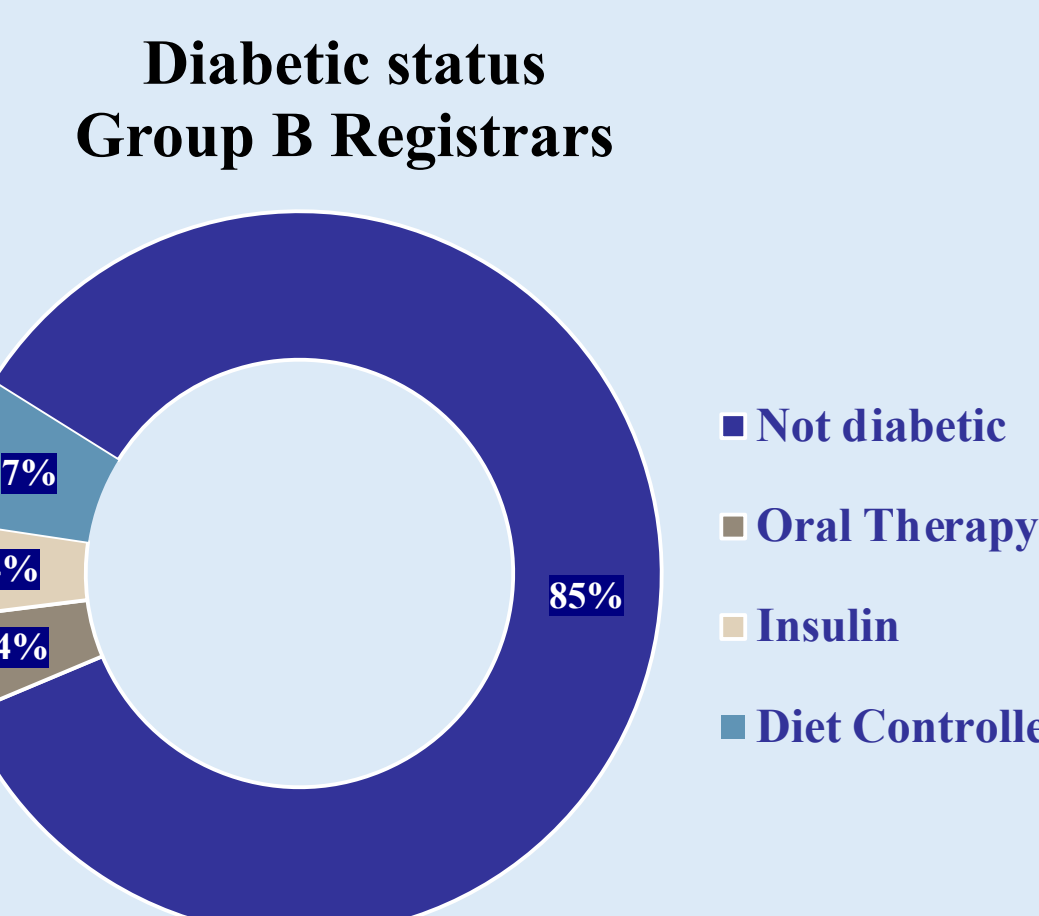
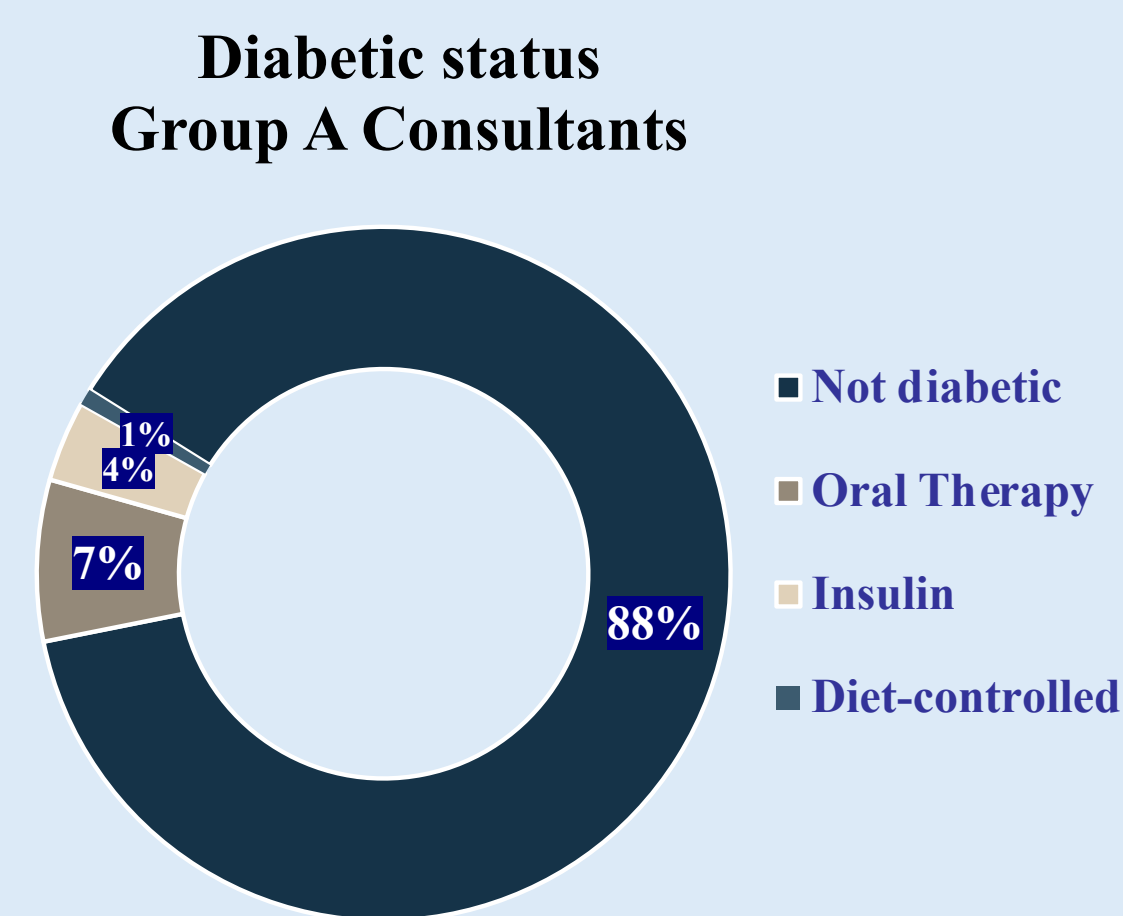
Continuous data will be reported as mean with standard deviation (SD) or median with interquartile range (IQR) as appropriate to the data distribution, and categorical data as counts and percentages.

