National Neurosurgical Audit Programme Report 2024

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NAP
NATIONAL NEUROSURGICAL AUDIT PROGRAMME

SOCIETY OF BRITISH NEUROLOGICAL SURGEONS
www.sbns.org.uk

This report was prepared by the NNAP team.

With special thanks to healthcare and industry providers for contributing content:

CHKS is a leading provider of healthcare intelligence and quality improvement services. Since 1989 they have been developing hospital benchmarking and performance management solutions for healthcare organisations in over 20 countries and have worked with over 400 clients throughout the world.

Bloomsbury Health are providers of referapatient, a referral management platform for specialist networks.

The Model Health System is a data-driven improvement tool that enables NHS health systems and trusts to benchmark quality and productivity. By identifying opportunities for improvement, the Model Health System empowers NHS teams to continuously improve care for patients.

NEC Software Solutions builds software and services that deliver better outcomes, keeping people safer, healthier and better connected.

The **GIRFT** national report made recommendations to help save lives and transform patient care and outcomes by reducing the risks associated with long waiting times, leveraging the expertise of the most experienced surgeons, and freeing up operating theatres and new beds for patients.

ORION MedTech provides health informatics technology for secure collection, sharing and analysis of high resolution healthcare data.

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Foreword

The National Neurosurgical Audit Programme (NNAP) has historically simply used HES data provided by NHS England, analysed by NEC a commercial data science company, to provide robust and reliable benchmarking mortality data to Trusts. In order for this to be reliable, this data requires specialised analyses including a standardised mortality model that accounts for co-morbidities and case mix. The model is calibrated by the aggregated HES mortality data of the 5 preceding years and therefore evolves over time. This is the gold standard method for statistically valid comparisons of mortality rates between units.

However, the assessments of safety and quality in the NHS are becoming increasingly data driven and complex, with multiple data sources and reports that complement, compete, and sometimes conflict with each other. NNAP is responding to that challenge and we are excited to present this new report that extends beyond the simple mortality benchmarking provided in previous years and, we hope, better serves the needs and interests of a modern Neurosurgery department.

NNAP is well positioned for this challenge, offering expertise in analysis of both HES data through our partnership with NEC and also synthesising the information from other datasets such as NCIP, Model Hospital and our national registries to provide context and a deeper understanding. Aligned with this goal of synthesising different data sets, a key future aspiration is also to incorporate Welsh, Scottish and Irish datasets to support the SBNS membership as a whole.

Beyond the goal of a comprehensive, integrated understanding of neurosurgical healthcare data, we intend to develop clinically useful and validated quality indicators for subspecialty neurosurgical practice, and offer support on projects of importance to sub-specialty groups. For example, we have recently commenced a national audit of the utility of LP in diagnosis of aneurysmal subarachnoid haemorrhage, in response to the updated NICE guidance that has created tension in the Neurosurgical community.

However, evolving towards these ambitions is necessarily an iterative process and we both welcome and encourage your feedback. Hearing those thoughts will help guide us to continually improve this into a publication that is clinically useful and interesting for all. We hope to theme these reports to align with contemporary interests and it is therefore no surprise that this iteration is focussed on the consequences of the COVID-19 pandemic.

In compiling the first of these new style of reports, special thanks must go to Nick Phillips, past Chair of NNAP for his support and wisdom, to Professor David Cromwell for his review and comments, and to all the NNAP team who have contributed to this document.

A Helmy, Chair NNAP
A Williams, Co-Chair NNAP

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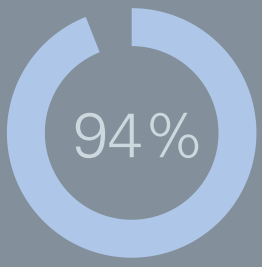
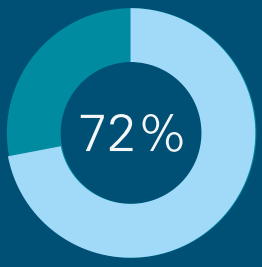
At a Glance



Cranial surgery has recovered to 94% of 2019 activity



Spinal surgery activity only 72% of 2019 activity

Pre-pandemic elective levels of operating may not be met until

2026

assuming the current recovery trajectory continues

+38%

Emergency Referral numbers have increased by 38% since 2019

Increase in age and comorbidities of average patient since COVID-19 Pandemic

19/24 adult Neurosurgical centres secure aneurysms on average within 24 hours on weekdays (2022/23)

Both Neurosurgical Trainee Workload and Experience reported as higher than other Surgical Trainees.

Hospital Episode Statistics data demonstrates Registries capture approximately

45%

of cases

Emergency length of stay:

2022: 15 days

2019: 13 days

Executive Summary

The COVID-19 pandemic will almost certainly be the single generational problem that our current neurosurgical services will have to face and therefore its impact on services forms the central theme for this annual report. We have considered this impact by reflecting on four time periods of its effect:

- Immediate - The original impact of the disease and deaths/morbidity related to acute infection.
- Early - The reduction in elective care to offset increased covid admissions and the mitigations required to manage those infections.
- Medium (and ongoing) - The delayed presentation and investigation of patients leading to higher disease acuity, more complex patients and higher complication rates.
- Chronic - Poorer national finances limiting innovation, burn-out and loss of senior clinicians - impacting overall quality and efficiency of service, and reduction in training opportunities for the next generation.

Whilst a comprehensive assessment of the impact of COVID is beyond the scope of this report, we hope that the areas within these domains we have focussed on will be of interest and useful to all.

At its most stark, the impact of the COVID-19 pandemic on UK neurosurgical services resulted in an extraordinary decline in elective operating. There has been a cumulative loss of over 20,000 elective neurosurgical operations in English NHS trusts between 2020 and 2023, the equivalent of the entire elective capacity of the UK between January to August.

This highlights the sheer magnitude of the challenge faced by the neurosurgical community and yet, despite this, there remain delays in returning to a pre-pandemic level of efficiency, nevermind the extra efficiency required to compensate adequately.

Unsurprisingly, the number of emergency operations have been relatively less affected, remaining stable at around 16,000 operations per year within the English NHS between 2019 and 2022. In contrast, over the same time period, there has been a 35% increase in emergency referrals, underscoring the strain and increased demand experienced by the on call neurosurgical services.

These findings emphasise the urgent need for targeted interventions and considered resource allocation to address the backlog of elective cases and ensure the continued provision of high-quality emergency care.

COVID-19 Pandemic

16,440

neurosurgical bed days lost in first wave

34,800

neurosurgical bed days lost in the second wave

-20,000

current deficit in operative spells between 2020-2023

Impact of COVID on emergency and elective care

The COVID-19 pandemic necessitated an immediate change in normal neurosurgical practice; to develop new processes to manage neurosurgical patients who were at risk of perioperative COVID-19 infection, to ration the care of neurosurgical patients through a severely limited bed base and, therefore, to allow hospitals to treat an unprecedented number of acutely unwell general medical patients.

Taking the first of these, during the first wave of COVID, defined here as the 1 March 2020 - 31 April 2020, an average of **5%** of Neurosurgical admissions had a COVID-19 diagnosis and this increased to **9%** during the second wave, defined here as 1 September 2020 - 28 February 2021. The mortality rate for Neurosurgical admissions with COVID-19 diagnosis between 2019-2022 was **9%** with a range between different Neurosurgical centres of **4-13%**.

The rationed neurosurgical bed base and the increase in general medical admissions severely reduced neurosurgical activity during the pandemic and we have not yet returned to pre-pandemic levels of activity. In order to quantify this, we compiled data on elective Neurosurgical activity for both inpatient spells and total bed days undertaken in NHS hospitals using Hospital Episode Statistics data between calendar years 2019 to 2023.

We defined the patient cohort as the number of inpatient spells for patients with the Neurosurgical specialty code 150 who underwent neurosurgical procedures listed in the NNAP OPCS code framework, thus excluding patients managed conservatively. Whilst each patient spell may contain more than one operation, for the purposes of this analysis, the number of operative spells was felt to be the optimum indicator of neurosurgical activity.

Comparing the periods of the two waves with the same periods in 2019 suggests there were **16,440** lost neurosurgical bed days during the first wave and **34,800** bed days lost during the second.

However, the deficit of Neurosurgical patients managed operatively grew throughout the whole COVID-19 pandemic, not merely during these two waves, and continues to grow today. The result is that there is a current deficit in excess of **20,000** operative spells between 2020 until the end of 2023.

Analysis shows that recovery is slow. Cranial surgery is recovering at a faster rate than spinal surgery, but both still remain below 2019 levels. By the end of 2023, elective spinal surgery was at **72%** of pre-COVID 19 Pandemic levels, 7924 operative spells when compared with 11,067 in 2019. Cranial elective surgery is at **94%** of 2019 levels, with 14,686 operative spells compared with 15,557 in 2019.

Emergency work has remained relatively stable throughout the period, with the overall emergency output at **93%** of 2019 levels, with 15,224 emergency spells counted in 2023 compared with 16,408 in 2019.

Table 1: Average number of total spells per adult English NHS Neurosurgical Centre.

	2019	2020	2021	2022	2023
Elective: spine	479	288	302	325	330
Elective: cranial	648	492	536	572	612
Elective: all procedures	1222	853	911	970	1020
Emergency: spine	169	166	171	160	159
Emergency: cranial	518	478	487	497	478
Emergency: all procedures	684	640	655	656	634

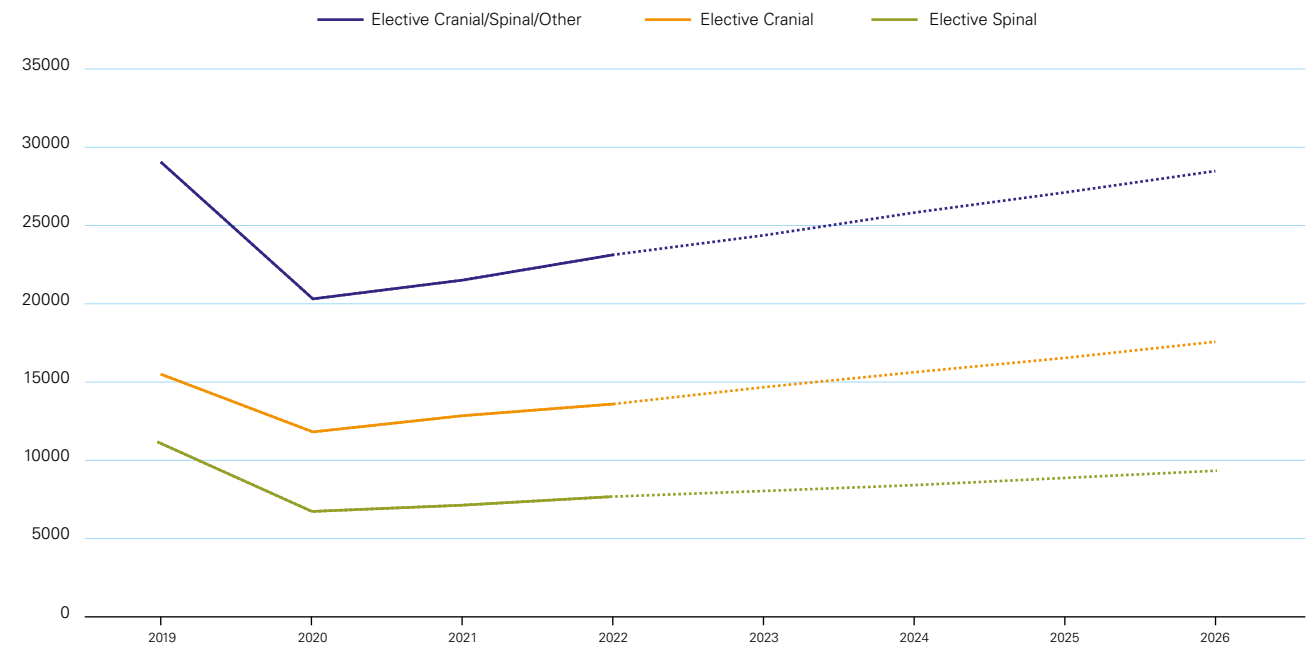
Data: CHKS.

Description: Each count describes 1 patient spell where they underwent at least 1 Neurosurgical operation as defined by the NNAP OPCS coding framework.

Date range: 1 January 2019 - 31 December 2023.

In assessing the recovery of elective work, if we extrapolate using current rates of recovery in a linear fashion, then this would mean that England would only return to pre-pandemic levels of Neurosurgical operative output by approximately **2026**. Whilst a simple linear extrapolation is likely to underestimate the herculean efforts departments have made to recover, other competing issues such as the NHS workforce strikes will have had their own impact.

Figure 1: Overall elective outputs plotted for 2019-2022 with extrapolation based on the current rate of recovery.



Data: CHKS.

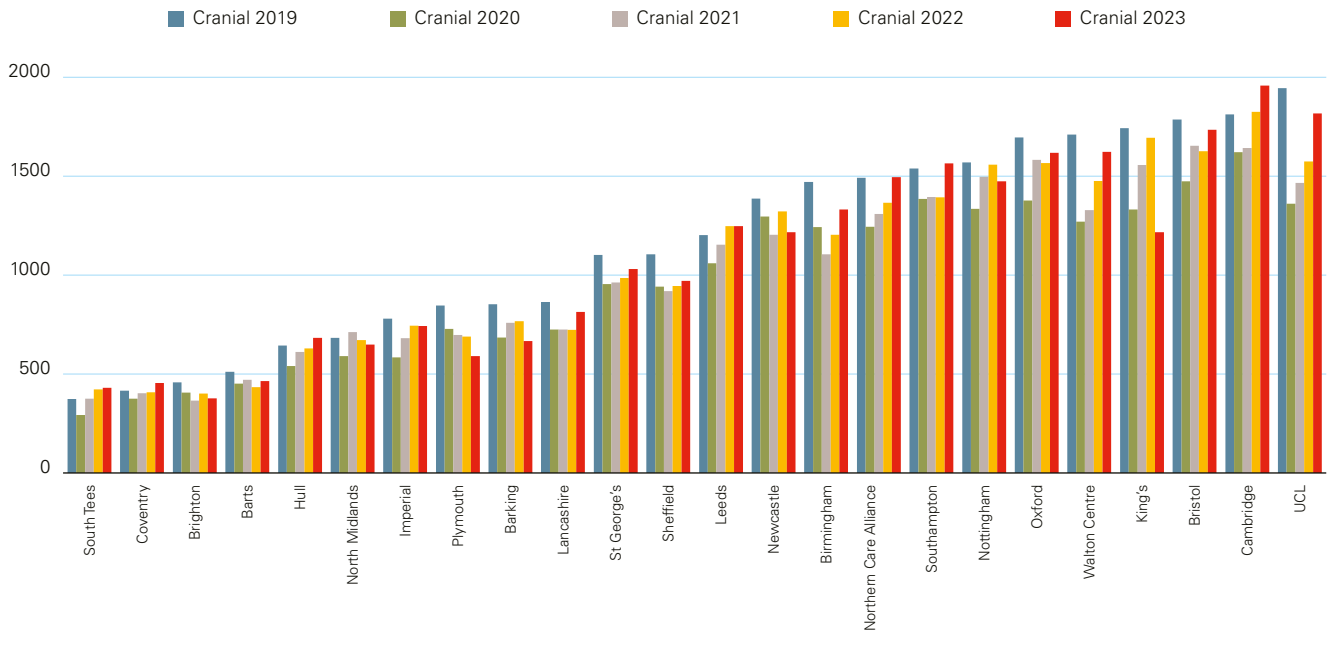
Description: This graph shows the extrapolation of rolling averages in terms of the number of total spells for cranial work, spinal work and combined. We have extrapolated this data to the year 2026. These numbers are crude estimates based upon the current rate of recovery.

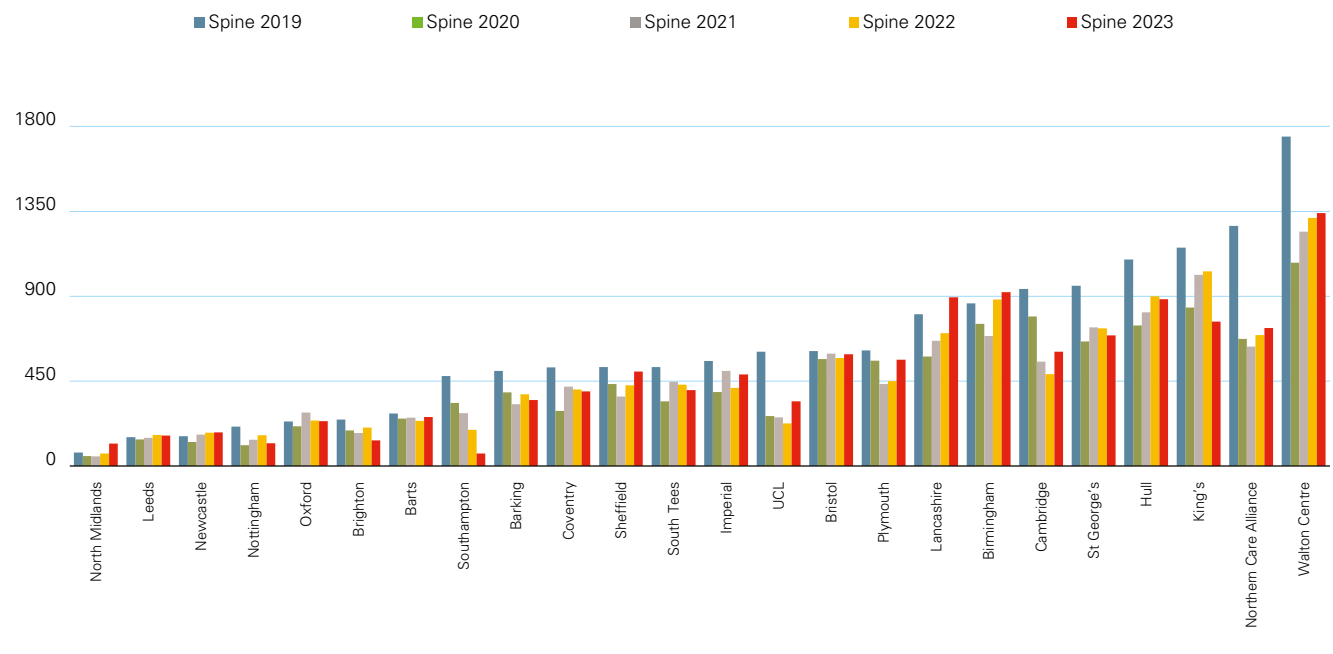
Date range: Extrapolation based on actual figures from 1 January 2019 - 31 December 2022.

Why have we not returned to pre-Pandemic levels of activity?

Whilst it is clear that the downturn experienced across the NHS is also being felt in Neurosurgery, the exact reasons for this are hard to discern. Below shows the variability of recovery in Cranial and Spinal work since the last pre-COVID 19 year. It is predominantly smaller Trusts that are closest to 2019 levels of output.

