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Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: retrospective cohort study

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ABSTRACT

Background: Following a virtual standstill in the delivery of elective procedures in England, a national block contract between the NHS and the independent sector aimed to help restart surgical care. The impact of this arrangement remains unknown, despite its potential to define the future relationship between sectors to address unmet surgical need.

Methods: Population-based retrospective cohort study, assessing the delivery of all publicly-funded and privately-funded elective care delivered in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. Discharge data from the Hospital Episode Statistics and private health care data from the Private Health Information Network was stratified by specialty, procedure, and patient complexity in terms of age, charlson comorbidity index, and length of stay.

Results: COVID-19 significantly reduced publicly-funded elective care activity, though changes were more pronounced in the independent sector (-65.1 percent) compared with the NHS (-52.7 percent), whereas reductions in privately-funded elective care activity were similar in both independent sector hospitals (-74.2%) and NHS hospitals (-72.9%). Patient complexity increased in the independent sector compared to the previous year, with mixed findings in NHS hospitals. All specialties, irrespective of sector or funding mechanisms, experienced a reduction in hospital admissions, except for medical oncology, clinical oncology, and cardiology, which experienced an increase in publicly-funded elective care activity in the independent sector.

Conclusion: Elective care delivered by the independent sector remained significantly below historic levels, although this overlooks significant variation between regions and specialities. There are opportunities to learn from regions with successful collaborations between sectors as a strategy to address the growing backlog of elective care.

Article summary

Strengths and limitations of this study

- Assessment of hospital activity across the entire independent sector and public sector in England.
- Implications of block contracts used during the first wave of the COVID-19 pandemic to generate additional resources and increase capacity within the National Health Service.
- Identifying regional variation in the use of independent sector capacity before and during COVID-19.
- Observational study without natural control group.

1. INTRODUCTION

Independent sector providers (ISPs) have played a role in the provision of publicly-funded elective health care services in England since the early 2000s.(1) Private, for-profit surgical centres have provided routine, high volume elective procedures to National Health Service (NHS) patients, supporting incumbent governments to tackle waiting times for surgery. Although the overall contribution of ISPs to NHS funded care was around six percent of total NHS elective activity before COVID-19,(2) for some elective procedures such as cataract repair, inguinal hernia repair, and hip replacement, close to one in every three publicly-funded treatment was performed by ISPs. In total, it is estimated that NHS commissioners spent £9.7 billion on services delivered by ISPs in 2019/20, accounting for approximately 7.2% of the annual health care budget.(3)

For years, the financing of private health care through public funds has been controversial and has sparked criticism, including from professional bodies and medical staff.(4) There remain uncertainties about the value of care provided by ISPs, the impact they might have on the NHS through its correlates like staffing, and a lack of transparency and governance of contracts struck between payers and providers of care.(5) Despite opposition to further expansion of ISPs provision of publicly-funded services, it was ISPs that promised a refuge for a struggling NHS to provide additional capacity when the pandemic started in 2020. Effective from 1st of April 2020, NHS England and NHS Improvement (NHSEI) agreed an emergency contract with ISPs via the Independent Healthcare Providers Network,(6) which was originally envisaged as covering the treatment of both COVID-19 and non-COVID-19 patients. Fortunately, NHS hospitals were not overwhelmed with COVID-19 pandemic during the first wave of pandemic, and the focus shifted towards utilising the independent sector to reconvene non-urgent elective operations.(7) ISP sites were intended to act as designated COVID-19-free facilities,(8) increasing available capacity within the NHS, and offering care to patients on growing waiting lists.(9) This national block contract ran until July 31st 2020 and was then replaced in favour of renegotiated contract that relied upon local agreements between NHS commissioners and independent sector hospitals.

The introduction of block contracts with the independent sector was seen as a radical step, though necessitated by the unprecedented situation faced by the NHS, and a departure from usual agreements commonly struck locally.(10) While improved collaboration with the independent sector provides opportunities to assist in clearing NHS backlogs of care, as for the first time approximately five million people are on a waiting list in England,(11) there is a need for effective financing mechanisms, regulation and governance to safeguard public funds and incentivise activity. Therefore, the decision taken by NHSEI in Spring 2020 provides a testing bed that could define the long-term relationship between sectors and offers insights into the use of public funds during health emergencies. However, it remains unknown how ISPs were impacted by the pandemic, and to what degree emergency contracts with the NHS incentivised an uptake of service provision for elective NHS patients.

2. METHODS

Study cohort

We analysed trends in elective care for publicly and privately-funded healthcare activity in both NHS hospitals and ISPs during the first wave of pandemic in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. We focused on differences in patient case-mix, specialties, procedures, and region (*i.e.*, Sustainability and Transformation Partnerships, or STPs). The decision was made to analyse changes at STP level as this has featured in other analysis of the impact of the COVID-19 pandemic on hospital bed capacity in the NHS,(12) and also reflects efforts by NHS England to encourage the coordination of local policy at the STP rather than CCG level since 2019.(13) The study period was chosen to capture service delivery across market quadrants during a period unaffected by COVID-19, compared with a period impacted by the COVID-19 pandemic and applicable to the national block contract in place between sectors. Moreover, the study period allowed to control for any bias resulting from seasonality.

Data for publicly-funded care was retrieved from the Hospital Episode Statistics database provided by NHS Digital (*i.e.,* the non-departmental public body responsible for information, data and IT systems in England). This national administrative database contains pseudonymised and unidentifiable information on all patients accessing care in the English NHS, including at Accident and Emergency departments, as inpatients and in outpatient settings. Privately-funded care was retrieved from the Private Health Information Network (PHIN). PHIN has been mandated by the Competition and Market Authority (CMA) as being responsible for collection and reporting of activity in the private health care sector since 2016.(14) Both datasets contain patient information including demographics, diagnosis, and treatment. The data is recorded in finished episodes of care, which relates to the clinician responsible for the respective aspect of care. When analysing numbers of hospital admissions, to avoid multiple counting, we linked episodes from patient admission to discharge into complete spells. However, when analysing numbers of procedures, we utilised finished episodes of care. Specialty was coded according to main specialty codes, as defined by NHS Digital and the UK Royal Colleges,(15) which is applied in both the HES and PHIN datasets. Hospitals spells were counted according to the specialty of the admitting consultant. Our analysis focused specifically on elective care. Emergency admissions were excluded as these are less likely to be impacted by contractual agreements between sectors, and historically only accounted for a small proportion of patients treated at ISPs.