The data were explored using cross-tabulations with the outcome and exposure variables, and continuous data explored graphically using histograms. Continuous data means were compared using the Student's T-test and the Wilcoxon rank-sum test according to the data distribution. Univariate analysis between categorical data were conducted using the Pearson Chi-Squared test or Fisher's exact test as appropriate.

All analyses were conducted using the Stata (StataCorp LLC, version 17, Tx, USA) software package.



Results: Between December 2019 and September 2023, 179 patients met the study inclusion criteria. The mean age was 63 (SD 13), and 59 (33%) were female. 133 (74%) of procedures were undertaken by consultants (group A) and 46 (26%) by SpRs (group B). 78% of SpR operations had a consultant scrubbed in.



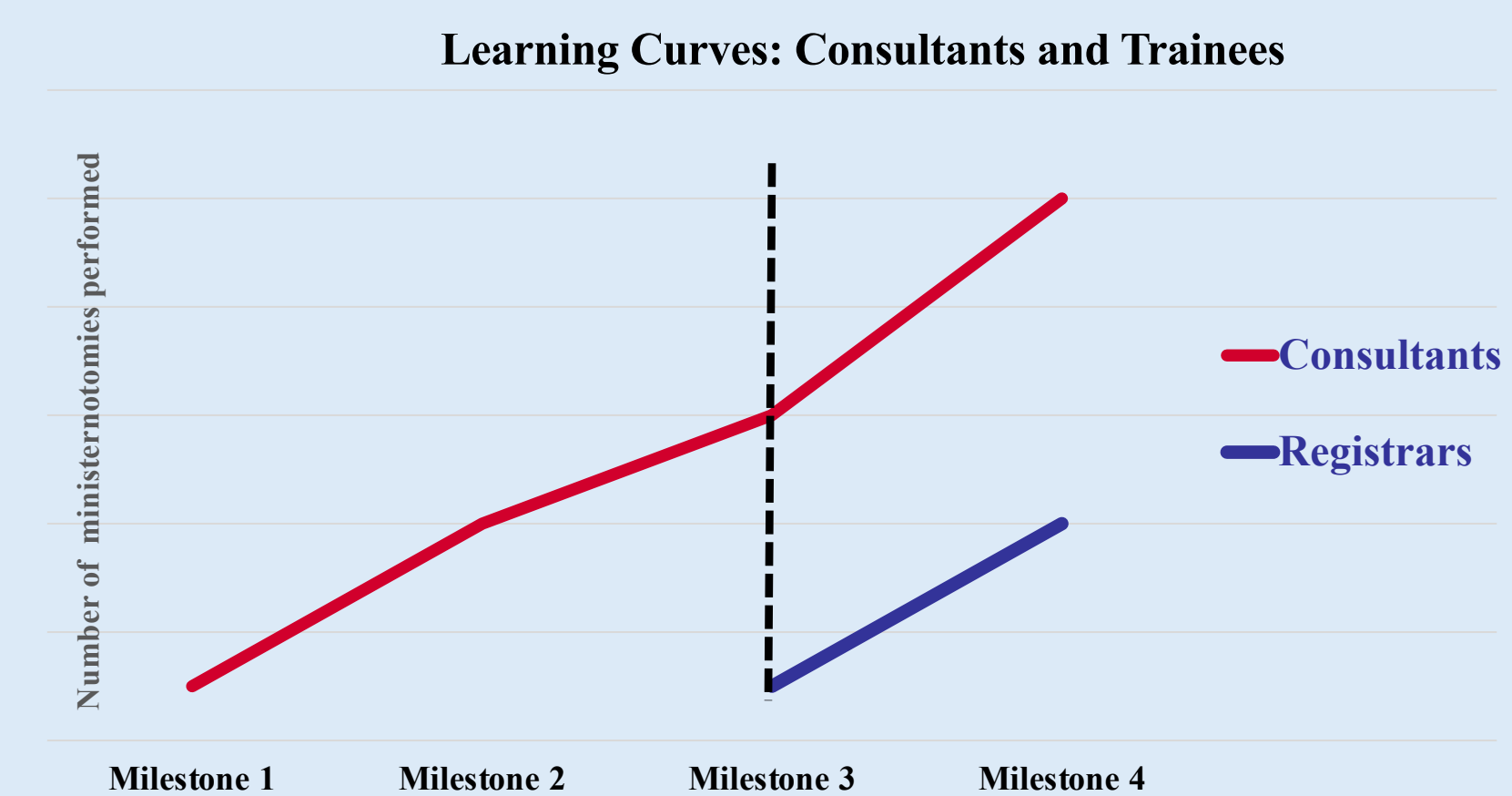
	Consultant	SpR	p-value
	n = 133 (100%)	n = 46 (100%)	
Clamp time (minutes)	56 (IQR 43 - 75)	65 (IQR 54-75)	0.07
Bypass time (minutes)	72 (IQR 60 - 92)	80 (IQR 68 - 94)	0.09
Post-op length of stay (days)	7 (IQR 5-10)	6 (IQR 5-9)	0.23
Deep Sternal Wound Infection	0 (0%)	0 (0%)	-
30-day mortality	0 (0%)	0 (0%)	-
Paravalvular leak	1 (1%)	0 (0%)	0.74
Pacemaker rate	1 (1%)	1 (2%)	0.45
Sutureless valve	16 (12%)	6 (13%)	0.86
Euroscore Two (%)	1.41 (IQR 0.94 – 2.78)	1.58 (IQR 1.17 – 2.27)	0.99
Age	62 (SD 14)	65 (SD 9)	0.11
Gender			
Male	86 (65%)	34 (74%)	
Female	47 (35%)	12 (26%)	0.25
Smoking Status			
Current	10 (7.5%)	6 (13%)	
Former	43 (32%)	19 (41%)	
Never	80 (60%)	21 (46%)	0.2
BMI (kg/m^2)	30 (SD 6)	28 (SD 5)	0.06
Diabetes			
Insulin	5 (3.5%)	2 (4.0%)	
Oral medication	10 (7.5%)	2 (4.0%)	
Diet	1 (1%)	3 (7.0%)	
Not diabetic	117 (88%)	39 (85%)	0.13

References