Figure 2a & b: Bar charts showing the total operative spells (Elective and Emergency) for Cranial and Spinal cases across 24 different Trusts.





Data: HES
Description: Total spells in each calendar year defined as either a cranial or spinal case using the NNAP OPCS coding framework.
Date range: 1 January 2019 - 31 December 2023

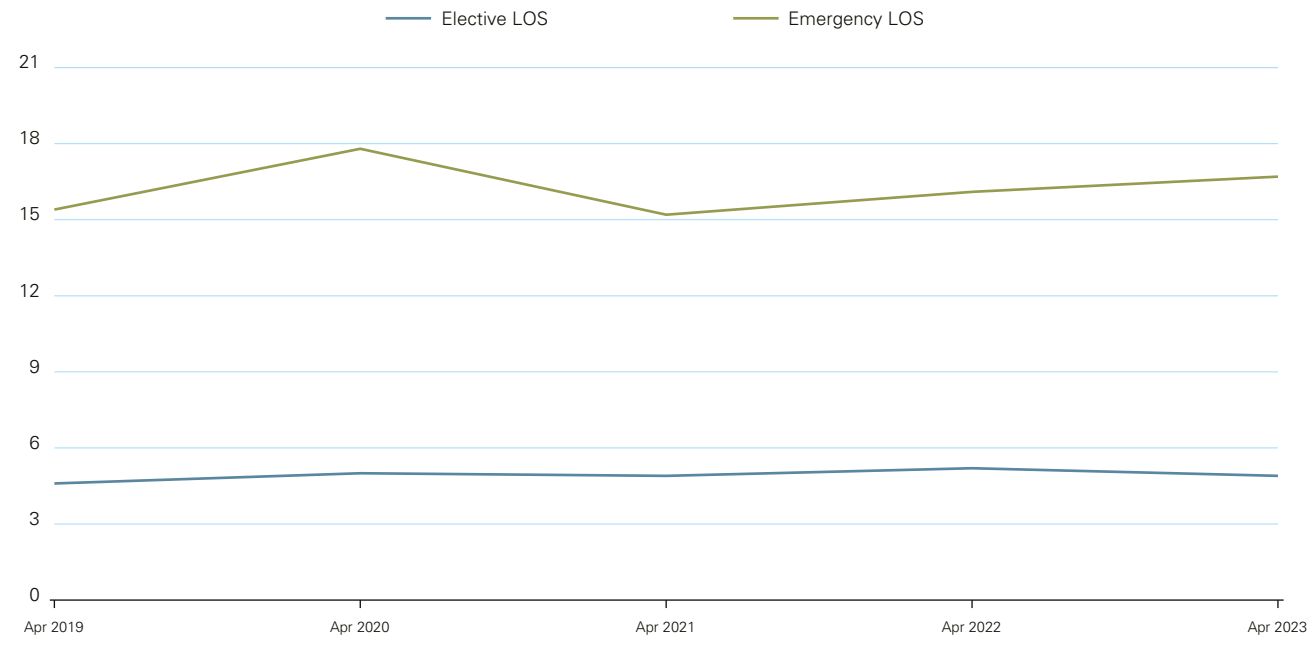
One area that may have impacted upon activity in Neurosurgical departments has been the increasing average length of stay since 2019, with the most significant difference being in emergency admissions. Below is the annual mean LOS derived from HES data.

Table 2: Mean LoS		
Year	Elective admissions	Emergency admissions
2019	3.01	13
2020	3.2	12.6
2021	3.3	12.8
2022	3.3	14.4
2023	3.15	14

Data: CHKS
Description: Average (mean) length of stay combining all 24 adult Neurosurgical centres and differentiating between elective and emergency admissions.
Date range: 1 January 2019 - 31 December 2023.

Further analysis using the 12 month rolling trend of length of stay, provided by Model Hospital (Figure 4) shows a declining emergency LOS from 2020-2021, however, this has subsequently continued to rise through 2023. Potential causes for this continued increase may be increased patient complexity, access to social care, repatriation difficulties, and less efficient clinical teams owing to sickness or burnout.

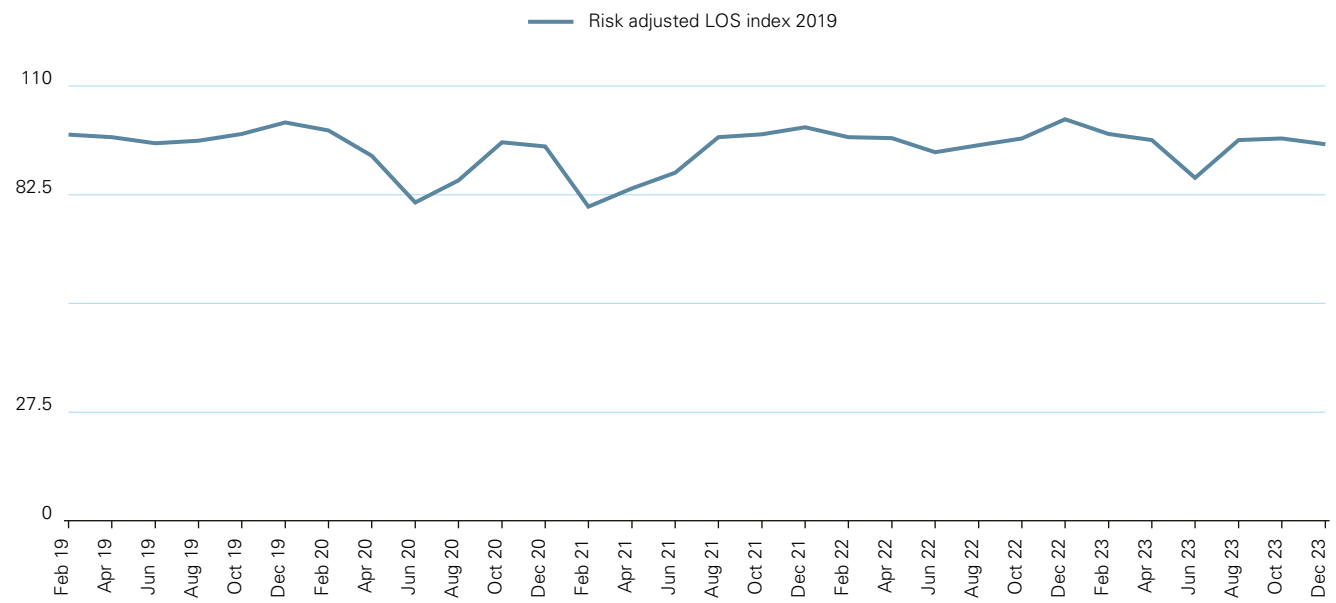
Figure 3: Rolling monthly median length of stay for all Neurosurgical admissions.



Data: Model Hospital
Description: Length of stay using total bed days as numerator and total spells as denominator across Neurosurgical Trusts.
Date range: 1 March 2020 - 1 March 2023

To investigate this further, it is possible to risk-adjust for case complexity and patient co-morbidities. When adjusted in this way, the length of stay does not rebound above historic rates, which may suggest much of the current trend is to do with more co-morbid, higher acuity patients as it is to do with inpatient care, efficiency and repatriation trends. Indeed, the 2023 risk-adjusted length of stay remains similar to 2019, suggesting the wider efficiency efforts have indeed made some improvements.

Figure 4: Risk-adjusted length of stay rolling average.



Data: CHKS
Description: Index adjusting the length of stay for the complexity of the patient - total bed days for patient / total expected bed days for patient with a lower number being better.
Date range: 1 October 2019 - 31 December 2023.

This interpretation is supported by the Charlson Comorbidity indices (CCI) over the same period and shows a subtle shift to patients being more comorbid. The average age has also increased by 1 year. This is likely to reflect a secular trend, rather than a specific reaction to COVID.

Given that it is not possible to fundamentally alter the complexity and co-morbidities of patients offered neurosurgery without either routine pre-habilitation services or exclusion of co-morbid patients who would historically have been offered surgery, greater efficiency savings elsewhere become key in maintaining departmental flow and reducing length of stay.

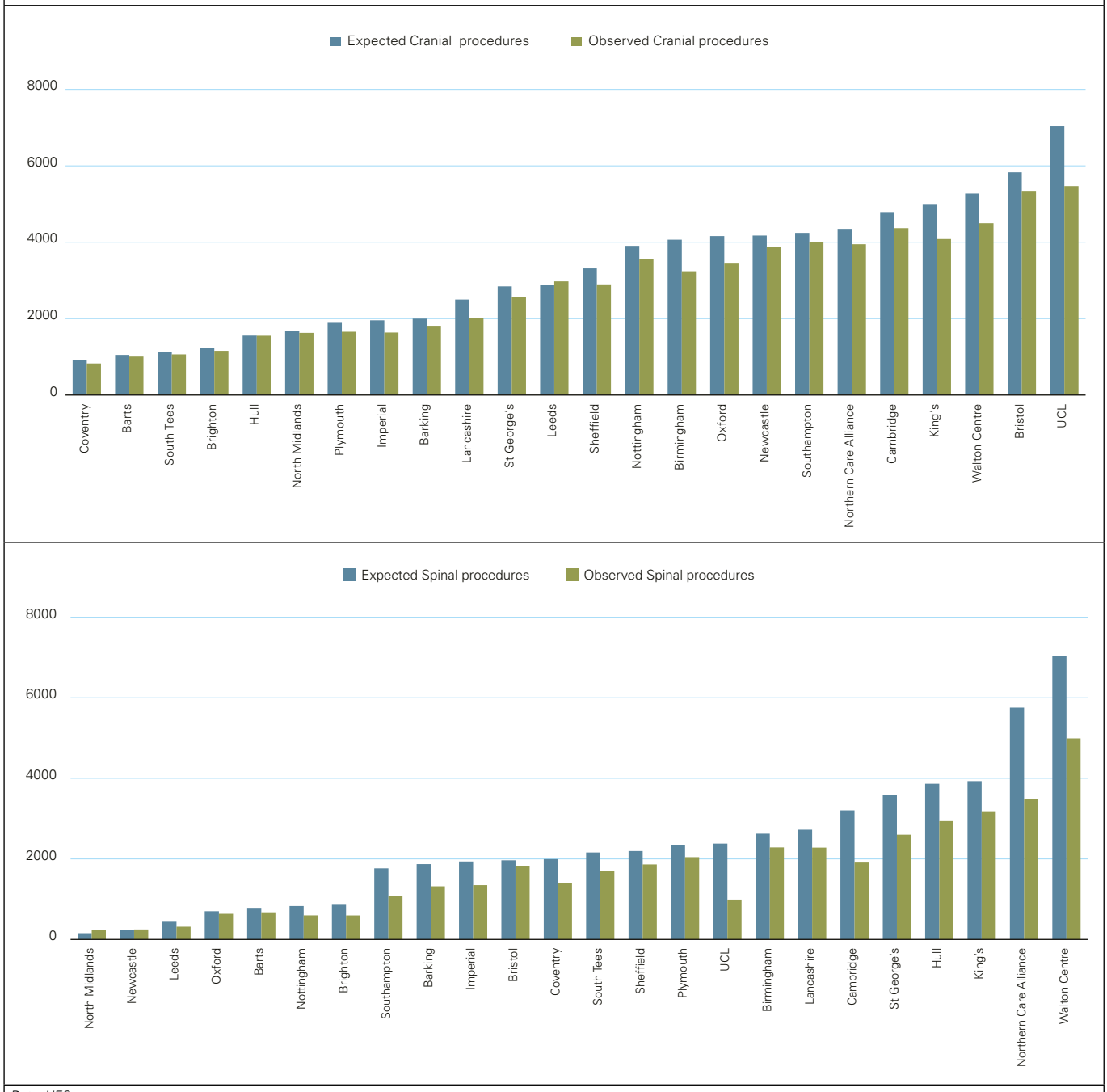
Table 3: Average Charlson Comorbidity score and average age of adult Neurosurgical patients across adult Neurosurgical centres in England.

Year	Average Charlson Score	Average age
2019	3	55
2020	3.3	55
2021	3.4	55
2022	3.4	56
2023	3.4	56

Description: Charlson comorbidity index provides a crude assessment of how sick a patient is by allocating a higher score for the more comorbidities they possess.Average age is worked out by adding up total ages and dividing by total spells.
Date range: 1 January 2019 - 31 December 2023

Post-pandemic recovery in Elective Care

Figure 5a & b: Two bar charts showing the number of Cranial and Spinal Elective cases performed at the 24 centres since 2019.



Data: HES

Description: The year of 2019 was used as the index year and expected cases were calculated using the number of cases performed at each centre in this the last pre-COVID 19 year. Number includes total spells with an associated Neurosurgical procedure as defined by the NNAP OPCS Framework.

Date range: 1 January 2019 - 31 December 2023.

As is clear from the above data, elective care recovery is proving deeply challenging. In 2023, cranial elective activity was only at **94%** of 2019 activity, and Spinal elective activity was lower still, at **72%**. Given our post pandemic activity remains below our baseline 2019 output, it is highly likely that we were still contributing to our elective deficit throughout 2023, rather than recovering.

This is a frank demonstration of the size of challenge in the current climate that is required to surpass 2019 activity in order to address both the current backlog and the increasing volume of new referrals. It is likely that this will require novel processes across all parts of the patient pathway and rapid sharing of the learning from successful initiatives, both underpinned with robust ways of monitoring efficiency.

Understanding and Improving Efficiency

Theatre utilisation:

Model Hospital can help provide insights into system improvements that might assist Trusts to tackle the backlog. One such example is exploring the metrics around efficient theatre utilisation.

Table 5: Metrics of theatre efficiency grouped by financial year.				
	19/20	20/21	21/22	22/23
Capped theatre utilisation %	56%	73.80%	72.10%	75.70%
Average late start (minutes)	62	37	40	36
Additional capacity as % current activity	45%	20%	24%	17%

Data: Model Hospital

Description: Capped theatre utilisation describes the amount of productive time use only including the hours the list was supposed to run over. Average late start describes how many minutes on average a theatre list started late. Additional capacity as a % of current activity is how many more operations could potentially be completed if the system was working at maximum efficiency.

Date range: 1 April 2019 - 31 March 2023.

Table 5 demonstrates different metrics that can be used to describe theatre efficiency. It appears clear from this that there have been improvements in these metrics since the nadir of the COVID-19 pandemic, however there are further challenges to address. GIRFT has set a target for Integrated Care Systems and providers to achieve 85% theatre touchtime utilisation by 2024/25, and thus we remain quite some distance from that goal.

However, a recent article in the British Journal of Anaesthesia criticised the theatre efficiency metrics used in Model Hospital [https://www.bjanaesthesia.org.uk/article/S0007-0912(23)00179-4/pdf]. An illustrative example is that **"Average late start"** only includes those lists when the start time was late.

Whilst there is no argument that the efficient use of theatre capacity is critical, it is equally important that the data used to drive these targets, and to which Trusts are held accountable, are accurate and mathematically sound.

Key issues:

1. Cranial and Spinal activity at 94% and 72% of 2019 levels respectively.
2. Current estimates suggest return to pre-COVID 19 pandemic levels of activity in 2026.
3. Current Neurosurgical operative spell deficit of 20,000 from 2020-2023.

Elective Surgery

Admission on day of surgery

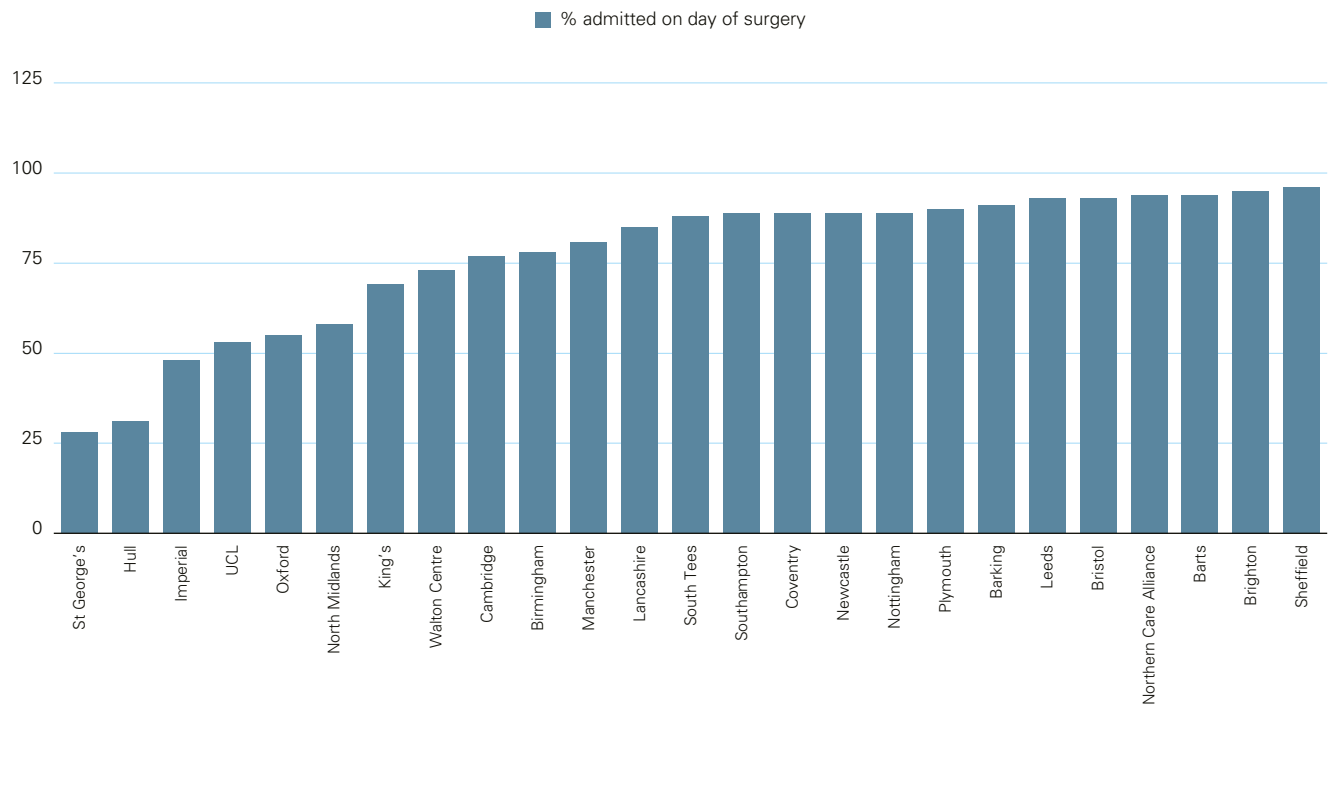
One area that helps significantly with bed management and patient turnover is admission on the day of surgery. This is a relatively robust metric and shows improvement in latter years as compared to the pre-pandemic baseline.