Study outcomes

Broadly the health care system in England, can be understood to have four market quadrants: publicly-funded care delivered by the NHS, publicly-funded care delivered by ISPs, privately-funded care delivered by the NHS, and privately-funded care delivered by ISPs. The primary outcomes in this study were the number of total hospital discharges following an elective hospitalisation by market quadrant, and separately for the ten specialties and procedures, which saw the largest and smallest percentage changes between the baseline period and the first wave of the COVID-19 pandemic, respectively. This was restricted to specialties with more than 1000 discharges, and procedures undertaken more than 200 times collectively during our baseline period and the first wave of the pandemic. All discharges were considered, irrespective of patient survival status.

The secondary outcomes studied relate to patient complexity and include patient age on admission, Charlson Comorbidity Index, and length of stay. We used the Charlson Comorbidity Index as a measure for patient complexity based on the number of comorbidities recorded in HES and PHIN data. The index is used widely for risk-stratification in health services research and was calculated based on diagnosis codes recorded at admission.(16) Length of stay was calculated as the difference between day of admission and day of discharge. Patients that were admitted and discharged on the same day, or without staying overnight were recorded with a zero length of stay.

Statistical analysis

We estimated the total number of patient discharges by market quadrant for the period of 1st of April 2019, and 31st of July 2019, and the same period in 2020. For the ten specialities with largest and smallest changes in discharges across time periods for each market quadrant, we calculate the percentage change between study periods. The same calculations were performed for procedures, classified based on OPCS-4 codes.(17) To assess differences in patient complexity, we performed paired-sample t-tests and report p-values with 0.05 considered as threshold for statistical significance. Sensitivity analysis investigated changes in patient case-mix by specialty group. All data cleaning and analyses were performed using STATA SE 15.

Patient and public involvement

No patients were involved in the development of the research question or the outcome measures. Patients were not involved in developing strategies for design or implementation of the study. The authors plan to disseminate results to patients and policymakers through virtual outreach activities, and platforms provided by PHIN and the Global Surgery Policy Unit, a new partnership between the London School of Economics and Political Science and the Royal College of Surgeons of England.

3. RESULTS

Service delivery before and during the COVID-19 pandemic

When analysing trends in activity levels during the first wave of the COVID-19 pandemic compared to the same period in 2019, we find that that there was significant reduction of publicly-funded health care activity (see Figure 1), though changes were more pronounced in ISPs (-65.1% percent) compared with the NHS (-52.7%), whereas reductions in privately-funded health care activity were similar in both ISPs (-74.2%) and NHS hospitals (-72.9%). Hospital admissions remained significantly below historic levels during the first wave of the COVID-19 pandemic, impacting all specialities, irrespective of sector or funding mechanisms.

While NHS providers experienced reductions across all clinical specialties (see Table 1), with the largest decreases in anaesthetics (-92.0%), trauma and orthopaedics (-89.9 percent), and oral surgery (-81.4 percent), we find that ISPs compensated some of the loss in activity with increases in volume for medical oncology, clinical oncology, and cardiology (see Table 2). Both clinical oncology and medical oncology experienced some of the smallest reductions in activity across all market quadrants, suggesting continuation of cancer care was prioritised during the first wave of the pandemic irrespective of funding mechanism. The only specialty which experienced increases in volume for privately-funded care, was obstetric care by the independent sector, indicating a number of patients opted to pay out-of-pocket payments to give birth in ISPs due to fear of exposure of coronavirus in NHS facilities. Specific procedures or treatments with largest increases for publicly-funded care by ISPs included partial excision of breast, transurethral resection of bladder tumour (TURBT), and mastectomy, even though in absolute numbers, these procedures recouped only a small proportion of the loss in high-volume publicly-funded activity observed at

ISPs (see Supplementary Material Tables 1 & 2). In relation to privately-funded care in ISPs, activity levels for both vaginal birth and caesarean section increased during the first wave of the pandemic compared to the previous year.

Table 1: Percentage change in hospitals spells for elective care by specialty with largest reductions and by market quadrant (for specialties with more than 1000 spells)

Specialty	April-July 2019	April-July 2020	% Change	Specialty	April-July 2019	April-July 2020	% Change
Independent site/NHS funded				NHS site/NHS funded			
Anaesthetics	13476	1074	-92.0%	Learning disability	1,816	53	-97.1%
Trauma & orthopaedics	62294	6301	-89.9%	Anaesthetics	50,701	5,039	-90.1%
Oral surgery	2572	479	-81.4%	Dental medicine speciality	1,239	169	-86.4%
Ophthalmology	47762	11606	-75.7%	Ear Nose and Throat	80,910	13,914	-82.8%
Gastroenterology	19789	5480	-72.3%	Trauma & orthopaedics	201,653	35,592	-82.3%
Dermatology	2809	835	-70.3%	Oral surgery	53,404	9,949	-81.4%
Neurosurgery	2122	677	-68.1%	Allied health professional	2,716	522	-80.8%
Ear Nose and Throat	3505	1360	-61.2%	Paediatric dentistry	7,616	1,672	-78.0%
Gynaecology	10247	4364	-57.4%	Oral & maxillo facial surgery	28,510	6,513	-77.2%
General surgery	32861	22991	-30.0%	Ophthalmology	205,573	54,572	-73.5%
Independent site/ Privately funded				NHS Site/ Privately funded			
Oral surgery	1802	141	-92.2%	Ear Nose and Throat	1,600	102	-93.6%
Plastic surgery	18842	1737	-90.8%	Ophthalmology	6635	583	-91.2%
Ear Nose and Throat	8675	878	-89.9%	Plastic surgery	1,152	118	-89.8%
Anaesthetics	5686	697	-87.7%	Trauma & orthopaedics	4090	469	-88.5%
Obstetrics & gynaecology	3002	417	-86.1%	Cardiology	5,529	760	-86.3%
Oral & maxillo facial surgery	1160	179	-84.6%	General surgery	4,216	671	-84.1%
Ophthalmology	21096	3515	-83.3%	Urology	3240	587	-81.9%
Trauma & orthopaedics	47697	8351	-82.5%	Gynaecology	2,081	447	-78.5%
General medicine	2380	489	-79.5%	General medicine	852	193	-77.3%
Gastroenterology	20227	4219	-79.1%	Gastroenterology	1,825	515	-71.8%

Table 2: Percentage change in hospitals spells for elective care by specialty with smallest reductions and by market quadrant (for specialties with more than 1000 spells)