- 1) Fattouch, K., Moscarelli, M., Giglio, M. del, Albertini, A., Comoglio, C., Coppola, R., Nasso, G., & Speziale, G. (2016). Non-sutureless minimally invasive aortic valve replacement: mini-sternotomy versus mini-thoracotomy: a series of 1130 patients. *Interact CardioVasc Thorac Surg*, 23, 253–261. <https://doi.org/10.1093/icvts/ivw104>
- 2) Lazovic, D. M., Kočica, M. J., Vučićević, F., Kočica-Karadžić, M., Grujić, M., Terzić, D., Dordević, A., Grujić, D., & Cvetković, D. (2021). Perceval Sutureless Bioprosthesis for Degenerative Aortic Valve Stenosis: Initial Experience With 67 Patients. *Heart Surgery Forum*, 24(6), E1065–E1069. <https://doi.org/10.1532/HSF.4027>

Results continued: 23 (13%) were diabetic, 16 (9%) were current smokers, 62 (35%) ex-smokers and 101 (56%) never smokers. The mean BMI was 29.8 kg/m² (SD 5.7). The median Euroscore II was 1.41 (IQR 0.94 – 2.78) in group A and 1.58 (IQR 1.17 – 2.27) in group B (p=0.99).

Median post-operative stay was 7 days (IQR 5-10) in group A and 6 days (IQR 5-9) in group B (p=0.23). Median cross clamp time was 56 minutes (IQR 43-92) in group A and 65 minutes (54-75) in group B (p=0.07). Paravalvular leak rate was 1% in Group A and 2% in Group B. The incidences of paravalvular leak and permeant pacemaker rate mirror that of allied data (2). All patients were alive at discharge. Further post-operative details are shown in Table 1.



Conclusion: The comparable postoperative outcomes between consultants and trainees can be a testament to the easily transferrable nature of the ministernotomy technique from consultant to trainee. However, the majority of SpR operations had a consultant scrubbed in. We aim to encourage consultant supervision without first assistantship to ascertain whether it is possible to replicate these outcomes without the presence of a scrubbed consultant.