Table 6a: Percentage of patients admitted on the day of their surgery per financial year.				
	2019/20	2020/21	2021/22	2022/23
Surgery on day of admission % (Neurosurgery)	73.90%	62.30%	82.70%	79%

Data: Model Hospital
Description: This describes the average percentage of total Neurosurgical elective cases that are admitted on the day of surgery expressed as a percentage.
Date range: 1 April 2019 - 31 March 2023.

The following graph shows data captured by Model Hospital with respect to surgery on the day of admission. The majority of centres achieve over 75%, however, Hull, St George's Hospital and Imperial are conspicuous as having rates of less than 50%.

Figure 6: Bar chart showing admission on day of procedure for elective cases at each individual Neurosurgical centre.



Data: CHKS
Description: This provides 6 month data capture showing the percentage of admissions on the day of surgery for elective Neurosurgical procedures split by provider.
Date range: 1 January - 31 July 2023.

Day case rates

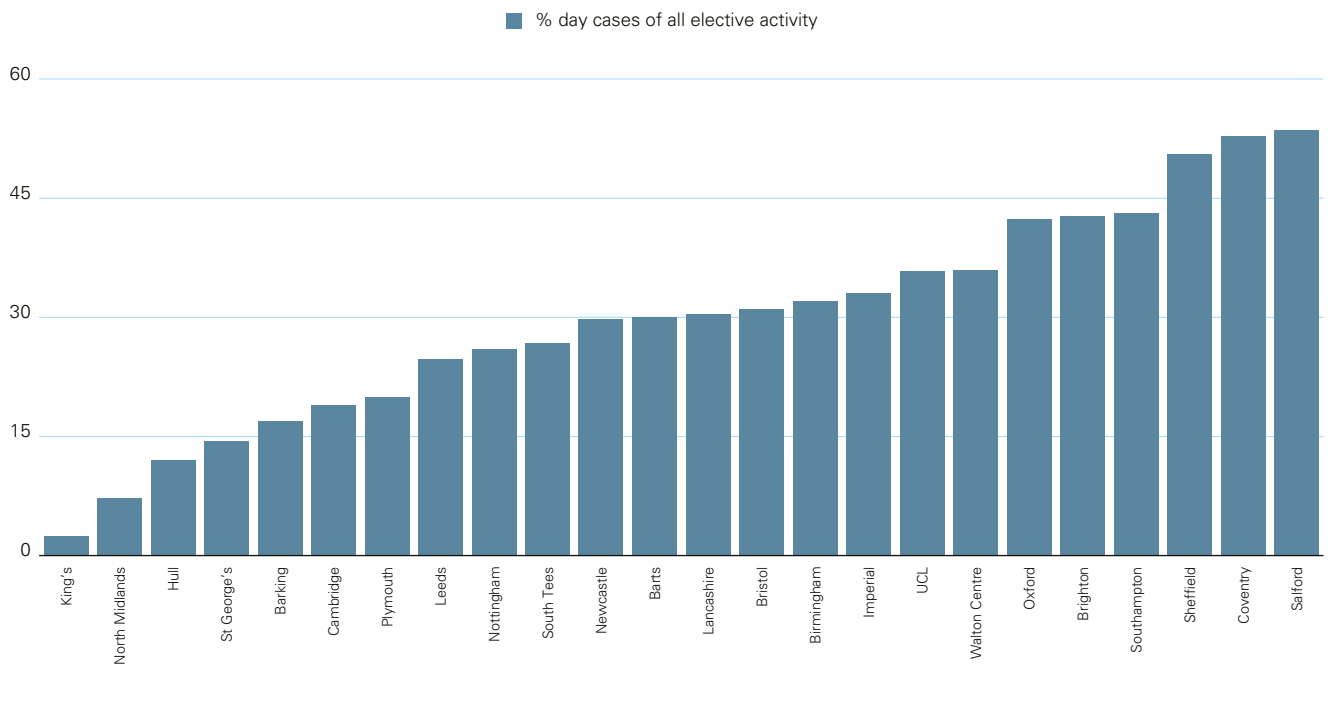
The rates of day case surgery are more challenging to interpret. The following bar chart from Model Hospital demonstrates a significant variability in the percentage of day cases at different hospitals. However, Model Hospital data is of limited utility as there is no risk adjustment for case-mix, case complexity or patient comorbidities. Therefore national expertise in a particular field, such as Stereotactic Radiosurgery may bias some units to large volumes of day surgery cases.

Table 6b: Percentage of total elective cases that are day cases and percentage of patients admitted on the day of their surgery per financial year.

	2019/20	2020/21	2021/22	2022/23
Day case as a % elective cases (Neurosurgery)	25.90%	23.90%	30.10%	34.90%

Data: Model Hospital
Description: This describes the average percentage of total Neurosurgical elective cases that are day cases expressed as a percentage.
Date range: 1 April 2019 - 31 March 2023.

Figure 7: Bar chart showing day cases as a percentage of total elective cases for individual centres.



Data: CHKS
Description: This provides 6 month data capture of the percentage of all elective surgery that were day cases.
Date range 1 January - 31 July 2023

A more considered way to assess day case surgery is to limit the dataset to only those procedures considered by the Neurosciences Transformation Programme to be deliverable as day case. These procedures are in the below table, and case studies demonstrate where this is working well.

Appendix 1: Day case procedures & biopsy groupings & codes used in analysis		
	Procedure Group	Inpatient Spell Primary Procedure
Group 1	Arteriography of cerebral artery	L352: Arteriography of cerebral artery
Group 2	Biopsy of lesion/Meninges of brain or cranium	A041: Open biopsy of lession of tissue of frontal lobe of brain
	Biopsy of lesion/Meninges of brain or cranium	A042: Open biopsy of lesion of tissue of temporal lobe of brain
	Biopsy of lesion/Meninges of brain or cranium	A043: Open biopsy of lesion of tissue of parietal lobe of brain
	Biopsy of lesion/Meninges of brain or cranium	A044: Open biopsy of lesion of tissue of occipital lobe of brain
	Biopsy of lesion/Meninges of brain or cranium	A045: Open biopsy of lesion of tissue of cerebellum
	Biopsy of lesion/Meninges of brain or cranium	A046: Open biopsy of lesion of tissue of brain stem
	Biopsy of lesion/Meninges of brain or cranium	A048: Other specified open biopsy of lesion of tissue of brain
	Biopsy of lesion/Meninges of brain or cranium	A049: Unspecified open biopsy of lesion of tissue of brain
	Biopsy of lesion/Meninges of brain or cranium	A081: Biopsy of lesion of tissue of frontal lobe of brain NEC
	Biopsy of lesion/Meninges of brain or cranium	A422: Biopsy of lesion of meninges of brain
	Biopsy of lesion/Meninges of brain or cranium	A082: Biopsy of lesion of tissue of temporal lobe of brain NEC
	Biopsy of lesion/Meninges of brain or cranium	A083: Biopsy of lesion of tissue of parietal lobe of brain NEC
	Biopsy of lesion/Meninges of brain or cranium	A084: Biopsy of lesion of tissue of occipital lobe of brain NEC
	Biopsy of lesion/Meninges of brain or cranium	A085: Biopsy of lesion of tissue of cerebellum NEC
	Biopsy of lesion/Meninges of brain or cranium	A086: Biopsy of lesion of tissue of brain stem NEC
	Biopsy of lesion/Meninges of brain or cranium	A088: Other specified other biopsy of lesion of tissue of brain
	Biopsy of lesion/Meninges of brain or cranium	A089: Unspecified other biopsy of lesion of tissue of brain
	Biopsy of lesion/Meninges of brain or cranium	V052: Biopsy of lesion of cranium
Group 3	Biopsy of muscle or peripheral nerve	T811: Percutaneous biopsy of muscle
	Biopsy of muscle or peripheral nerve	T812: Biopsy of neuromuscular junction
	Biopsy of muscle or peripheral nerve	T813: Biopsy of lesion of muscle NEC
	Biopsy of muscle or peripheral nerve	T818: Other specified biopsy of muscle
	Biopsy of muscle or peripheral nerve	T819: Unspecified biopsy of muscle
Group 4	Intracranial destruction of trigeminal nerve	A365: Denervation of trigeminal nerve (v)
	Inrtracranial destruction of trigeminal nerve	Radiofrequency controlled thermal destruction of peripheral nerve
	Inrtracranial destruction of trigeminal nerve	A263: Intracranial destruction of trigeminal nerve (v)
	Inrtracranial destruction of trigeminal nerve	A281: Extracranial transection of trigeminal nerve (v) NEC
Group 5	Operations on spinal nerve root or peripheral nerve or epidural injection	A577: Injection of therapeutic substance around spinal nerve root
	Operations on spinal nerve root or peripheral nerve or epidural injection	A735: Injection of therapeutic subtance around peripheral nerve
	Operations on spinal nerve root or peripheral nerve or epidural injection	A521: Therapeutic lumbar epidural injection
	Operations on spinal nerve root or peripheral nerve or epidural injection	A522: Therapeutic sacral epidural injection
Group 6	Spinal puncture, Neurostimulation of brain or cranial nerve, Operation on spinal cord	A332: Maintenance of neurostimulator in cranial nerve
	Spinal puncture, Neurostimulation of brain or cranial nerve, Operation on spinal cord	A483: Insertion of neurostimulator adjacent to spinal cord
	Spinal puncture, Neurostimulation of brain or cranial nerve, Operation on spinal cord	A544: Attention to intrathecal drug delivery device adjacent to spinal cord
	Spinal puncture, Neurostimulation of brain or cranial nerve, Operation on spinal cord	A484: Attention to neurostimulator adjacent to spinal cord NEC
	Spinal puncture, Neurostimulation of brain or cranial nerve, Operation on spinal cord	A487: Insertion of neurostimulator electrodes into the spinal cord
	Spinal puncture, Neurostimulation of brain or cranial nerve, Operation on spinal cord	A092: Maintenance of neurostimulator in brain

Case study 1: Day-case Image-guided biopsy for brain tumours in Southampton

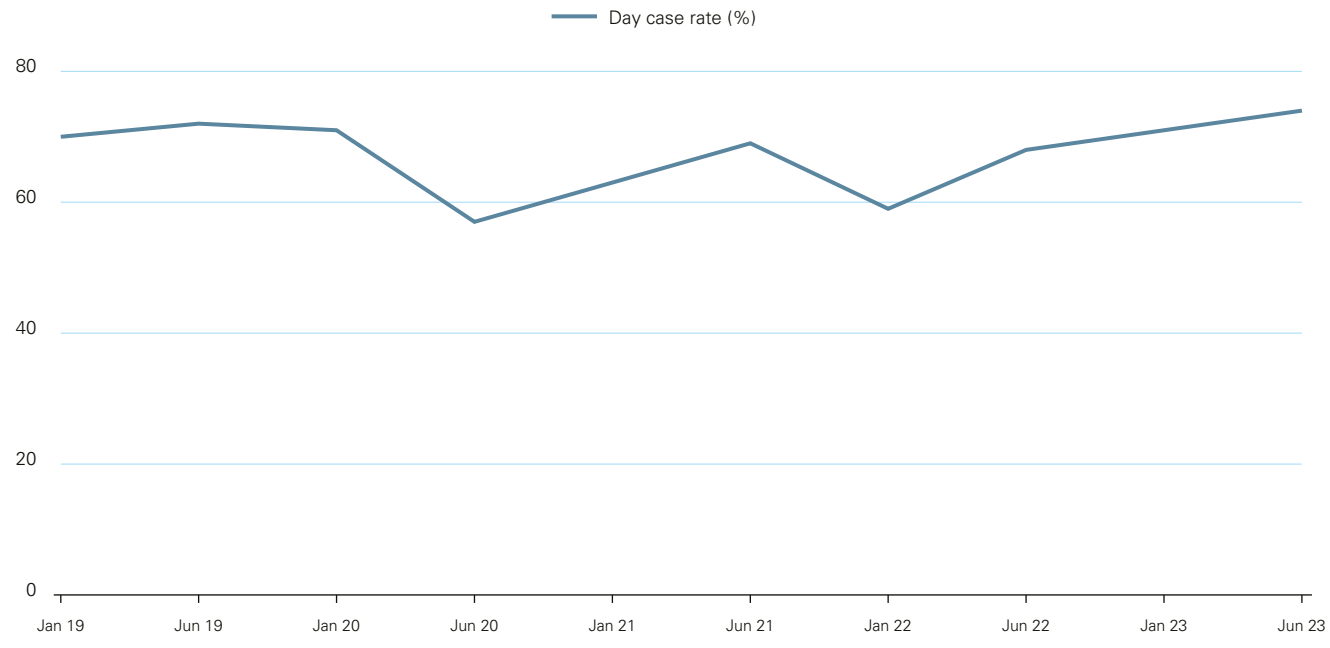
In the United Kingdom widespread adoption of day-case image-guided biopsy (DIB) for brain tumour has not occurred. To qualify for DIB patients are selected in the outpatient clinic and day-case is defined as arriving and being discharged from hospital on the same day. Discharge is allowed providing patients have no new neurology, are ambulant, have eaten, drunk passed urine, and have no significant pathology on their 4-hour postoperative CT head (CTH). University Hospital Southampton now has over 15 years of experience with this protocol.

They presented their findings over a 10 year period (October 2006 - March 2016) and performed 355 DIB in this period. 92% (327/355) of patients were successfully discharged within 6 hours of the procedure. Only 2% (8/355) were subsequently readmitted within a 2 week period.

DIB surgery with close clinical and radiological surveillance is well-tolerated, safe and feasible. Given the need for centres to increase the number of day case procedures this presents an opportunity for other units to increase their capacity.

In our further analysis in the trends of adoption of the NHSE recommendations, we have excluded 'non-operative' cases (groups 1 and 4) and the resulting rolling monthly trend and distribution for 2023 is as follows.

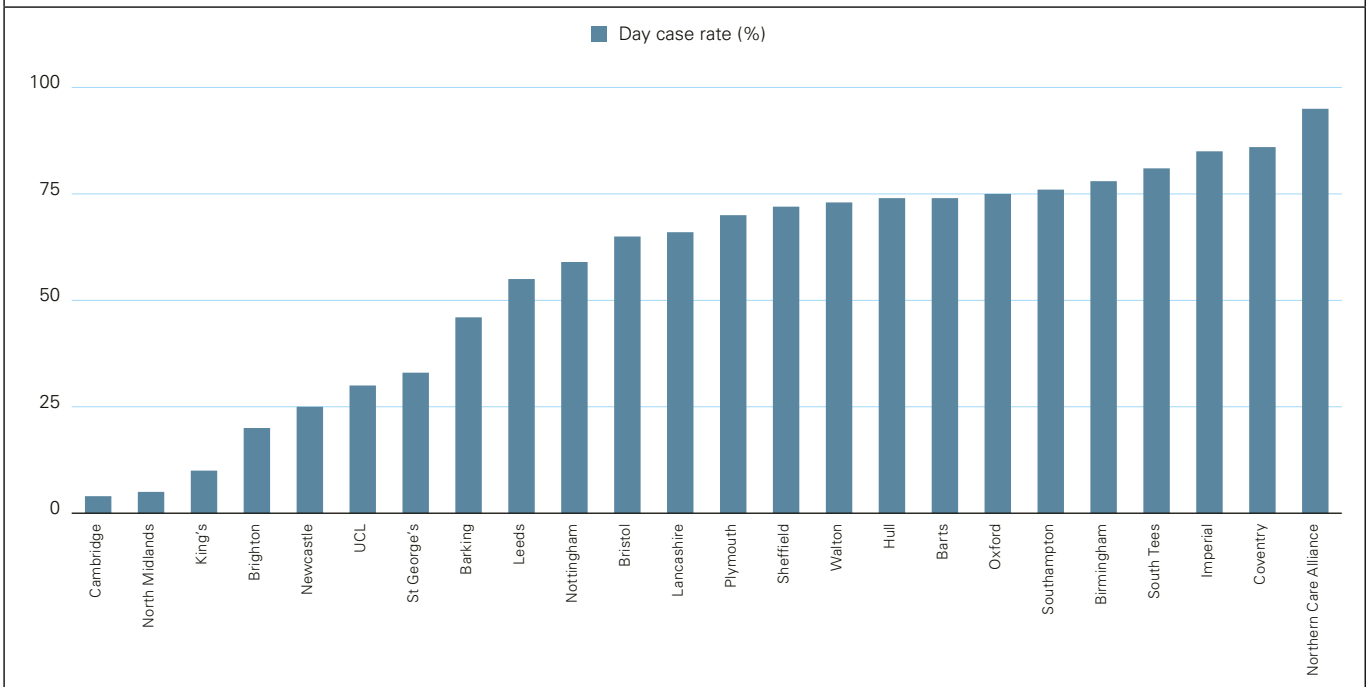
Figure 8: Line graph showing average day case rate at 6 monthly intervals.



Data: HES
Description: This demonstrates the average day case rates in the 24 Neurosurgical adult centres in England over the last 5 years. It demonstrates that there has not been a significant change over this period.
Date range 1 January 2019 - 30 June 2023

Whilst there has been a steady trend in increasing day case rates following the pandemic, there has not been the major shift in efficiency that would be desirable. The variation of day case rates for these procedures across Trusts is significant. This may suggest an opportunity for some centres to significantly increase bed capacity by moving to a daycase model for these procedures.

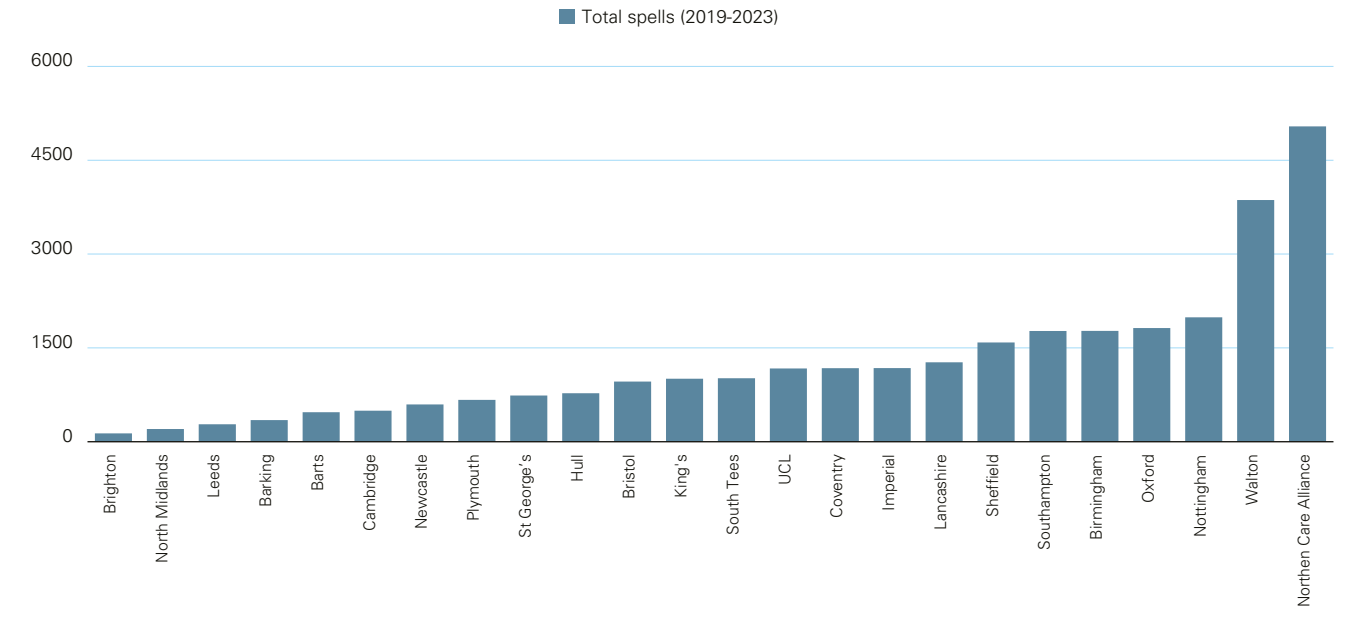
Figure 9: Bar chart showing day cases as a percentage of total elective cases considered deliverable as day cases by the Neurosciences Transformation Programme for individual centres.