Specialty	April-July 2019	April-July 2020	% Change	Specialty	April-July 2019	April-July 2020	% Change
Independent site/NHS funded				NHS site/NHS funded			
Clinical oncology	0	1689	-	Nephrology	272,704	251,571	-7.7%
Medical oncology	0	1266	-	Old age psychiatry	933	806	-13.6%
Cardiology	507	1117	120.3%	Adult mental illness	3,486	2,867	-17.8%
Oral & maxillo facial surgery	910	920	1.1%	Microbiology & virology	818	631	-22.9%
Plastic surgery	2477	2325	-6.1%	Geriatric medicine	7,133	5,473	-23.3%
Urology	9623	7868	-18.2%	Medical oncology	178,737	132,744	-25.7%
General medicine	1727	1387	-19.7%	Haematology	26,184	19,241	-26.5%
General surgery	32861	22991	-30.0%	Clinical oncology	195,465	143,602	-26.5%
Gynaecology	10247	4364	-57.4%	Clinical haematology	248,652	176,384	-29.1%
Ear Nose and Throat	3505	1360	-61.2%	Acute internal medicine	1,684	1,150	-31.7%
Independent site/ Privately funded				NHS Site/ Privately funded			
Obstetrics	536	555	3.5%	Medical oncology	8259	5205	-37.0%
Clinical oncology	1175	980	-16.6%	Ophthalmology	6635	583	-40.5%
Medical oncology	21711	15416	-29.0%	Clinical haematology	3722	2216	-59.3%
Haematology	1477	978	-33.8%	Clinical oncology	2118	862	-59.7%
Paediatrics	920	600	-34.8%	Nephrology	1599	645	-60.3%
Clinical haematology	2429	1,564	-35.6%	Obstetrics	1382	549	-71.8%
Radiology	1438	642	-55.4%	Gastroenterology	1,825	515	-77.3%
Cardiothoracic surgery	852	299	-64.9%	General medicine	852	193	-78.5%
Cardiology	3377	1,183	-65.0%	Gynaecology	2,081	447	-81.9%
Urology	15543	4569	-70.6%	Urology	3240	587	-84.1%

Patient complexity

Previous evidence has suggested that ISPs treat patients that are less clinically complex, leaving incumbent NHS sites with sicker, and costlier patients.(18,19) It remains contested whether these observed differences in patient case mix are a true reflection of patients seen in practice, which would point to cream skimming behaviour,(20) or are a fallacy resulting from data recording.(18) Despite this, our analysis indicates that ISPs shifted care towards treating more clinical complex patients during the first wave of the pandemic (Figure 2). The mean age of patients treated in all market quadrants increased with the exception of privately-funded care by NHS hospitals (54.88 years versus 52.98 years, p-value=0.000), with the largest increase seen in publicly-funded care by ISPs (59.56 years versus 61.13 years, p-value=0.000). Mean length of stay increased by ISPs, but decreased in NHS hospitals, potentially reflecting a lower threshold for discharge by NHS hospitals because of increased risk of hospital acquired COVID-19 infection. The largest increase for length of stay was for publicly-funded care by ISPs (0.36 versus 0.81, p-value=0.000). This is likely to reflect the suspension of high-volume elective procedures such as cataract surgery and hernia repair typically delivered as a day case. Mean Charlson comorbidity index increased for all market quadrants, with the exception of privately-funded care by NHS hospitals, with the largest increase seen in privately-funded care by NHS hospitals (1.16 versus 2.02, p-value=0.000) (see Figure 2). This could possibly reflect cancer care (as cancer diagnoses are incorporated in the Charlson comorbidity index) accounting for a larger proportion of total elective care during the first wave of the pandemic, as medical and clinical oncology consistently had the smallest reductions in activity irrespective of market quadrant (see Table 2).

Sub-analysis at the specialty level (see Supplementary Material Table 3) revealed these changes during the first wave of the COVID-19 pandemic were exemplified for certain specialities when focusing on publicly-funded care by ISPs. For general surgery, patients were on average significantly older (52.01 versus 57.63, p-value=0.000), had a longer length of stay (0.08 versus 1.05, p-value=0.000), and had a higher Charlson comorbidity index (0.231 versus 0.263, p-value=0.000). Similarly for urology, patients were also on average significantly older (51.88 versus 64.28, p-value=0.000), stayed longer (0.76 versus 1.14, p-value=0.000), and had a higher Charlson comorbidity index (0.25 versus 0.93, p-value=0.000). Interestingly, the opposite is seen for orthopaedics, where in all market quadrants, with the exception of privately-funded care by NHS hospitals, patients were on average younger, had a shorter length of stay, and a lower Charlson comorbidity index. It is possible this may reflect how reductions in orthopaedic care for paediatric patients were less severe than those experienced for adult patients during the first wave of the pandemic

Geographical variation in the use of independent sector capacity

Throughout the first wave of the pandemic there was regional variation in COVID-19 related hospital admissions, with London and the North West approaching almost 100% occupancy for general and acute beds, with other regions such as the South West, Yorkshire and Humber, and the North East, less impacted.(12) It is therefore not surprising we have identified regional variation in the provision of elective care during the first wave of the pandemic in our analysis (see Figure 3).

The highest degree of variation experienced by STP was for publicly-funded care by the independent sector, ranging from an increase of 280.8% at the Frimley Health and Care Integrated Care System (ICS) STP, to a reduction of -99.8% at the Shropshire, Telford and Wrekin STP. A total of six STPs observed a net increase in publicly-funded activity by the independent sector compared with the baseline period (*i.e.,* Frimley Health and Care ICS, North West London Health and Care Partnership, Dorset, Our Healthier South East London, Herefordshire and Worcestershire, and Coventry and Warwickshire). Almost two-thirds of STPs saw provisions of volume linked to oncology and cardiology increase (*e.g.*, at the Devon STP, activity increased from 1 case in 2019, to 1892 cases in 2020), with 19 STPs introducing these specialties for the first time due to the emergency contracting with NHSEI.

4. DISCUSSION

In England, ISPs have treated publicly-funded elective patients for almost two decades, mostly specialising in high volume surgical procedures such as cataract repair, inguinal hernia repair, and joint replacements.(2) With a growing proportion of the health care budget spent on the independent sector, rather than investments into existing NHS infrastructure, the reliance on independent hospitals to treat NHS patients has raised concerns amongst the medical profession and the general public.(4) When the COVID-19 pandemic started in 2020, NHSEI secured ISP capacity in England through emergency block contracts with the independent sector via the Independent Healthcare Providers Network, fostering a greater collaboration than ever seen before. While these contracts covered both COVID-19 and non-COVID-19 care, fortunately ISP capacity was ultimately not required for COVID-19 patients and instead ISPs were used as sites to deliver elective care to non-COVID0-19 patients on growing waiting lists.(8) While further analysis is required, this study provides insights into trends in the delivery of elective care across the NHS and ISPs while this block contract was in place.