Data: HES
Description: This shows the average day case rates for the procedures shown in Appendix 1 at each individual adult Neurosurgical centre in England.
Date range 2019-2023

However, a further complication is the even wider distribution of total spell data for this case selection. The following graph demonstrates how the Northern Care Alliance and The Walton Centre perform over double the number of these procedures of the next busiest centre.

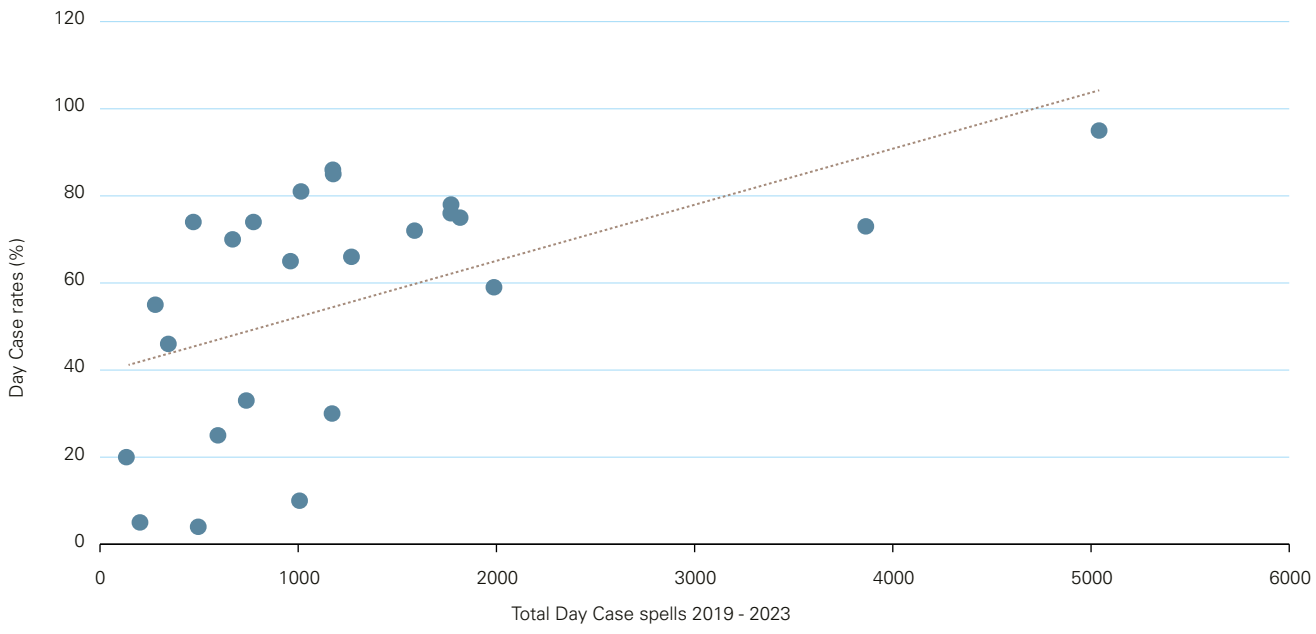
Figure 10: Bar chart showing the number of spells at each centre for the operative day case procedures shown in Appendix 1.



Data: HES
Description: This graph demonstrates that there is a significant difference in volume of day case procedures occurring in different Neurosurgical centres in England.
Date range 2019-2023

Indeed, if we plot the day case rates against the number of spells there is a faintly positive correlation, but with two notable outliers skewing the data.

Figure 11: Scatter diagram plotting the total number of spells against the day case rate for each centre.



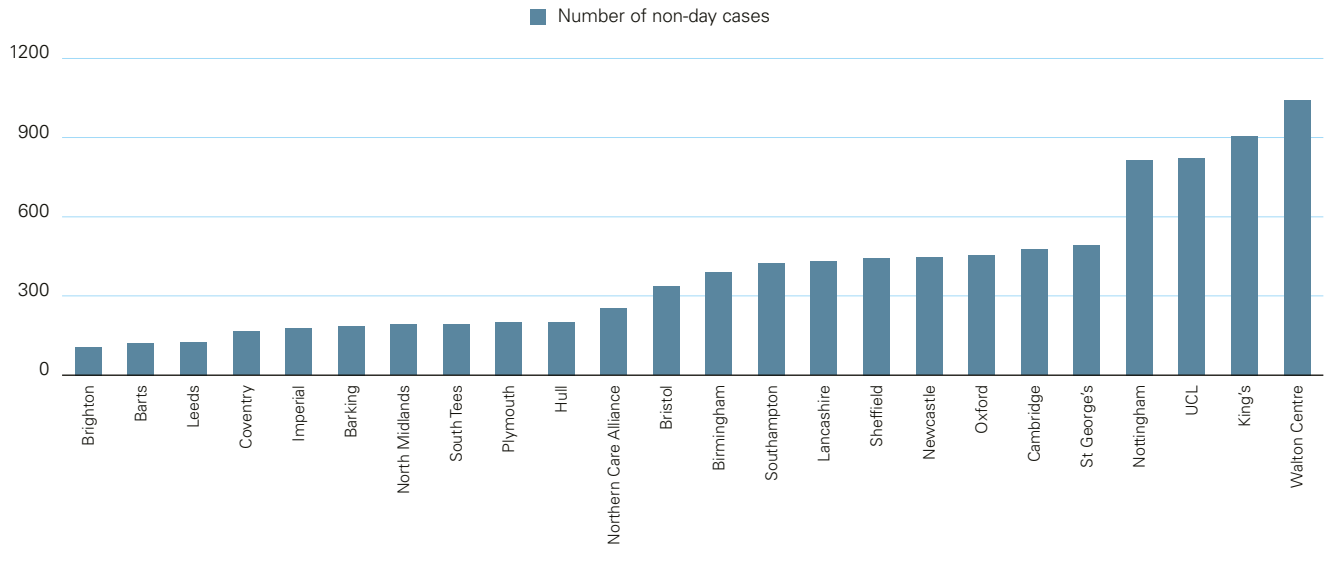
Data: HES

Description: This graph demonstrates that there is a positive correlation between the total number of cases performed and the day case rate with 2 significant outliers. This may suggest that simple procedures such as nerve root injections may make up a higher percentage of the procedures of high volume centres.

Date range 2019-2023

Another way of assessing this domain is looking at the number of cases that could be performed as a day case that are not currently being delivered by individual centres. This provides an understanding of future opportunities for efficiency savings.

Figure 12: Bar chart showing the number of cases that are coded as day cases in Appendix 1 that required a longer length of stay.



Data: HES

Description: This graph shows the number of total spells of day case groups 2,3,5 &6 that have the potential to be turned into day cases at each adult Neurosurgical centre in England.

Date range 2019-2023

Case study 2: Spine Awake Surgery in Oxford

Spinal Awake Surgery (SAS) The Oxford Protocol offers the first protocolised pathway that aims to train bespoke teams performing spine awake surgeries safely, efficiently and in a standardised and repeatable fashion.

SAS is relatively new. It aims to achieve faster recovery times, better outcomes, and a lesser economic impact on society. The scope of procedures available under SAS range from lumbar decompressions, discectomies, instrumented procedures and functional spinal neurosurgery.

At the time of publication of the protocol 10 patients had undergone the procedure. The age range of our patients was 46–84 years. There were 3 discectomies and 7 central canal stenosis decompressions. Eight patients were discharged on the same day whilst 2 stayed overnight (one due to anxiety, another due to a TIA). All patients gave positive feedback about their experience of SAS.

A cost saving of £84,800 was made compared to a general anaesthetic overnight stay across the group. No on day cancellations occurred due to lack of bed availability. No patient needed analgesia in the recovery room or needed additional analgesia over and above the SAS e-prescription take home package.

As elective surgical practice is trying to resume in the NHS, spinal practice is being affected, as for other specialties, in the management of its elective surgery lists counteracted by an increase of urgent referrals that we think represents a symptom of the case backlog that has been accumulated. Elective spine cases have decreased, as compared to the pre pandemic age and the necessity to reinstate such lists, in order to buffer the current backlog, is of paramount importance. The cost of reinstating elective surgery after the emergency is estimated to be high and under these circumstances, SAS could bring an important contribution to the different health systems around the world.

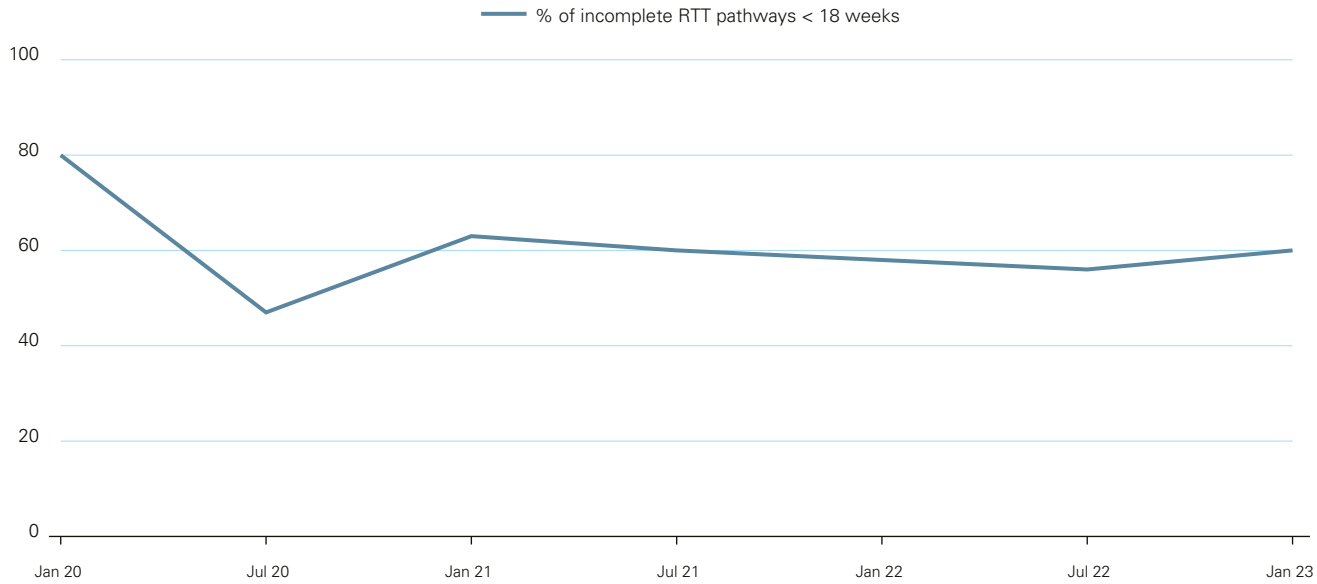
The UK waiting list backlog will require creative solutions to improve efficiency of care. We have detailed some examples of this as well as a novel way of measuring day case rates. Further collaboration will help us to meet the challenge that the backlog poses.

Responding to GIRFT

The Getting it Right First Time cranial and spinal programmes seek to investigate unwanted variations in performance and address these as a means of quality improvement. These were developed pre-pandemic and therefore the ability to achieve success has inevitably been stymied by this. However, we reflect upon some of the areas of GIRFT focus below.

Accelerate the referral to treatment time for all patients identified as in need of cranial neurosurgery

Figure 13: Line graph plotting the percentage of incomplete referral to treatment pathways that should be commenced within 18 weeks at Neurosurgical adult centres reporting data to Model Hospital.



Data: Model Hospital

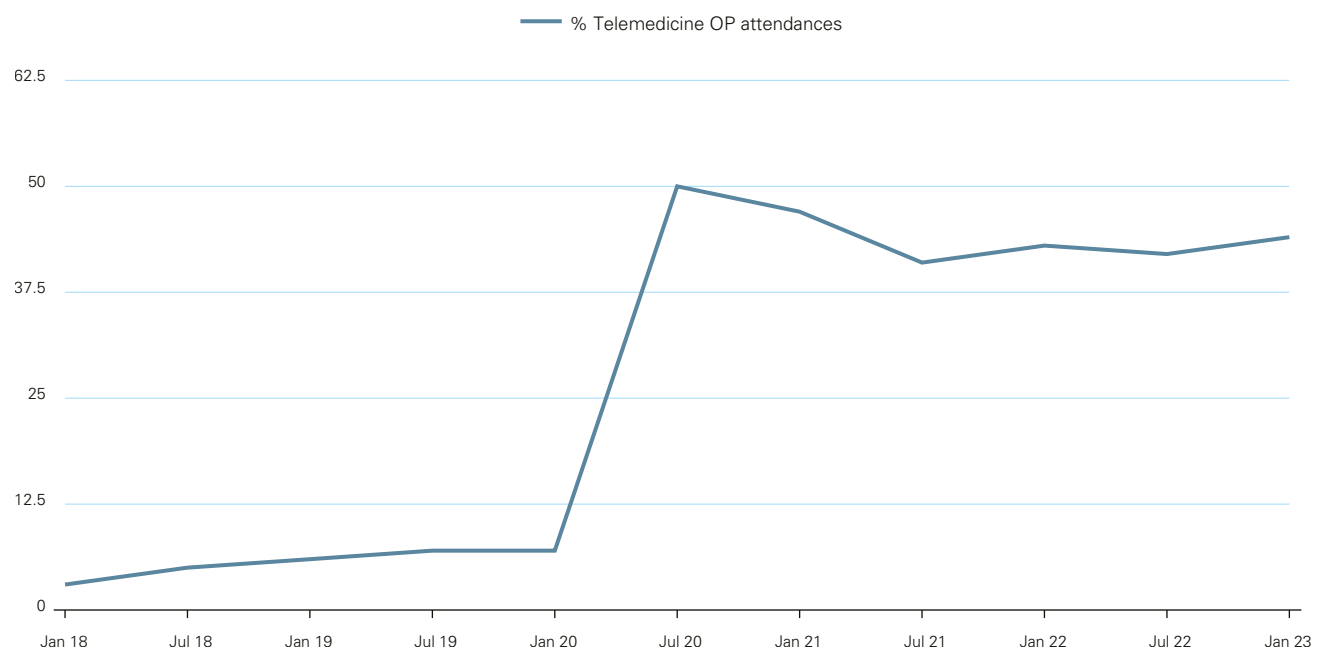
Description: The plot shows the number of incomplete pathways for referral to treatment that should be completed by 18 weeks coming down but remaining stable at around 60% on average for all adult Neurosurgical centres.

Date range: January 2020 - January 2023

The number of patients waiting greater than 18 weeks for completion of their pathway from referral point remains 20% higher than pre-COVID 19 pandemic.

Improve outpatient efficiency through greater use of non-consultant and non face to face outpatient appointments

Figure 14: Line graph showing the average percentage of outpatient appointments across all adult Neurosurgical centres reporting to Model Hospital that are not performed face-to-face.



Data: Model Hospital

Description: The plot shows a dramatic rise in the use of telemedicine for Neurosurgical outpatient appointments brought about by the COVID-19 pandemic. These levels have broadly been maintained since then.

Date range: January 2018 - January 2023

Table 7: Table showing the percentage of outpatient appointments where the patient did not arrive broken down by whether they were face-to-face or utilising telemedicine.

	%Tele DNAs	% F2F DNAs
2019	5	95
2020	29	71
2021	36	64
2022	32	68

Data: CHKS

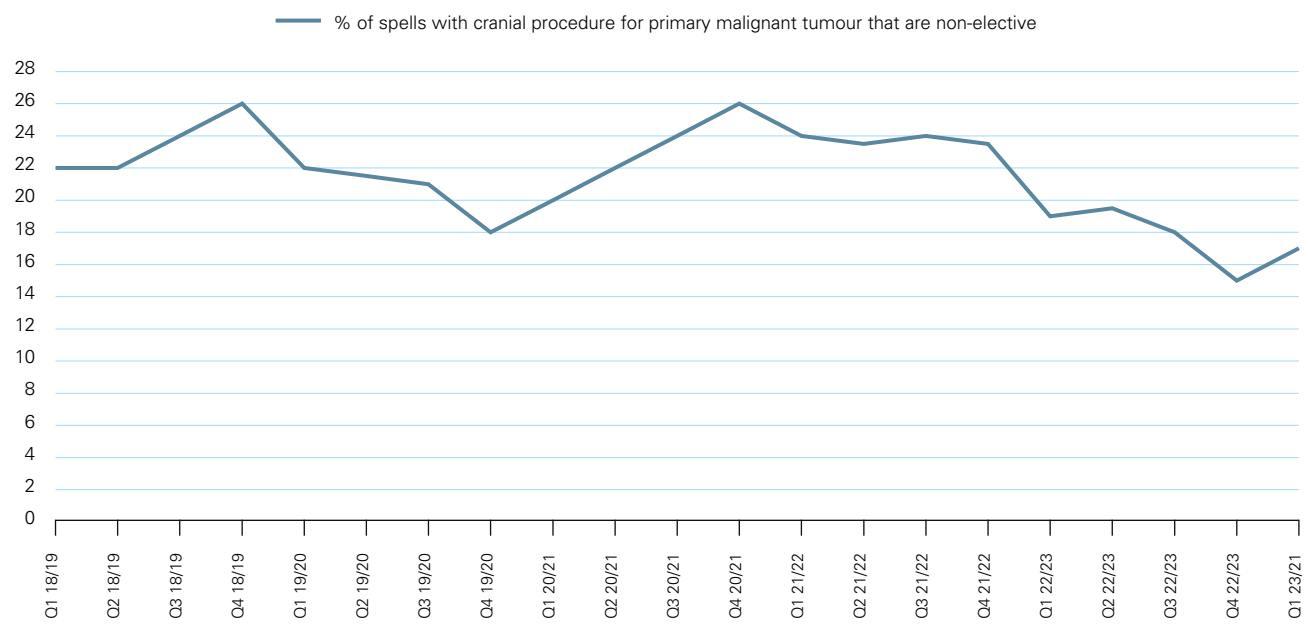
Description: This table shows that pre-COVID 19 Pandemic patients rarely missed telephone appointments, however, given they are now more prevalent they account for approximately 1/3rd of missed appointments.