To our knowledge this is the first analysis that provides a complete assessment of changes in patient care during the first wave of the pandemic as it links patient-level data for all four market quadrants, including NHS funded care and privately-funded care within NHS providers and ISPs. Indeed, our analysis shows that by entering into block contracts with the NHS, some ISPs showed flexibility by expanding their service portfolio promptly to include procedures that align with national priorities. Moreover, reductions in elective care activity in ISPs were more pronounced for privately-funded care than for publicly-funded care, indicating some ISPs may have prioritised publicly-funded care during our period of analysis. However, it is challenging to ascertain to what degree this occurred as several factors may have contributed to both publicly-funded and privately-funded elective care activity at ISPs, including a reduced availability of staff and equipment, or reduced patient demand due to shifts in patients' willingness to attend an operation due to fear of infection.

In contrast to previous research which suggests that ISPs appear to treat less clinically complex patients,(18,19,21,22) our analysis finds significant increases in average patient complexity within the independent sector during the first wave of the pandemic in terms of age, length of stay and comorbidities. This could reflect a shift towards delivering high volumes of more complex types of care, for example cancer care, to patients who are more likely to be older and have higher comorbidity. However, the suspension of less complex types of care, such as cataract and hernia operations, and cosmetic surgery, which typically involves younger patients with fewer comorbidities may have also contributed to the apparent increase in patient complexity. As these are typically high-volume procedures in ISPs, and changes in cancer care were relatively low-volume, this is likely to have contributed to the majority of changes seen in terms of average patient complexity.

While NHSEI and major ISPs were quick to negotiate block contracts for publicly-funded care in the independent sector at the national level, our analysis provides evidence that developing effective collaboration between NHS and ISPs took place at different speeds at the local level. It is possible that more extensive collaboration between NHS and ISPs in parts of the country (*e.g.* at the North West London STP) predated the pandemic than in other regions and therefore it was easier to capitalise upon block contracts.(23) It is important that areas where successful collaboration did take place share lessons learnt during the pandemic, to inform future efforts to engage with the independent sector to clear backlogs of elective care.

Strengths and limitations

Our analysis was based on administrative hospital data and is subject to residual error resulting from misclassification. However, HES data is generally considered of high quality, as it is derived from data used for hospital reimbursement and has been used in the study of quality of care,(24) and policy evaluations linked to specific emergency and elective patient groups.(25,26) The collection of information on admitted patient care by PHIN has been based upon the HES dataset, and therefore shares such limitations, however PHIN remains the only source of data on privately-funded care in the independent sector. While this is the first study, which has utilised PHIN data, it has been used routinely by the healthcare sector for several years as a source of information on trends in the independent sector.(27) Moreover, a significant strength of our analysis is that we can provide a complete pictures of healthcare market, taking account of both privately and publicly-funded care by the independent sector and the NHS.

One limitation of data submitted by the independent sector seen in both HES and PHIN data, is the quality of coding in relation to patient comorbidities. It is notable in our analysis that age and length of stay is on average higher in ISPs compared to NHS hospitals, but the Charlson Comorbidity Index is lower. This would suggest some degree of coding inaccuracy rather than this being a true reflection of case-mix, and therefore any comparisons between ISPs and NHS hospital related to patient comorbidities must be interpreted with caution. However, even if comorbidities are poorly recorded in ISPs, there is still merit in comparing trends before and during the pandemic, assuming that the degree of coding accuracy has not significantly changed during the study period.

Finally, a further limitation of our analysis is that we chose to restrict our analysis to a four-month period between April and July 2020 compared to the previous year. There will of course be further insights from analysing additional time periods during subsequent waves of COVID-19, and this should indeed be the focus on additional work. However, we chose to restrict our analysis to this time period as the focus on this paper is to understand trends in elective care provision across the English healthcare system during a period which national block contracts between the NHS and independent sector were in place.

Policy implications and conclusion

The NHS has struggled to keep up with demands for its services even preceding the COVID-19 pandemic.(28) Due to a combination of policy failures that encouraged hospital efficiency and discouraged long-term capital investment, capacity constraints have adversely impacted on patients, from long waiting times at Accident & Emergency departments,(29) to cancelled elective surgeries,(30) and poor patient outcomes.(31) The pandemic has uncovered a lack of resilience in the NHS driven by poor capacity, that weakened its ability to cope with a stressor such as the COVID-19 pandemic. If utilised effectively, the availability of additional capacity at ISPs can therefore be a crucial resource to enable serving those that have been struggling to receive the care they need. Until substantial investments into NHS infrastructure materialise, contracting with the independent sector may be one of the only solutions to expand service provision at a scale required to tackle the five million patient-strong waiting list, in the short to medium term.(32)

Our analysis has shown that during the first wave of the COVID-19 pandemic, ISPs increased activity for a few select specialties and procedures, although these increases were relatively small in comparison to total reductions in publicly-funded elective care and were concentrated in certain regions. Despite a national block contract being in place, a significant amount of capacity in the independent sector remained underutilised, although reductions in publicly-funded care were less pronounced than for privately-funded care. While the reasons driving this are multifactorial, it is possible that block contracts did not sufficiently incentivise publicly-funded elective activity in the independent sector. Future contracts with the independent sector should incentivise activity where it is most needed in order to release pressure from the NHS. There are also opportunities for the regions which successfully achieved significant increases in publicly-funded elective care in the independent sector to share their experiences and provide insights into how to realise effective collaboration at the local level.

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Contributors

RF drafted the manuscript, and MA and LM undertook the data analysis. All authors commented and edited iterative drafts of the manuscript.

Competing interests

RF received financial support from AstraZeneca for work unrelated to this study. RF is a scientific advisor to Circle Cardiovascular Imaging Inc. and receives regular financial support for his services. No further competing interest to declare.

Ethical approval

No ethical approval was required for this study.

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Data sharing

The data controller of the data analysed on publicly-funded care is NHS Digital, whereas the data controller of data analysed on privately-funded is the Private Health Information Network. Patient-level data are available subject to their information governance requirements. The authors will be able to share aggregate data and coding scripts upon request.

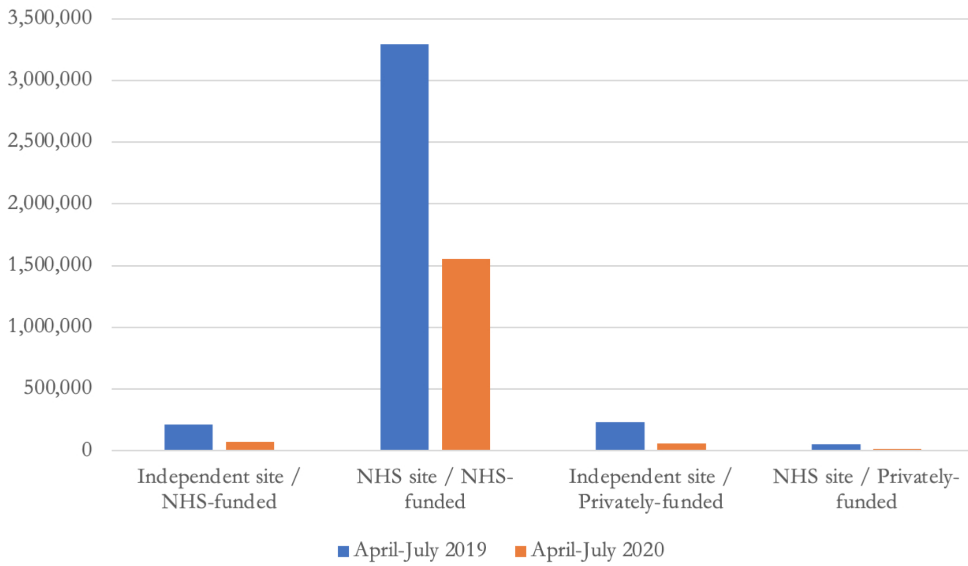

Figure 1: Total number of hospital spells by market quadrant in April-July 2020 versus April-July 2019

223x127mm (144 x 144 DPI)

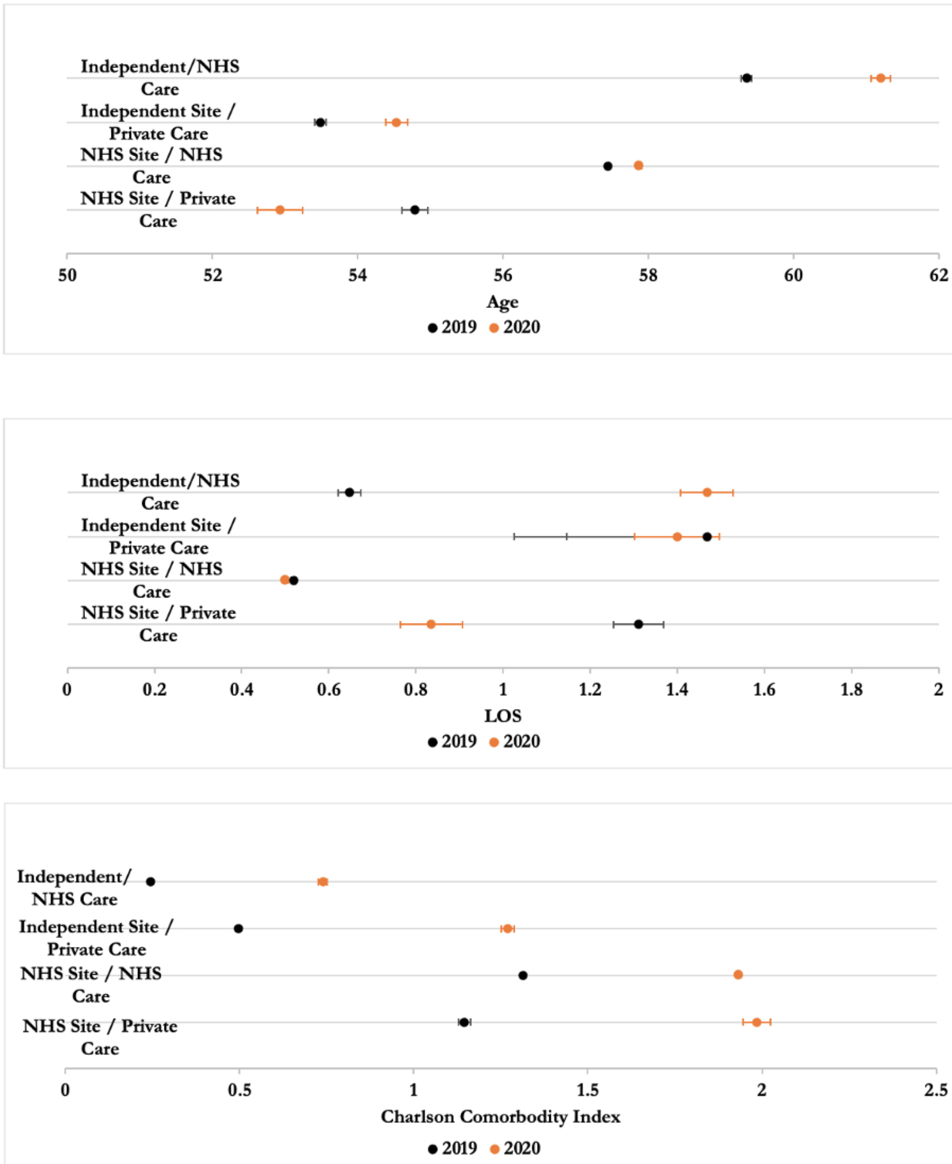

Figure 2: Mean age, length of stay and Charlson comorbidity index by market quadrant for April-July 2019 and April-July 2020

163x199mm (144 x 144 DPI)