Date range: January 2019 - December 2022

The COVID 19 pandemic provided an opportunity for the acceleration of the telemedicine approach and the number of Telemedicine outpatient appointments remains close to 50% whereas it was all but non-existent prior to the COVID-19 pandemic.

Reduce proportion of primary malignant brain cancer patients that are admitted via emergency/non-elective route

Figure 15: Line graph plotting the average percentage of spells in adult Neurosurgical centres for primary malignant tumours that are coded as emergency admissions.



Data: Model Hospital

Description: The graph demonstrates that over the period the percentage of emergency admissions for primary malignant brain tumours in UK adult Neurosurgical centres has dropped by approximately 10%.

Date range: April 2018 - March 2023

There have been improvements made with respect to the number of tumour patients being admitted on emergency pathways, which is down 4% between 2018-2023.

Key issues:

1. Surgery on day of admission at 79% up from 74% pre-COVID 19 pandemic.
2. Significant variability between Trusts in terms of % of surgeries suitable for day case being performed as a day case.
3. The number of patients waiting >18 weeks for completion of referral to treatment pathway up by 20% since pre-COVID 19 pandemic.

Recommendations:

1. Day of surgery admission is likely to become the default for all elective surgery, and robust preadmission processes should be put in place.
2. Day case surgery provides the opportunity for further bed day savings: dissemination of best practices from around the country can support this.
3. Remote outpatient review is likely to become an increasing part of neurosurgical practice. Units and specialty associations should define which parts of the patient pathway require face-to-face review.

Emergency Care

Using data from the electronic referral platform Referapatient for Southmead Hospital, Bristol and ORION for Addenbrooke's Hospital we demonstrate emerging patterns in referrals and emergency care.

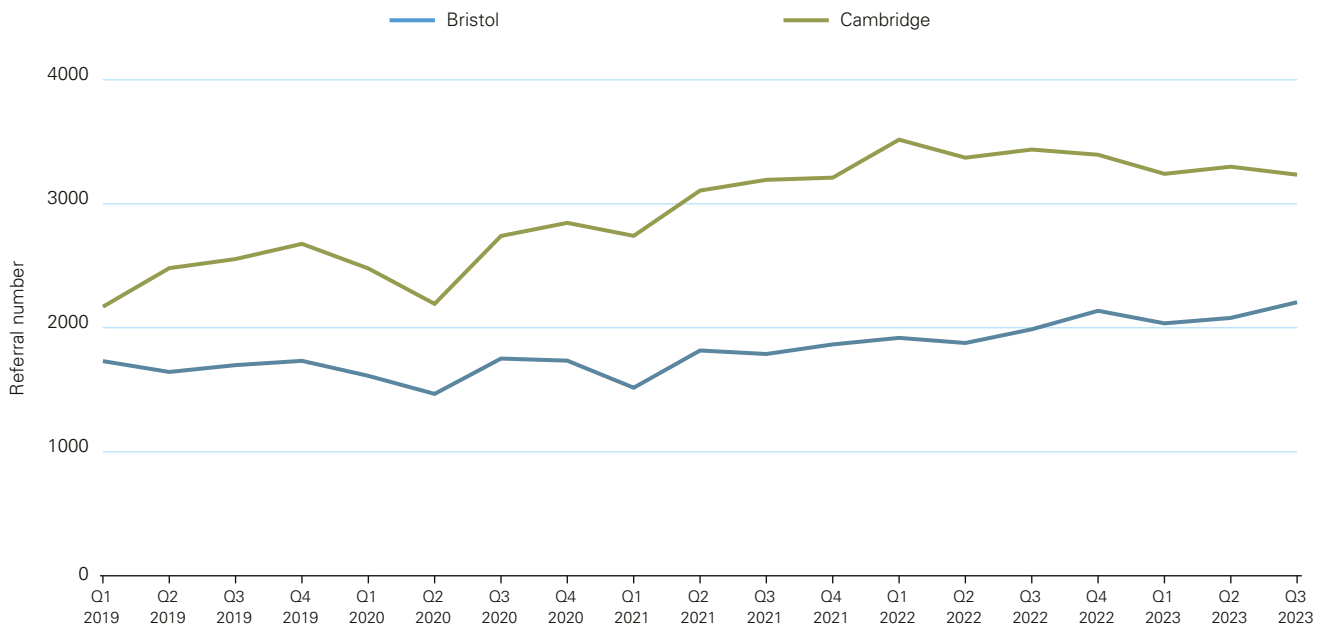
The two waves of the COVID-19 pandemic are visible in the 2019/20 data, with 15% percentage reduction in referrals during those periods. However, outside those periods, a steady and significant increase in referrals is noted. In this case study, as shown below, referrals have increased by approximately **27%** in Bristol and **49%** in Cambridge since 2019, far outstripping the increasing activity.

Increase in referrals since 2019:

Bristol **+27%** ↑

Cambridge **+49%** ↑

Figure 16: Line graph plotting number of referrals to Southmead Hospital and Addenbrookes Hospital adult Neurosurgical centres against time.

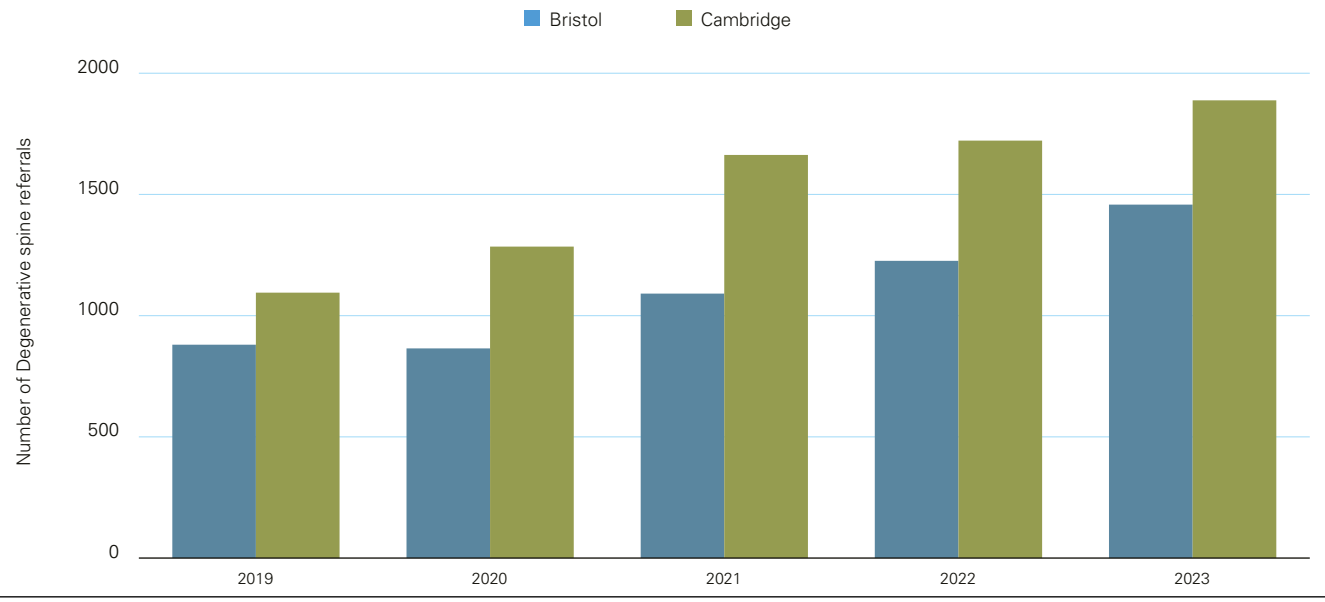


Data: ReferaPatient
Description: This shows the number of referrals received by Southmead Hospital and Cambridge University Hospital each quarter since Q1 of 2019.
Date range: January 2019 - September 2023

For example, in Emergency Medicine, there 2017/18 there were 23.8 million attendances in 2017/18 and in 2021/22 there were 24.4 million ED attendances, an increase of 2.5%. For GP appointments in 2017/18 there were 307 million GP appointments and 336.7 million in 2021/22 (NHS Digital), an increase of 9.4%.

The reasons for the dramatic increase in Neurosurgical referrals is unclear. One explanation for this may be the fact that elective spinal surgery is at 76% of pre-pandemic levels currently and these referrals may therefore spill into emergency work. There may also be an increasing tendency towards more risk averse referral behaviours within the NHS at large.

Figure 17: Bar chart showing the number of emergency referrals received for the pathology "Degenerative spine" per year at Southmead Hospital and CUH.



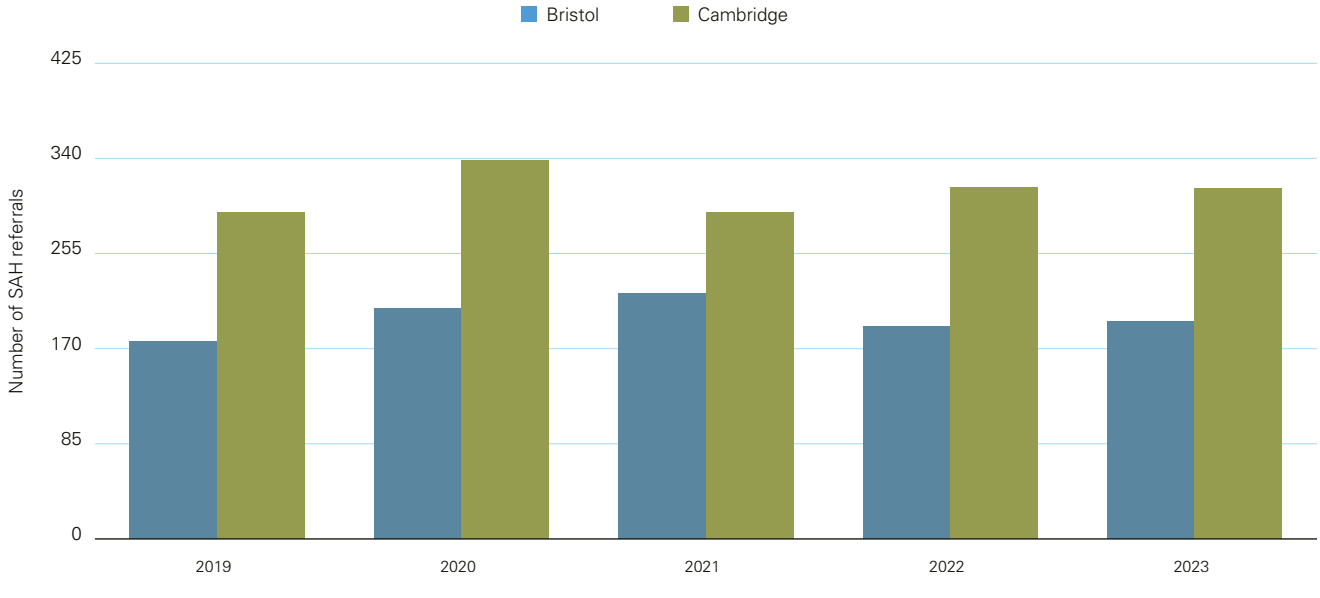
Data: ReferaPatient

Description: This shows the number of referrals received by Southmead Hospital and CUH each year since 2019 and is filtered for only "Degenerative spine" cases as entered by the referring clinician on the original referral.

Date range: 2019-2023

As demonstrated above, the number of degenerative spine referrals are rising year on year. Whereas the referral numbers for spontaneous subarachnoid haemorrhage in the same time period have remained stable.

Figure 18: Bar chart showing the number of referrals received for the pathology "Spontaneous Subarachnoid haemorrhage" per year at Southmead Hospital and CUH.



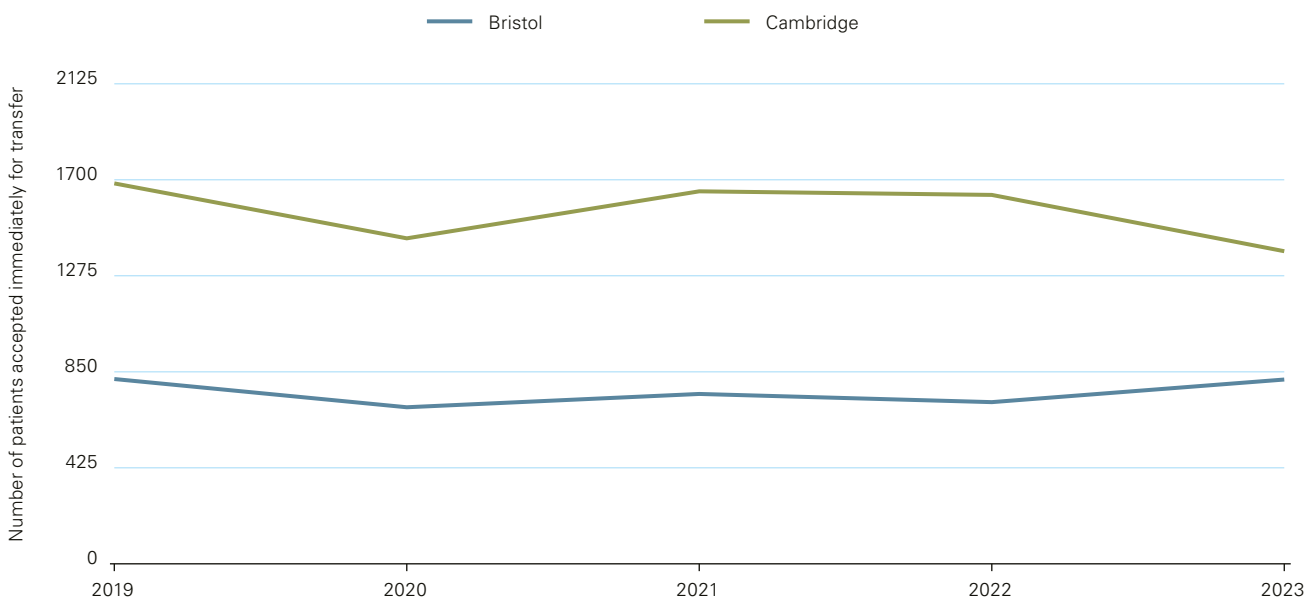
Data: ReferaPatient

Description: This shows the number of referrals received by Southmead Hospital and CUH each year since 2019 and is filtered for only "Spontaneous Subarachnoid haemorrhage" cases as entered by the Specialist receiving the original referral.

Date range: 2019-2023

We can also demonstrate that although the number of referrals is increasing, Neurosurgical centres are not accepting any more patients as emergencies.

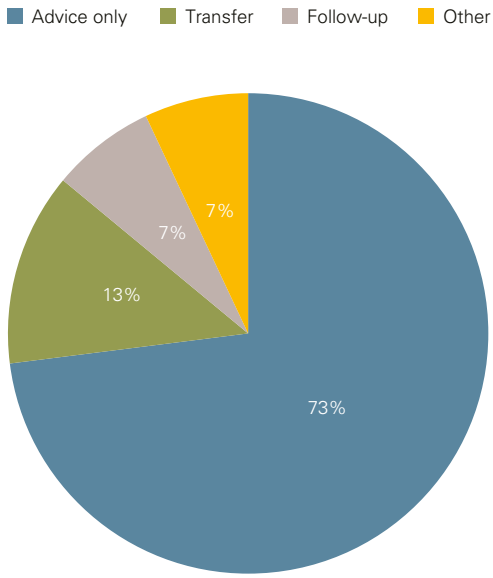
Figure 19: Line chart showing the number of male/female patients "accepted immediately" by Southmead Hospital and CUH adult Neurosurgical centres each year.



Data: ReferaPatient
Description: This shows the number of patients who are accepted immediately having been referred to Neurosurgery each year. It demonstrates that these numbers are broadly stable.
Date range: 2019-2023.

73% of all Neurosurgical referrals to Bristol and Cambridge result in "Advice only" with only 13% of referrals requiring acute admission.

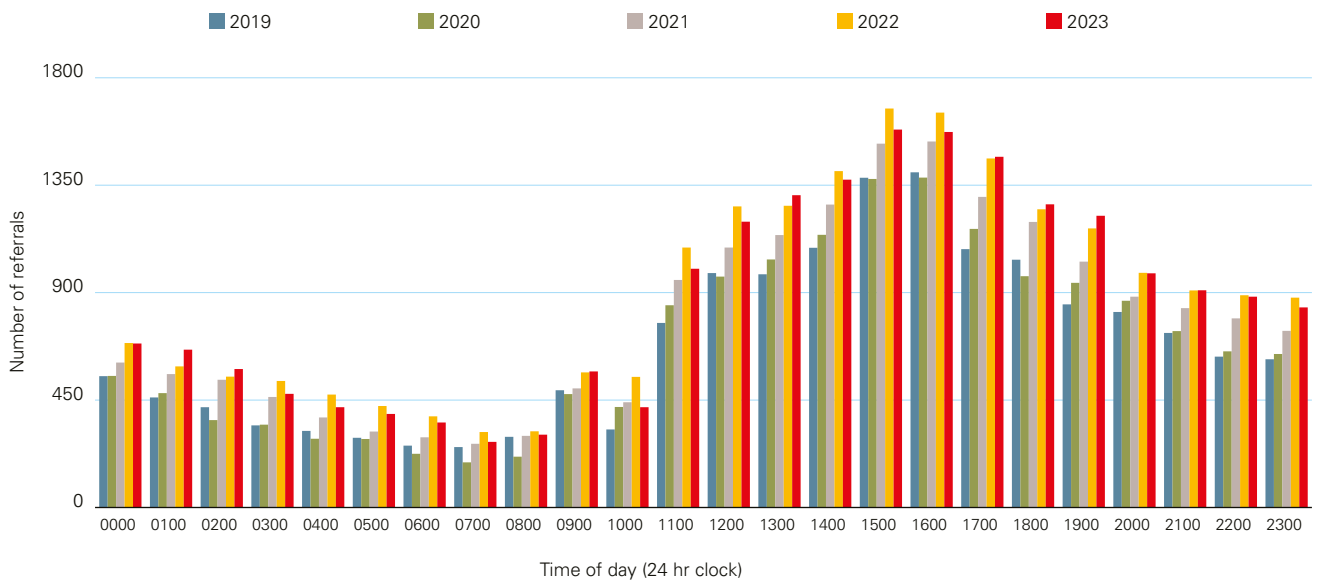
Figure 20: Pie chart showing the breakdown of outcomes to referrals made to Southmead Hospital and CUH adult Neurosurgical centres.