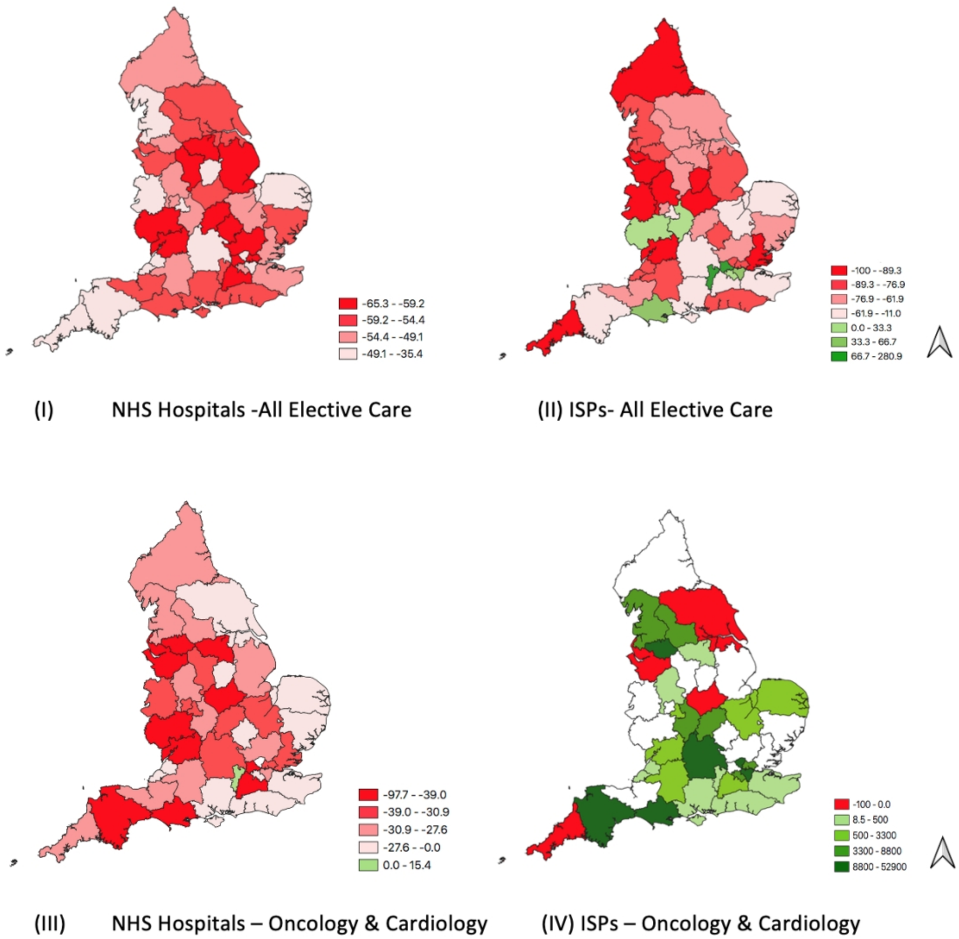

Figure 3: Growth rate on the number of admissions for NHS funded care for NHS Hospitals and Independent Sector Providers (ISPs) by Sustainability and Transformation Partnerships (STP) - April-July 2019 v April-July 2020 (%)

230x215mm (144 x 144 DPI)

Supplementary table 1: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Largest Reductions in Volume and Market Quadrant *

Procedure	April-July 2019	April-July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Bursa excision (surgical)	275	6	-97.8%	Varicose vein treatment (avulsion)	1018	39	-96.2%
Bursa treatment (non-surgical)	944	22	-97.7%	Halo procedure	383	19	-95.0%
Metatarsal osteotomy	770	24	-96.9%	Varicose vein treatment (laser ablation)	1023	53	-94.8%
Vasectomy	1068	40	-96.3%	Rhinoplasty	729	38	-94.8%
Spinal injection (facet joint injection or paravertebral block)	3059	119	-96.1%	Spinal injection (facet joint injection or paravertebral block)	8773	462	-94.7%
Joint injections for pain	8772	384	-95.6%	Varicose vein combined treatments	853	45	-94.7%
Septoplasty	1011	49	-95.2%	Vasectomy	1761	97	-94.5%
Knee replacement (primary)	8796	446	-94.9%	Breast enlargement	937	53	-94.3%
Haemorrhoid treatment	2166	112	-94.8%	Ankle replacement (primary)	316	18	-94.3%
Knee replacement (primary - unicompartmental)	1073	63	-94.1%	Breast lift	271	16	-94.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Cosmetic Rhinoplasty	275	3	-98.9%	Eardrum surgery	342	1	-99.7%
Weight loss surgery (gastric banding)	324	8	-97.5%	Joint injections for pain	205	4	-98.0%
Varicose vein treatment (ligation and stripping)	294	8	-97.3%	Tonsillectomy	368	14	-96.2%
Face lift	579	16	-97.2%	Knee replacement (primary)	437	17	-96.1%
Varicose vein treatment (avulsion)	459	14	-96.9%	Hip replacement (primary)	718	32	-95.5%
External ear plastic surgery (pinna)	423	15	-96.5%	Knee arthroscopy	281	14	-95.0%
Septoplasty	1166	46	-96.1%	Circumcision	236	16	-93.2%
Labiaplasty	344	14	-95.9%	Cardiac surgery (coronary artery bypass graft - CABG)	255	19	-92.5%
Rhinoplasty	1200	50	-95.8%	Cataract surgery	4299	358	-91.7%
Eye lift (blepharoplasty)	1139	49	-95.7%	Cardiac Ablation	819	71	-91.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary table 2: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Smallest Reductions in Volume and Market Quadrant *

Procedure	April -July 2019	April -July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Partial excision of breast (wide local excision)	1	1671	167000.0%	Percutaneous bile duct procedure	216	211	-2.3%
Bladder tumour resection (TURBT)	59	1000	1594.9%	Ascitic drain	5717	5503	-3.7%
Prostate needle biopsy	69	977	1315.9%	TAVI (Transcatheter Aortic Valve Implantation)	916	840	-8.3%
Mastectomy	115	1281	1013.9%	Therapeutic spinal tap	3459	3171	-8.3%
Kidney stone treatment - keyhole (PCNL)	61	576	844.3%	Right hemicolectomy	855	766	-10.4%
Excision lesion of breast (lumpectomy)	50	413	726.0%	Percutaneous liver blood vessel procedure	389	329	-15.4%
Prostate surgery (prostatectomy)	48	316	558.3%	Cervical suture in pregnancy	187	152	-18.7%
Thyroidectomy	55	311	465.5%	Spinal biopsy	171	136	-20.5%
Rectal lesion removal	60	322	436.7%	Intrathecal drug delivery system procedure	1523	1202	-21.1%
Bladder lesion treatment (endoscopy)	88	359	308.0%	Appendix removal - emergency keyhole	174	132	-24.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Vaginal birth	116	146	25.9%	Caesarean delivery	272	269	-1.1%
Caesarean delivery	233	273	17.2%	Vaginal birth	176	101	-42.6%
Partial excision of breast (wide local excision)	513	451	-12.1%	Partial excision of breast (wide local excision)	165	69	-58.2%
Mastectomy	554	434	-21.7%	Prostate surgery (prostatectomy)	259	85	-67.2%
Ascitic drain	173	128	-26.0%	Prostate needle biopsy	184	51	-72.3%
Excision lesion of breast (lumpectomy)	271	192	-29.2%	Skin lesion removal	399	87	-78.2%
Prostate surgery (prostatectomy)	264	178	-32.6%	Epidural injection	416	85	-79.6%
Bladder tumour resection (TURBT)	372	217	-41.7%	Inguinal hernia repair	341	66	-80.6%
Pacemaker - insertion, removal or attention	240	132	-45.0%	Pacemaker - insertion, removal or attention	459	89	-80.8%
Removal of products of conception (RPOC)	279	143	-48.7%	Spinal decompression (lumbar)	459	89	-81.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary table 3: Mean Age, Length of Stay (LOS), Charlson Comorbidity Index (CCI) by Speciality for top 10 highest volume specialities and by Market Quadrant in April-July 2020 and April-July 2019*