Data: ReferaPatient
Description: This shows the breakdown of referral outcomes and demonstrates that the majority of referrals result in only advice being given by the Specialist.
Date range: 2018 - 2023

In terms of when referrals are received, there is a predictable pattern as it becomes busier from 9am and peaks at around 4pm before getting gradually quieter throughout the night. The proportion of referrals at different hours of the day has remained relatively stable as demonstrated in the table below.

Figure 21: Bar chart plotting the number of referrals against hour of the day at Southmead Hospital and CUH adult Neurosurgical centres.



Data: ReferaPatient
Description: This shows the volume of referrals being made per hour of the day broken down by year.
Date range: 2019 - 2023

Table 8: Table demonstrating the proportion of referrals to the nearest percentage per hour of the day.

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
2019	3%	3%	3%	2%	2%	2%	2%	2%	2%	3%	2%	5%	6%	6%	7%	8%	9%	7%	6%	5%	5%	4%	4%	4%
2020	3%	3%	2%	2%	2%	2%	1%	1%	1%	3%	3%	5%	6%	6%	7%	8%	8%	7%	6%	6%	5%	4%	4%	4%
2021	3%	3%	3%	2%	2%	2%	2%	1%	2%	3%	2%	5%	6%	6%	7%	8%	8%	7%	6%	5%	5%	4%	4%	4%
2022	3%	3%	3%	2%	2%	2%	2%	1%	1%	3%	3%	5%	6%	6%	7%	8%	8%	7%	6%	5%	5%	4%	4%	4%
2023	3%	3%	3%	2%	2%	2%	2%	1%	1%	3%	2%	5%	6%	6%	7%	8%	8%	7%	6%	6%	5%	4%	4%	4%

Data: ReferaPatient
Description: This table demonstrates that the percentage of referrals received in a particular hour of the day has remained relatively stable over the last 5 years.
Date range: 2019 - 2023

Further work is needed in order to determine whether the experience of Bristol and Cambridge reflects the trends experienced by Neurosurgical units throughout the UK. However, the increase in emergency referrals and the volume that do not require Neurosurgical intervention appears to require attention. We have instigated a national audit to address whether these findings are reproduced across the UK.

Key issues:

1. Referral numbers have increased by approximately 35% since 2019.
2. The number of patients accepted as an emergency by Neurosurgical centres has not increased.
3. 73% of all Neurosurgical referrals received required "Advice only".

Recommendations:

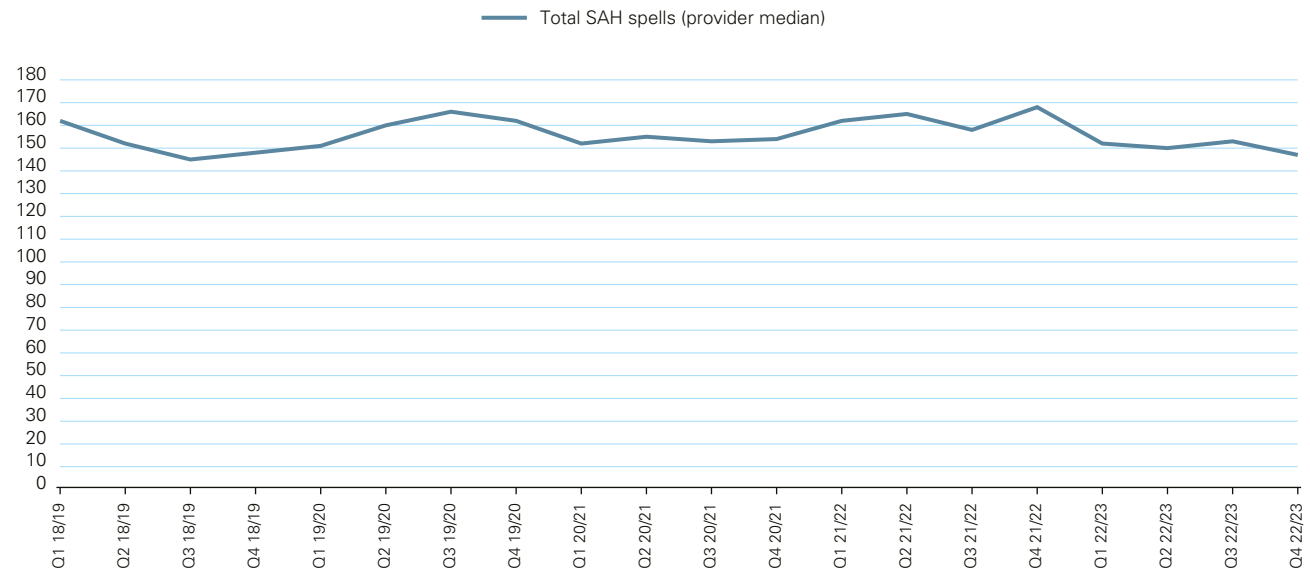
1. Regional networks should signpost local units to existing guidance on common neurosurgical referrals, to avoid unnecessary referrals to over-burdened on-call services.
2. On-call neurosurgical services should not be used as the first point-of-call for advice and guidance.
3. Further collaborative work needed to investigate national referral patterns given the findings from Bristol and Cambridge.

Subspecialty and Registry Focus

Subarachnoid haemorrhage

Although the Pandemic had an overall impact on case mix during the periods of lockdown, spontaneous subarachnoid haemorrhage rates appeared to remain stable throughout, as would be expected.

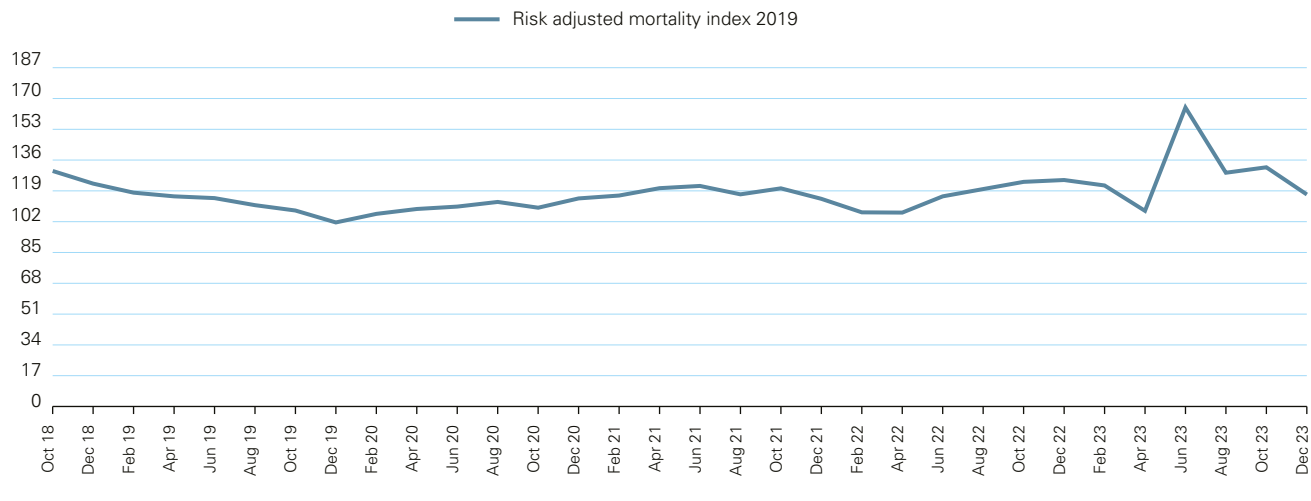
Figure 22: Line chart plotting the median number of spells of spontaneous subarachnoid haemorrhage patients across adult Neurosurgical centres against financial year quarter.



Data: CHKS
Description: The graph demonstrates the stability of spontaneous subarachnoid haemorrhage presentations across the UK throughout the time period.
Date range: April 2018 - March 2023

Reassuringly, the risk-adjusted mortality index over the same time period has also remained stable.

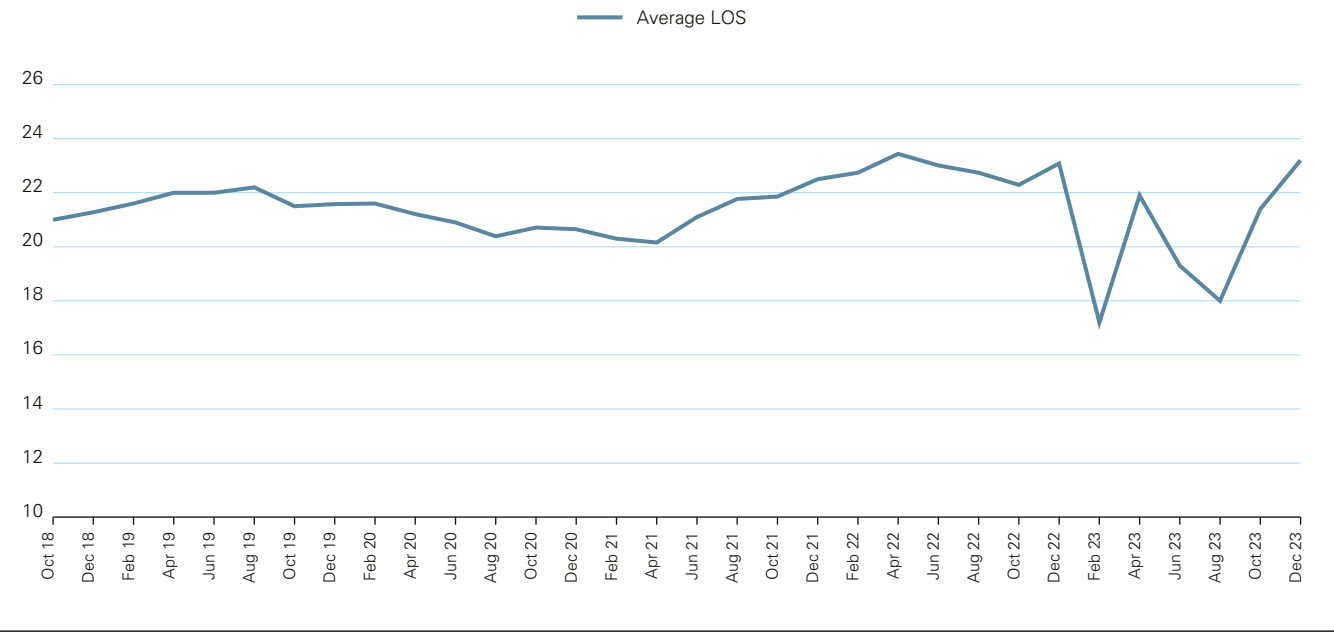
Figure 23: Line chart plotting the risk-adjusted mortality index for SAH patients in the UK against time.



Data: CHKS
Description: The graph demonstrates the stability of spontaneous subarachnoid haemorrhage presentations across the UK throughout the time period.
Date range: April 2018 - March 2023

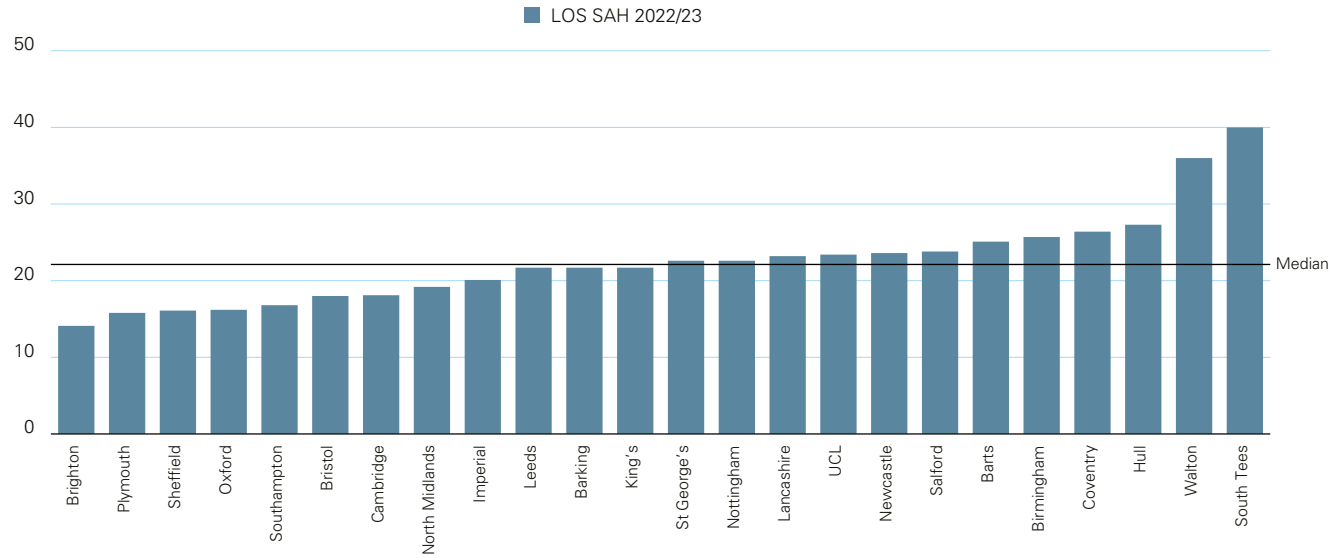
However, there was an increase in average LOS in keeping with other inpatient spells analysed, which has not yet returned to the pre-pandemic levels. Whilst this is only 2 days per patient spell it results in a total of 5550 national bed days per year.

Figure 24: Mean length of stay for SAH patients at adult Neurosurgical centres plotted against time.



Data: CHKS
Description: The graph demonstrates that the mean LOS has gone up over the time period in question.
Date range: October 2018 - December

Figure 25: Bar chart showing the mean LOS for SAH patients at each individual adult Neurosurgical centre.

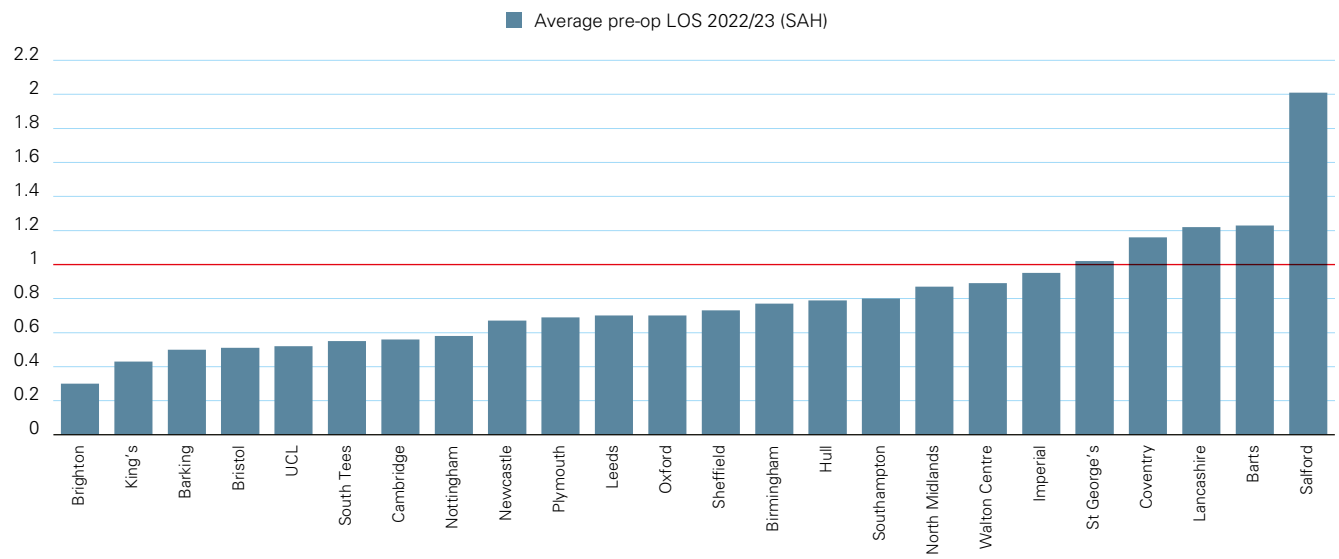


Data: CHKS
Description: The bar chart shows on average how long SAH patients stay at Neurosurgical centres for following admission.
Date range: January 2022 - December 2023

The above graph demonstrates the variability in length of stay between centres. Local policies regarding minimum LOS for SAH patients may have an impact on mean LOS as well as case mix and further work with respect to this could reveal a significant opportunity in terms of bed day savings.

In terms of the timely securing of aneurysms, which is paramount to effective emergency management of SAH, HES data demonstrates that in the years 2022/23 all but 5 centres performed an operative procedure within 24 hours of admission to Neurosurgical units. These figures must, however, be understood in context. This number does not describe what is happening on a patient level and indeed for those centres with an average close to 24 hours this would likely mean half of patients being treated after 24 hours at a Neurosurgical centre. This also does not incorporate transfer time and so may mean many patients are not treated until over 24 hours post-ictus. Also, for some patients the index procedure will be an external ventricular drain or other procedure to temporise the patient. This means again that time to secure the aneurysm may well be longer.

Figure 26: Bar chart showing the mean pre-operative LOS for SAH patients at each individual adult Neurosurgical centre.



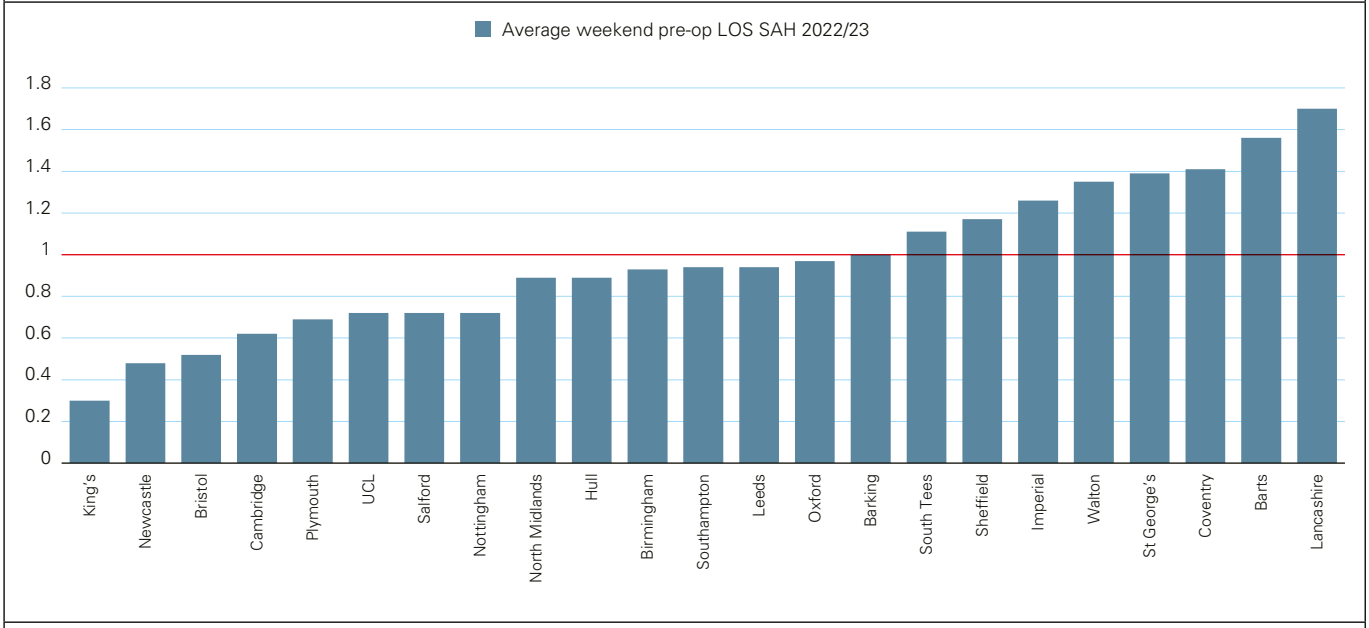
Data: CHKS

Description: The data shows the average amount of time from admission in the Neurosurgical centre before an operation is performed for patients that have a coiling or clipping procedure. These procedures could be an EVD or other operation as well as the securing of the aneurysm. This only includes patients that received definitive treatment.