Specialty	Age			LOS			CCI		
	2019	2020	P value	2019	2020	P value	2019	2020	P value
Independent site/NHS-funded									
General surgery	52.012	57.626	0	0.082	1.046	0	0.231	1.001	0
Gastroenterology	51.271	56.91	0	0.007	0.177	0	0.266	0.247	0.043
Nephrology	N/A	56.67	N/A	N/A	1.00	N/A	N/A	2.33	N/A
Haematology	N/A	65.11	N/A	N/A	1.92	N/A	N/A	0.79	N/A
Medical oncology	N/A	63.84	N/A	N/A	0.81	N/A	N/A	1.83	N/A
Orthopaedics	59.611	54.688	0	0.931	0.774	0	0.262	0.208	0
Ophthalmology	74.877	74.703	0.088	0.002	0.003	0.183	0.206	0.12	0
Clinical oncology	N/A	62.36	N/A	N/A	0.15	N/A	N/A	5.91	N/A
General medicine	64.433	57.035	0	1.04	0.795	0.14	0.18	0.561	0
Urology	51.877	64.487	0	0.224	0.645	0	0.245	0.931	0
NHS site/NHS-funded									
General surgery	59.012	59.619	0	0.765	1.139	0	0.699	1.113	0
Gastroenterology	56.422	53.788	0	0.091	0.13	0	0.372	0.467	0
Nephrology	63.522	62.964	0	0.072	0.055	0	2.006	2.033	0
Haematology	62.776	61.398	0	0.335	0.332	0.761	1.621	1.63	0.05
Medical oncology	61.401	59.936	0	0.104	0.105	0.806	5.408	5.529	0
Orthopaedics	54.891	47.366	0	1.294	1.111	0	0.34	0.306	0
Ophthalmology	70.112	69.53	0	0.028	0.035	0.025	0.37	0.354	0
Clinical oncology	63.236	61.921	0	0.084	0.071	0.001	5.226	5.439	0
General medicine	59.883	59.941	0.431	0.214	0.295	0	0.827	1.09	0
Urology	62.364	63.583	0	0.514	0.542	0.009	0.961	1.189	0
Independent site/ Privately-funded									
General surgery	53.289	52.994	0.155	0.627	0.899	0	0.278	0.635	0
Gastroenterology	50.002	49.7	0.29	0.088	0.203	0	0.17	0.284	0
Nephrology	55.579	63.647	0.035	8.748	13.353	0.54	1.284	1.441	0.711
Haematology	59.954	60.419	0.391	1.393	0.879	0.018	1.38	1.857	0
Medical oncology	58.114	57.853	0.052	4.426	2.785	0	2.712	3.2	0
Orthopaedics	54.525	52.276	0	1.02	1.011	0.771	0.124	0.114	0.036
Ophthalmology	71.881	71.59	0.214	0.044	0.021	0.589	0.141	0.113	0.002
Clinical oncology	60.017	60.247	0.671	0.764	1.919	0.02	3.383	4.476	0
General medicine	57.258	60.477	0.002	2.652	3.619	0.205	0.42	0.732	0
Urology	59.47	61.758	0	0.476	0.562	0.011	0.403	0.586	0
NHS Site/ Privately-funded									
General surgery	53.602	0.011	2.16	2.132	0.908	1.044	1.608	0	53.602
Gastroenterology	50.151	0.018	0.701	0.178	0.071	0.588	0.642	0.517	50.151
Nephrology	52.392	0	1.141	0.003	0.007	2.065	2.303	0	52.392
Haematology	49.033	0	1.376	0.879	0.008	1.179	1.169	0.802	49.033
Medical oncology	55.317	0.007	0.488	0.412	0.235	3.258	3.413	0.001	55.317
Orthopaedics	47.634	0	2.353	2.442	0.687	0.279	0.331	0.206	47.634
Ophthalmology	62.573	0.001	0.062	0.057	0.81	0.18	0.182	0.952	62.573
Clinical oncology	55.393	0	0.64	0.317	0.198	3.671	3.674	0.977	55.393
General medicine	57.828	0.77	1.595	0.777	0.19	0.939	0.917	0.899	57.828
Urology	58.632	0.278	0.964	0.844	0.267	0.93	1.281	0	58.632

*P values were produced using t-test to undertake a comparison of means
N/A as <=1 admissions during 2019

Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: retrospective cohort study

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Word count: 3627

STROBE Statement

Checklist of items that should be included in reports of observational studies

Section/Topic	Item No	Recommendation	Reported on Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4, 5
Objectives	3	State specific objectives, including any prespecified hypotheses	4, 5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5, 6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5, 6
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	5, 13
Study size	10	Explain how the study size was arrived at	5, 6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6

		(*c*) Explain how missing data were addressed	-
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	6

Section/Topic	Item No	Recommendation	Reported on Page No
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7, 8, 9, 10, 11
		(b) Indicate number of participants with missing data for each variable of interest	
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7, 8, 9, 10, 11
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7, 8,9,10,11
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11, 12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11, 12, 13,14
Generalisability	21	Discuss the generalisability (external validity) of the study results	13

Other Information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

**Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.*

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: a descriptive analysis

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Keywords:	COVID-19, SURGERY, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: a descriptive analysis

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ABSTRACT

Background: Following a virtual standstill in the delivery of elective procedures in England, a national block contract between the NHS and the independent sector aimed to help restart surgical care. This study aims to describe subsequent changes in trends in elective care service delivery following implementation of the initial iteration of this contract.