Date range: January 2022 - December 2023

If we look at only weekend admissions, we see that a greater proportion of Trusts have an average pre-operative length of stay for coiling or clipping ruptured aneurysms that is over 24 hours. However, all centres perform their first operation well within 48 hours on average, in keeping with NCEPOD Nov 2013 [ManagingTheFlow_SummaryReport.pdf].

Figure 27: Bar chart showing the mean preoperative LOS for SAH patients at each individual adult Neurosurgical centre for patients admitted at the weekend.



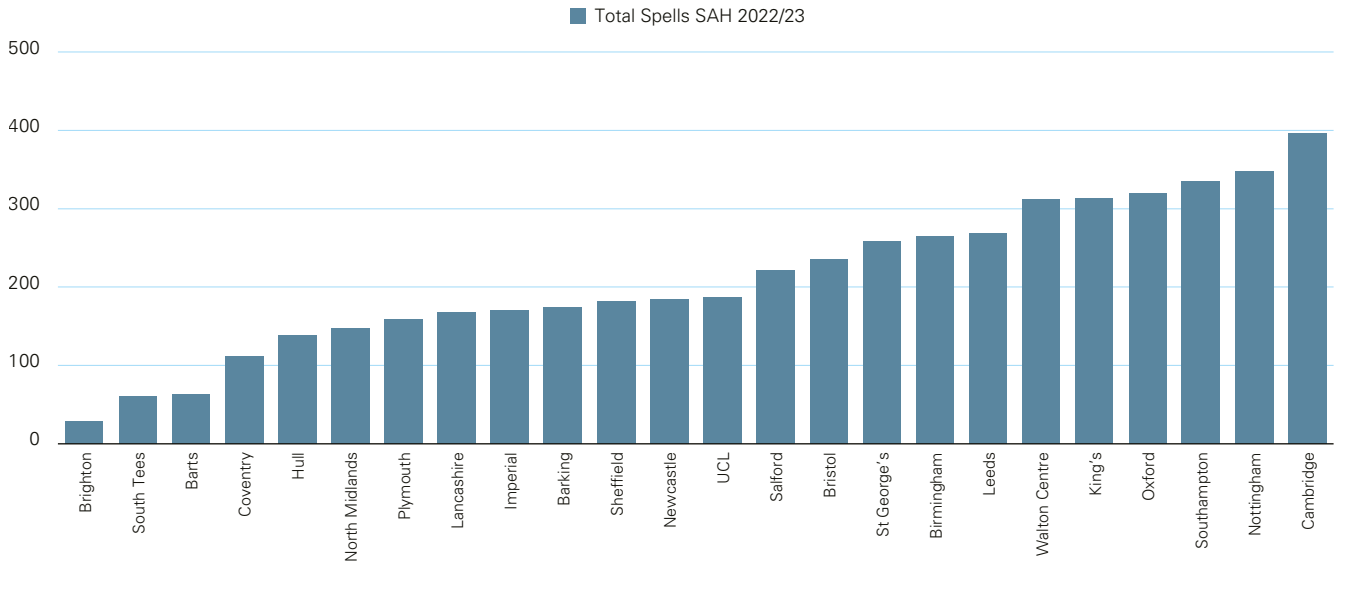
Data: CHKS

Description: The data shows the average amount of time from admission in the Neurosurgical centre before an operation is performed for patients that have a coiling or clipping procedure. These procedures could be an EVD or other operation as well as the securing of the aneurysm. This only includes patients that received definitive treatment.

Date range: January 2022 - December 2023

However, it must also be appreciated that the number of patients admitted with SAH varies significantly between centres over a two year period with an Interquartile Range of 137 [153-290, Range=367]. This means the busier centres such as Cambridge, Nottingham and Southampton are more likely to have findings over a 2 year period that are reflective of overall practice rather than smaller units such as Brighton, South Tees and Barts. Indeed Barts, Coventry and Lancashire with average pre-operative LOS >1 day all have fewer than 85 cases per year.

Figure 28: Bar chart showing the total spells of patients admitted with spontaneous SAH to each adult English Neurosurgical centre.



Data: CHKS

Description: The bar chart shows the spread of total spells between Trusts.

Date range: January 2022 - December 2023

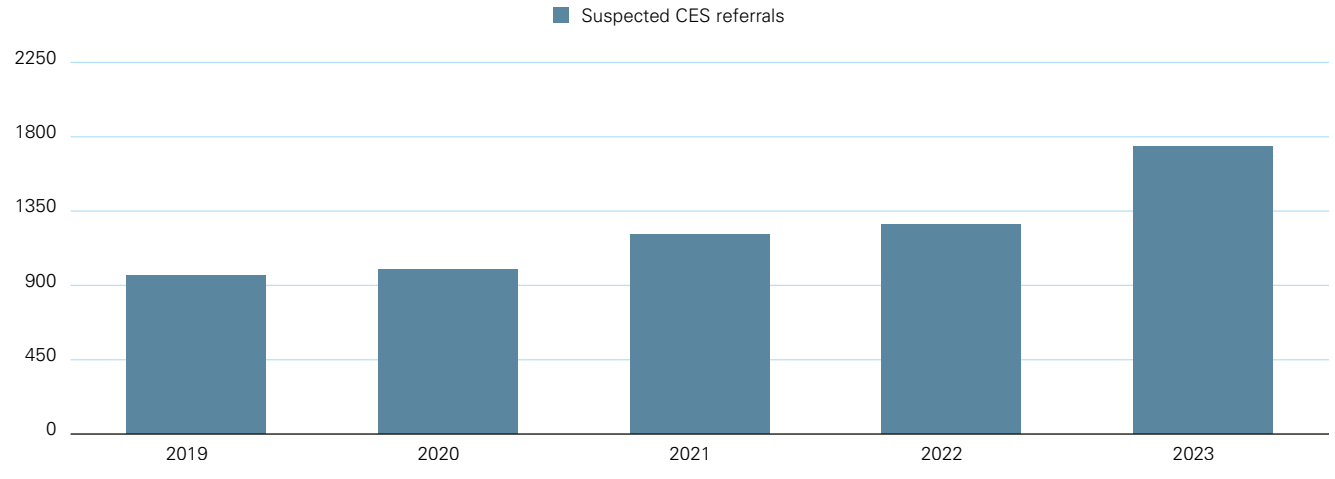
The unadjusted mortality rate for SAH admitted at the weekend that were either coiled or clipped was **9.13% (683 patient spells)** compared with **8.507% (1815 patient spells)** for weekday admissions suggesting that the slight increase in centres unable to definitively treat within 24 hours is not translating into a statistically significant change in mortality rates (p=0.64).

The most recent NICE Guidance on management of aneurysmal SAH (NG228, November 2022)[https://www.nice.org.uk/guidance/ng228/chapter/Recommendations#managing-a-confirmed-aneurysmal-subarachnoid-haemorrhage] suggests that treatment for a culprit aneurysms should be managed within 24 hours, and that the risk of re-haemorrhage is highest in this period (1.2.8). We expect this will lead to a change in expectation of an acceptable treatment window for ruptured aneurysms reducing to 24 hours over time which will most directly impact weekend working. The expansion of interventional radiology services for thrombectomy, co-located within neuroscience centres, is likely to need to provide increased provision of INR infrastructure and access to services out of hours, and we will continue to report on this in future years.

Cauda Equina Syndrome

There has been a marked increase in suspected Cauda Equina Syndrome referrals over the past 3 years. The number of referrals has almost doubled when compared with 2019. The previous evaluation of nationwide CES referral pathways [https://doi.org/10.1080/02688697.2019.1648757] contained only an average of 160 referrals between October 2016 - March 2017. This is significantly lower than the number of referrals being received by Southmead and CUH currently. This poses questions of the new GIRFT guidelines and how tertiary centres can maintain timely imaging and assessment.

Figure 29: Bar chart plotting the number of suspected Cauda Equina Syndrome referrals against year for Southmead Hospital & CUH.



Data: ReferaPatient
Description: The bar chart demonstrates a significant rise in suspected CES cases in 2023.
Date range: January 2019 - December 2023

When we look at the average number of CES presentations per year that result in lumbar surgery per Trust as per CHKS data we see that these have remained fairly stable with a small spike in the immediate post-COVID year as may have been expected.

2019 - 12.6
2020 - 12.4
2021 - 15.7
2022 - 13.1

The question therefore becomes how services answer the challenge of the National Suspected Cauda Equina Syndrome Pathway. Utilisation of Same Day Emergency Clinics or the creation of diagnostic hubs are two ways in which an increased volume of referrals may be processed.

National Registries

Neurosurgery is privileged to have a number of National Registries exist that collect data on the management of a variety of pathologies. HES data does not include some outcomes of concern for research purposes, therefore we are reliant upon these registries to provide the real granular detail on outcomes, especially with respect to patient-centred outcomes. Rich data sets are fundamental to improving outcomes for patients, but as registry data is not automated and requires extra effort on the part of busy clinicians, there are concerns that as the capture of patients by registries is not complete and that this may introduce bias when using the data sets for research.

Below is a comparison of registry capture with HES data from the same time periods.

Table 9: Table comparing the number of patients whose data contributed to registry data compared with the number of spells captured for patients with the condition using HES data.

Registry	Dates	Patients captured by registry	HES data	Capture %
Acoustic Neuroma	1st April 2018 - 31st March 2021	308 resections	879	35%
Neuromodulation	2018-2022	Full implant - 2283	3620	63%
		Trial implant - 1295		
Shunt registry	April 2020 - March 2021	Shunt - 687	1312	52%
		ETV - 57	289	20%
		Revisions - 347	1155	30%
SAH	2022	1493	2975	50%
Cranioplasty	June - November 2019	Cranioplasty - 255	331	77%
		Revisions - 58	25	232%

Data: CHKS
Description: The table shows how there is incomplete capture by the registries with respect to the number of patients that could potentially be captured from those presenting with each condition to adult Neurosurgical centres.
Date range: Described above

The synthesis of HES capture with the granularity of registry data will be important going forwards to help better understand our management of important neurosurgical pathologies.

Key issues:

1. 21/24 centres treating aneurysms on average within 24 hours for weekday admissions.
2. Referrals for suspected CES have almost doubled since 2019.
3. Incomplete capture of patient data by Neurosurgical registries, between 20-77% of number of cases in HES data.

Recommendations:

1. The most recent GIRFT guidance on suspected CES is not reliably followed leading to large numbers of unnecessary referrals: regional networks should play a role in disseminating this pathway.
2. GIRFT indicates that local provision for MRI scanning should be in place in all referring hospitals by June 2024: neurosurgical units should work with their referring hospitals to make sure this is in place.
3. Neurosurgical Units should provide formal arrangements for weekend provision of services to secure ruptured aneurysms within 24 hours, with supra-regional arrangements if necessary.

Training

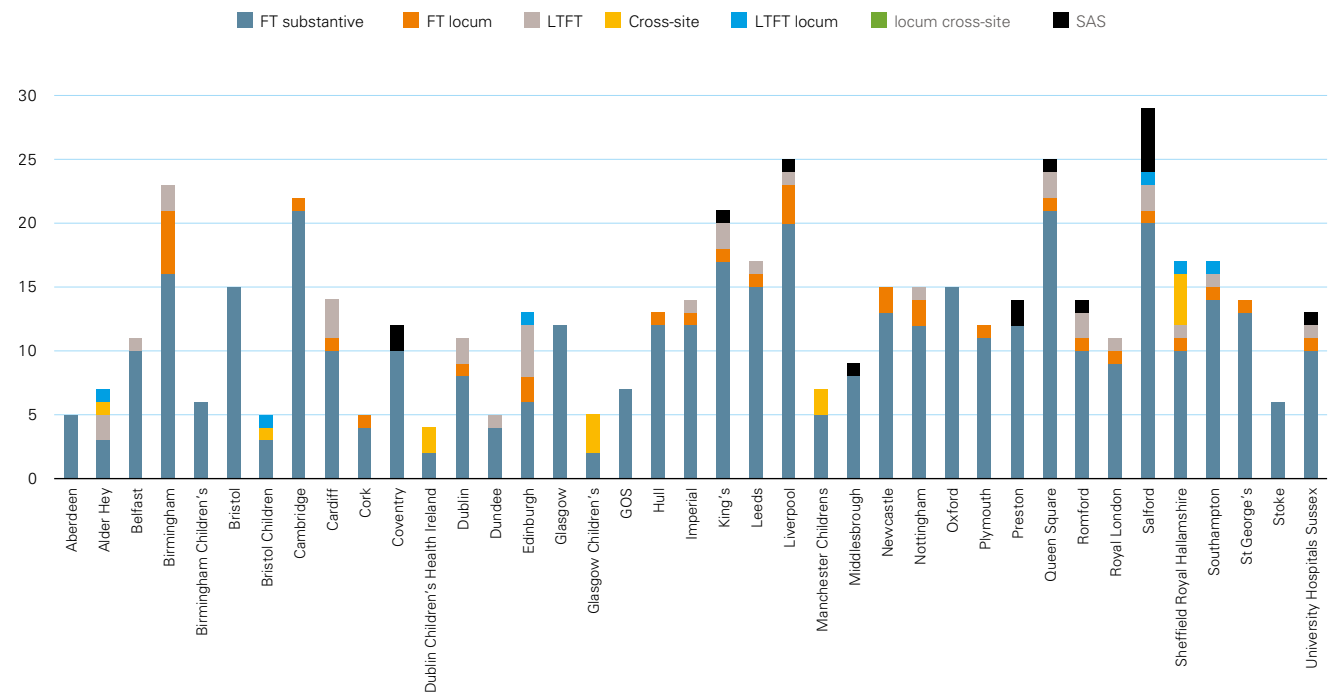
One further area of concern with respect to the future outlook of Neurosurgery given the effects of the COVID-19 Pandemic is with respect to training the Neurosurgeons of the future. This did not affect all trainees equally, but there is a consensus that in some way or another it will have disrupted the progress of every Junior Neurosurgeon. In this section we attempt to make sense of some of the effects to better understand the areas that need our focus going forwards.

Society of British Neurological Surgeons' Census 2023

Regional survey data helps demonstrate the range in terms of Consultant and Trainee numbers throughout the UK. At the time of the survey there were 242 NTNs in training as well as 244 Staff Grade Neurosurgeons. There is not an even spread of trainees and non-trainees between units with there being a range of NTNs:Staff Grades of 0.2 – 4.5 across the UK. These junior Neurosurgeons are being supervised by a total of 408 substantive Full Time Consultants as well as 31 Full Time Locum Consultants.

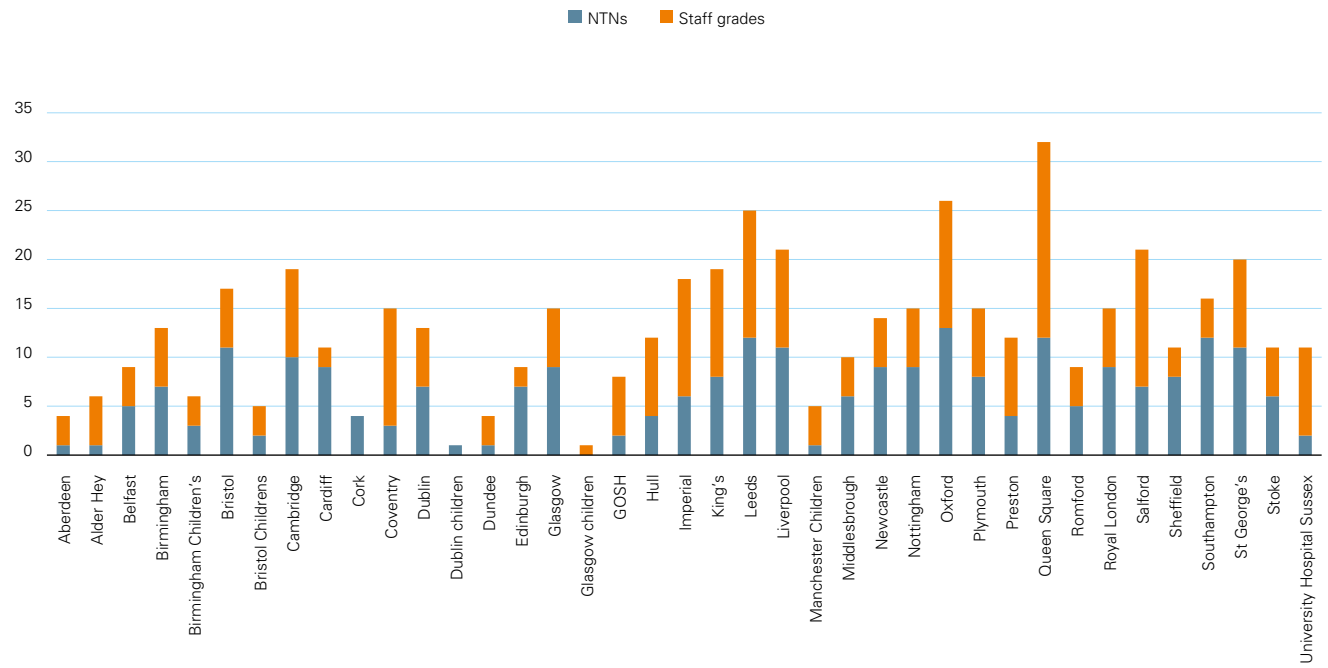
The interest in the distribution of trainees is the exposure to surgical experience and how this differs throughout the UK. Joint work between the SAC and the NNAP going forwards will assess this to define and operative training index per unit.

Figure 30: Bar chart demonstrating the distribution of Consultant and SAS positions across the UK Neurosurgical landscape.



Data: SBNS Regional Survey
Description: Results demonstrate the variability in Consultant numbers at different centres.
Date range: 2023

Figure 31: Bar chart showing the numbers of Trainee and Staff Grade Neurosurgeons throughout the UK.



Data: SBNS Regional Survey
Description: Data demonstrates the different degrees of reliance upon Staff Grade Neurosurgeons in the system.
Date range: 2023

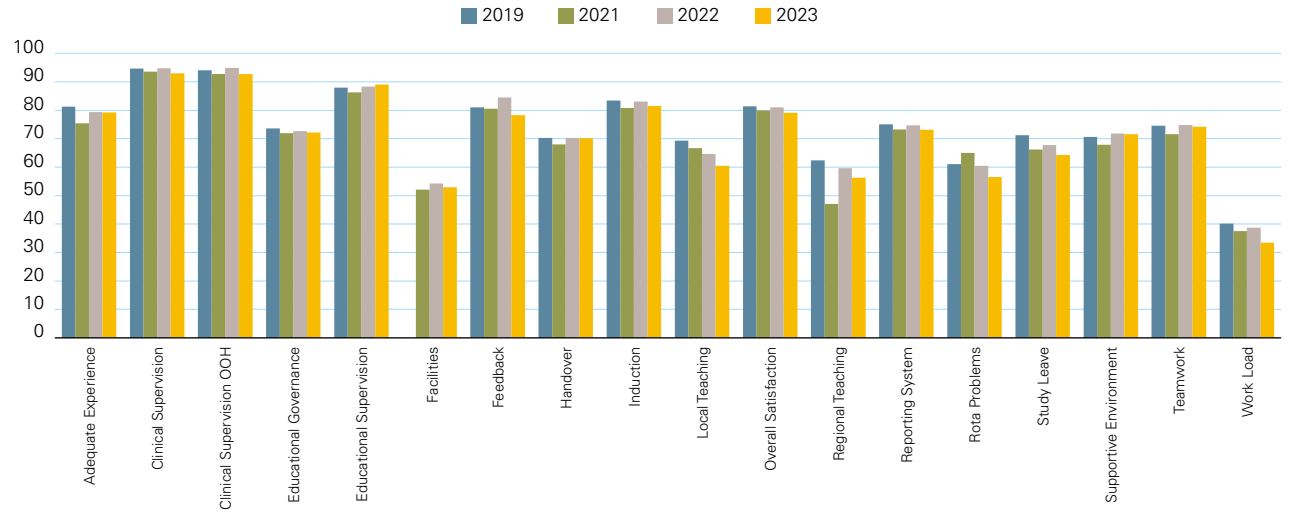
GMC Neurosurgical Trainee Feedback

Below is the graph for all GMC survey results (2023) with the marker showing the Neurosurgery result whilst the lines represent the interquartile ranges (IQR) for all surgical disciplines.

The chart shows that in both regional teaching and workload Neurosurgery was a low outlier. It should also be noted that although the rest remain within the pan-surgery IQR they were mostly towards the bottom end of the range.

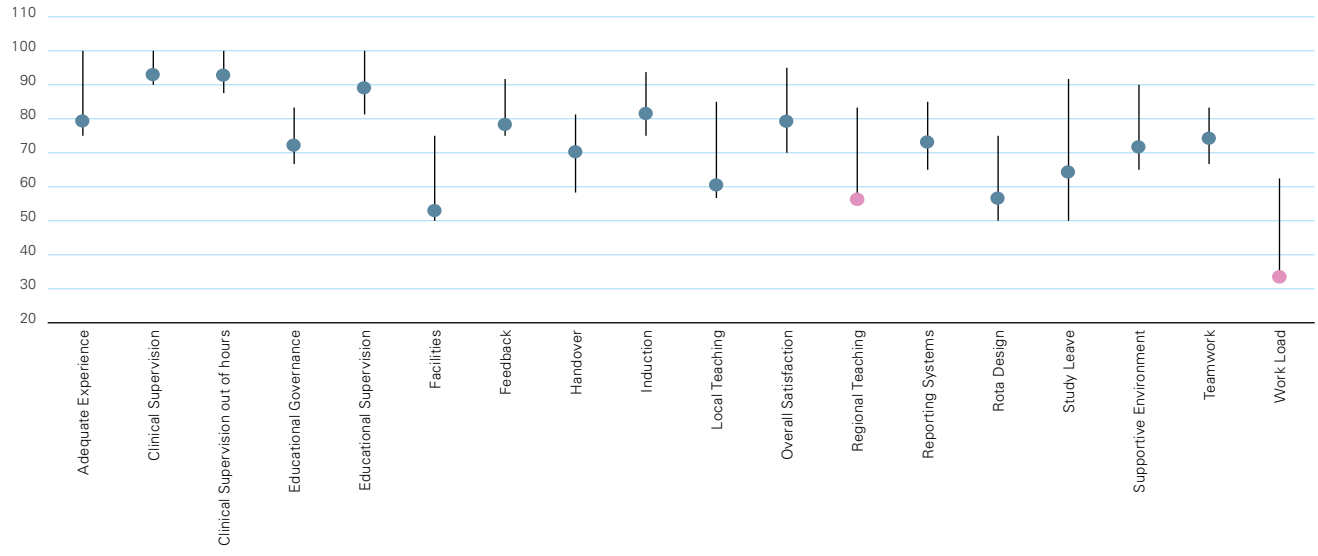
Neurosurgical trainees were much more likely to work beyond their rostered hours than other surgical trainees. Indeed the workload has always been ranked higher by Neurosurgeons, but the level of experience has also always been above that of other surgical disciplines.

Figure 32: Bar chart showing satisfaction % from Neurosurgical trainees for different domains in the GMC survey.



Data: GMC survey
Description: Results demonstrate a drop in satisfaction over multiple domains following the COVID-19 pandemic with some not returning to pre-pandemic levels.
Date range: 2019-2023

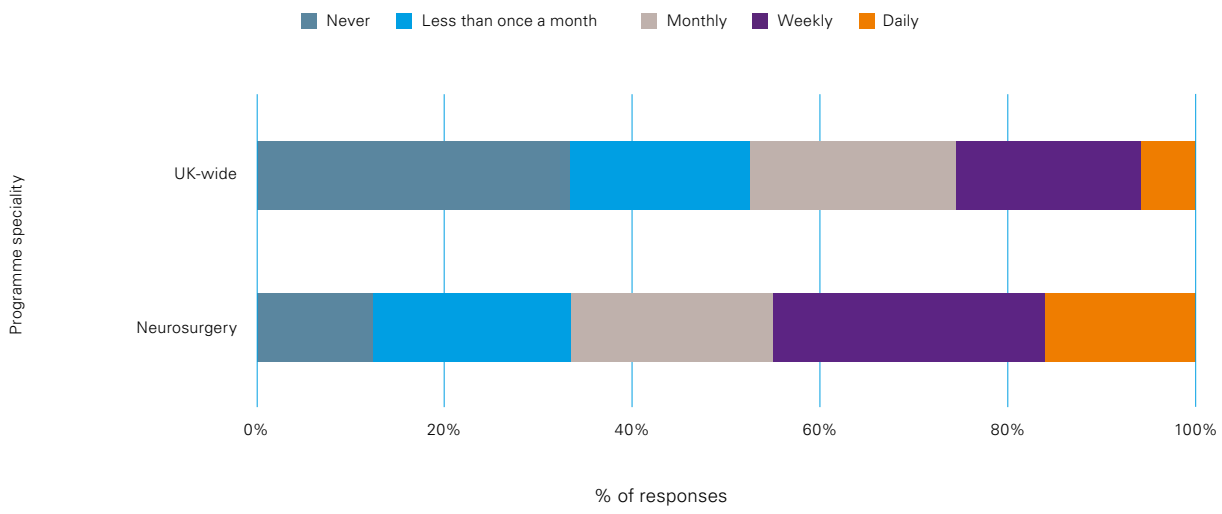
Figure 33: Graph demonstrating how the Neurosurgical feedback from the GMC survey compares with other surgical disciplines.

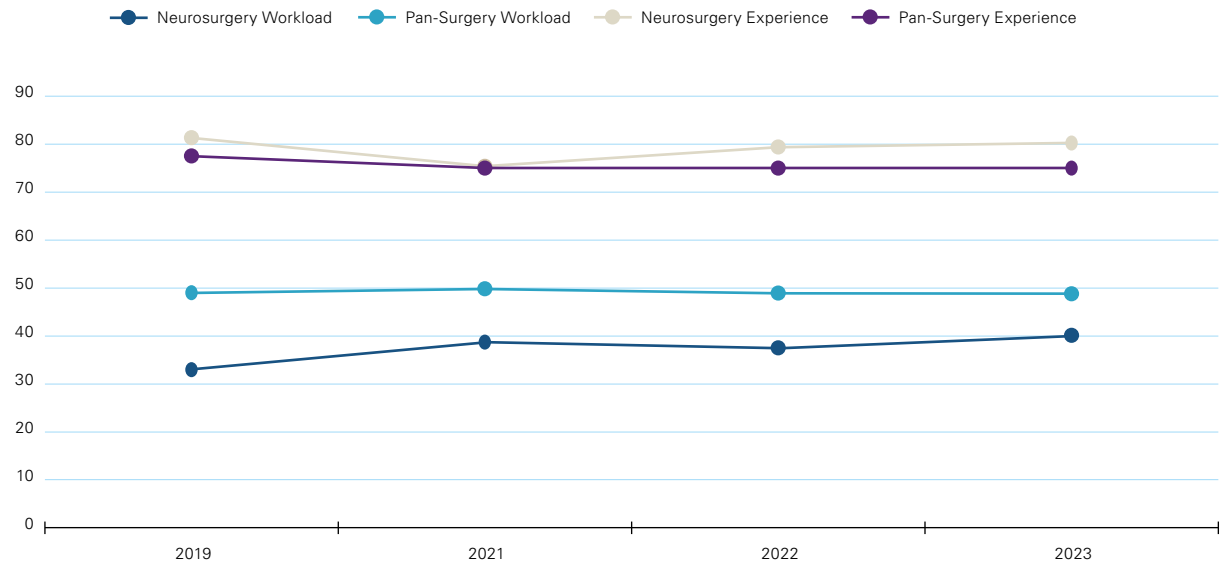


Data: GMC survey
Description: The data shows that Neurosurgical feedback generally places results at the bottom end of the range when compared with other surgical specialties.
Date range: 2019-2023

Neurosurgical trainees were much more likely to work beyond their rostered hours than other surgical trainees. Indeed the workload has always been ranked higher by Neurosurgeons, but the level of experience has also always been above that of other surgical disciplines.

Figure 34a & b: Work Load feedback – In this post, how often (if at all) did your working pattern leave you feeling short of sleep when at work?





Data: GMC survey
Description: Neurosurgery trainees described feeling over worked more frequently than other surgical trainees in the UK.
Date range: 2023

Table 10: ARCP outcomes by trainee level in UK Neurosurgery 2023.										
Level	1	10.2	2	3	5	6	7.2	8.2	8.3	N
ST1	22				4			1		
ST2	19	1	1	1	4			1		2
ST3	31		4	3	2			2		
ST4	23			1	2			3		1
ST5	37		4	3	2			1		1
ST6	25		2					1		1
ST7	19	1	2	1	4		1	1		1
ST8	3	1	2	4	3	18				
NULL	1							11	2	
Total	180	3	15	13	21	18	1	21	2	6

Data: ISCP
Description: ARCP outcomes for each level of Neurosurgical trainee.
Date range: August 2022 – August 2023

The majority of trainees attained a satisfactory outcome. No trainees were removed from the programme. However, only 18/31 ST8 trainees were granted an outcome 6 at their ARCP. The reasons for this were not clear for 3 trainees. Excluding these 3 this meant that 10 out of the 28 (36%) needed to provide extra evidence or needed extra time to be ready for CCT.

The authors of the GMC survey report believed that some may have been down to logistics (i.e. not uploading all evidence in time although it was complete) and as the below table suggests the FRCS may have been an issue given the multiple failed attempts. Further work will be needed to ensure training reaches the standards that were being set pre-COVID 19 pandemic and that trainees have all the necessary experience to CCT in their ST8 year.

Table 11: Outcomes for the Neurosurgery FRCS exam.											
	2019		2020		2021		2022		2023		Total
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	
Section 1	30	8	13	2	34	3	14	3	24	8	139
Section 2	29	5	14	0	32	5	19	0	21	3	128

Data: FRCS
Description: Number of Pass and Fail attempts for FRCS by year.
Date range: 2019-2023

Key issues:

1. Work force planning within the SBNS is already reducing the bulge of post-CCT trainees seeking a substantive position."
2. COVID-19 caused a deterioration in "Adequate experience", "Regional teaching", "Supportive environment" and "Workload" felt by Neurosurgical trainees.

Recommendations:

1. Supra-regional teaching arrangements are being rolled out across the country, mirroring successful programmes in the North-East/ North-West.
2. Audit to be undertaken by NNAP to ensure training cases in line with general trends in operative output.
3. Work to be undertaken in coordination with the SAC to define an operative training index per unit.

Recommendations

Elective Surgery:

1. Day of surgery admission is likely to become the default for all elective surgery, and robust preadmission processes should be put in place.
2. Day case surgery provides the opportunity for further bed day savings: dissemination of best practices from around the country can support this.
3. Remote outpatient review is likely to become an increasing part of neurosurgical practice. Units and specialty associations should define which parts of the patient pathway require face-to-face review.

Emergency Care:

1. Regional networks should signpost local units to existing guidance on common neurosurgical referrals, to avoid unnecessary referrals to over-burdened on-call services.
2. On-call neurosurgical services should not be used as the first point-of-call for advice and guidance.
3. Further collaborative work needed to investigate national referral patterns given the findings from Bristol and Cambridge.

Subspecialty and Registry Focus:

1. The most recent GIRFT guidance on suspected CES is not reliably followed leading to large numbers of unnecessary referrals: regional networks should play a role in disseminating this pathway.
2. GIRFT indicates that local provision for MRI scanning should be in place in all referring hospitals by June 2024: neurosurgical units should work with their referring hospitals to make sure this is in place.
3. Neurosurgical Units should provide formal arrangements for weekend provision of services to secure ruptured aneurysms within 24 hours, with supra-regional arrangements if necessary.

Training:

1. Supra-regional teaching arrangements are being rolled out across the country, mirroring successful programmes in the North-East/ North-West.
2. Audit to be undertaken by NNAP to ensure training cases in line with general trends in operative output.
3. Work to be undertaken in coordination with the SAC to define an operative training index per unit.

NNAP Research Output

Further efforts this year will be made by NNAP to investigate the variability in return to normal operative output following the COVID-19 pandemic. Projects are already underway regarding the diagnosis of SAH using LP and an overview of the work of registries in UK Neurosurgery. We rely on the engagement of individual centres for ongoing projects and are very grateful for the efforts made with these.

Below is a summary of the recent academic output from the National Neurosurgical Audit Programme.

Publications:

1. Thompson D, Williams A, Whitfield PC, Hutchinson P, Phillips N, Cromwell D, Helmy, A. **Surgical recovery from the COVID-19 pandemic in English adult neurosurgical centres.** Br J Neurosurg. 2024 April. [https://www.tandfonline.com/doi/full/10.1080/02688697.2024.2339355]
2. Wahba AJ, Cromwell DA, Hutchinson PJ, Mathew RK, Phillips N. **Assessing national patterns and outcomes of pituitary surgery: is hospital administrative data good enough?** Br J Neurosurg. 2023 Feb 2:1-8. [https://pubmed.ncbi.nlm.nih.gov/36727284/]
3. Wahba AJ, Cromwell DA, Hutchinson PJ, Mathew RK, Phillips N. **Mortality as an indicator of quality of neurosurgical care in England: a retrospective cohort study.** BMJ Open. 2022 Nov 4; 12(11):e067409. [https://researchonline.lshtm.ac.uk/id/eprint/4667970/1/Wahba_BMJopen2022_Neurosurgery-mortality-indicator.pdf]
4. Wahba AJ, Cromwell DA, Hutchinson PJ, Mathew RK, Phillips N. **Patterns and outcomes of neurosurgery in England over a five-year period: A national retrospective cohort study.** Int J Surg. 2022 Mar;99:106256. [https://pubmed.ncbi.nlm.nih.gov/35150923/#:~:text=Results%3A%20During%20the%205%2Dyear,%2C%2068.3%25%20were%20elective%20procedures.]
5. Wahba AJ, et al **Benchmarking short-term postoperative mortality across neurosurgery units: is hospital administrative data good enough for risk-adjustment?** Acta Neurochir (Wien). 2023 Jul;165(7):1695-1706. doi: 10.1007/s00701-023-05623-5. [https://pubmed.ncbi.nlm.nih.gov/37243824/#:~:text=Conclusions%3A%20Reasonable%20risk%2Dadjustment%20models,frailty%20often%20improved%20model%20performance.]

Reports:

1. Wahba AJ, Phillips N. **Evaluating infection rates after cranial neurosurgery using HES.** April 2022.
2. Wahba AJ, Cromwell DA, Phillips N. **An evaluation of the NNAP Coding Framework and attribution of procedures to a consultant neurosurgeon in HES in a single institution.** NNAP Report. July 2020.
3. Phillis N, Wahba A. **Cranioplasty in England 2013-2019. NNAP Report.** May 2020.

Published abstract:

1. **Readmission and reoperation rates after resection of malignant primary brain tumours in England 2013-2017.** BNOS July 2021. [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8517902/]

Presentations:

1. **NNAP Research Programme – results so far and future direction.** A Wahba RCS CEU Departmental meeting. Oct 2022.
2. **National perspective on pituitary surgery in England 2013-2019.** D Parikh, A Wahba, N Phillips. BSBS. June 2022.
3. **Tools and Techniques for data analysis for research and audit. Excel to Python**. N Phillips, A Wahba. eBrain Webinar. June 2022
4. **NNAP Research Programme using HES for quality assurance and main research findings.** A Wahba. SBNS Cardiff. March 2022.
5. **Neurosurgical mortality as an indicator of quality of care.** Wahba AJ, Cromwell DA, Hutchinson PJ, Mathew RK, Phillips N. Oral presentation. SBNS Council, January 2022.
6. **Improvements in the quality of hospital administrative data for pituitary surgery.** Wahba AJ, Cromwell DA, Hutchinson PJ, Mathew RK, Phillips N. Oral Presentation. BNES. December 2021.
7. **Readmission and reoperation rates after resection of malignant primary brain tumours in England 2013-2017.** Wahba A, Phillips N, Hutchinson P, Cromwell D, Mathew R. Top Scoring Paper – Oral Presentation. BNOS. July 2021.
8. **Update on the NNAP Research Programme.** Wahba A, Phillips N. SBNS Council. May 2021.
9. **Statistical performance of the NNAP.** Wahba A. NNAP Steering Group. November 2020.