Methods: Population-based retrospective cohort study, assessing the delivery of all publicly-funded and privately-funded elective care delivered in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. Discharge data from the Hospital Episode Statistics and private health care data from the Private Health Information Network was stratified by specialty, procedure, length of stay and patient complexity in terms of age, and charlson comorbidity index.

Results: COVID-19 significantly reduced publicly-funded elective care activity, though changes were more pronounced in the independent sector (-65.1 percent) compared with the NHS (-52.7 percent), whereas reductions in privately-funded elective care activity were similar in both independent sector hospitals (-74.2%) and NHS hospitals (-72.9%). Patient complexity increased in the independent sector compared to the previous year, with mixed findings in NHS hospitals. Most specialties, irrespective of sector or funding mechanisms, experienced a reduction in hospital admissions. However, some specialities, including medical oncology, clinical oncology, clinical haematology, and cardiology, experienced an increase in publicly-funded elective care activity in the independent sector.

Conclusion: Elective care delivered by the independent sector remained significantly below historic levels, although this overlooks significant variation between regions and specialities. There may be opportunities to learn from regions which achieved more significant increases in publicly-funded elective care in ISPs as a strategy to address the growing backlog of elective care.

Article summary

Strengths and limitations of this study

- Assessment of hospital activity across the entire independent sector and public sector in England.
- Implications of the national block contracts used during the first wave of the COVID-19 pandemic to generate additional resources and increase capacity within the National Health Service.
- Identifying regional variation in the use of independent sector capacity before and during COVID-19.
- Observational study without natural control group.

1. INTRODUCTION

Independent sector providers (ISPs) have played a role in the provision of publicly-funded elective health care services in England since the early 2000s.(1) Private, for-profit surgical centres have provided routine, high volume elective procedures to National Health Service (NHS) patients, supporting incumbent governments to tackle waiting times for surgery. Although the overall contribution of ISPs to NHS funded care was around six percent of total NHS elective activity before COVID-19,(2) for some elective procedures such as cataract repair, inguinal hernia repair, and hip replacement, close to one in every three publicly-funded treatment was performed by ISPs. In total, it is estimated that NHS commissioners spent £9.7 billion on services delivered by ISPs in 2019/20, accounting for approximately 7.2% of the annual health care budget.(3)

For years, the financing of private health care through public funds has been controversial and has sparked criticism, including from professional bodies and medical staff.(4) There remain uncertainties about the value of care provided by ISPs, the impact they might have on the NHS through its correlates like staffing, and a lack of transparency and governance of contracts struck between payers and providers of care.(5) Despite opposition to further expansion of ISPs provision of publicly-funded services, it was ISPs that promised a refuge for a struggling NHS to provide additional capacity when the pandemic started in 2020. Effective from 1st of April 2020, NHS England and NHS Improvement (NHSEI) agreed an emergency contract with ISPs via the Independent Healthcare Providers Network,(6, 7,8) which was originally envisaged as covering the treatment of both COVID-19 and non-COVID-19 patients. The complete terms and conditions of the contract have yet to be publicly published, however it is known that activity based payments were suspended and instead the NHS agreed to purchase 100% of capacity available in ISPs on an "at cost" basis.(9) ISPs were also free to utilise unused capacity for privately-funded patients and a rebate system agreed to refund payments to the NHS in this circumstance.(9) In total, it is estimated this contracting arrangement cost the NHS £200 million per month.(10) Fortunately, NHS hospitals were not overwhelmed with COVID-19 during the first wave of the pandemic, and the focus shifted towards utilising the independent sector to reconvene non-urgent elective operations.(7) ISP sites were intended to act as designated COVID-19-free facilities,(12) increasing available capacity within the NHS, and offering care to patients on growing waiting lists.(13)

The introduction of block contracts with the independent sector was necessitated by the unprecedented situation faced by the NHS, and a departure from usual agreements commonly struck locally.(14) The initial iteration of this national block contract ran until July 31st 2020 and was then renegotiated in favour of a greater emphasis on local agreements between NHS commissioners and independent sector hospitals. While establishing the casual impact of this national block contract is difficult as ISPs struggled with many capacity issues also experienced by NHS hospitals during the COVID-19 pandemic, there is an unmet need for analyses which describe trends of elective care service delivery during the implementation of this contracting arrangement. The imperative to understand these trends has only increased recently as for the first time there is approximately five million people on a waiting list in England,(15) and there is growing attention on how to design effective financing mechanisms, regulation and governance of ISPs when contracting with the NHS in a manner that safeguards public funds and incentivises activity to clear elective care backlogs.

2. METHODS

Study cohort

We analysed trends in elective care for publicly and privately-funded healthcare activity in both NHS hospitals and ISPs during the first wave of pandemic in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. We focused on differences in patient case-mix, specialties, procedures, and region (*i.e.*, Sustainability and Transformation Partnerships, or STPs). The decision was made to analyse changes at STP level as this has featured in other analysis of the impact of the COVID-19 pandemic on hospital bed capacity in the NHS,(16) and also reflects efforts by NHS England to encourage the coordination of local policy at the STP rather than CCG level since 2019.(17) The study period was chosen to capture service delivery across market quadrants during a period unaffected by COVID-19, compared with a period impacted by the COVID-19 pandemic and applicable to the national block contract in place between sectors. Moreover, the study period allowed to control for any bias resulting from seasonality.

Data for publicly-funded care was retrieved from the Hospital Episode Statistics database provided by NHS Digital (*i.e.,* the non-departmental public body responsible for information, data and IT systems in England). This national administrative database contains pseudonymised and unidentifiable information on all patients accessing care in the English NHS, including at Accident and Emergency departments, as inpatients and in outpatient settings. Privately-funded care was retrieved from the Private Health Information Network (PHIN). PHIN has been mandated by the Competition and Market Authority (CMA) as being responsible for collection and reporting of activity in the private health care sector since 2016.(18) Both datasets contain patient information including demographics, diagnosis, and treatment. The data is recorded in finished episodes of care, which relates to the clinician responsible for the respective aspect of care. When analysing numbers of hospital admissions, to avoid multiple counting, we linked episodes from patient admission to discharge into complete spells. However, when analysing numbers of procedures, we utilised finished episodes of care. Specialty was coded according to main specialty codes, as defined by NHS Digital and the UK Royal Colleges,(19) which is applied in both the HES and PHIN datasets. Hospitals spells were counted according to the specialty of the admitting consultant. Our analysis focused specifically on elective care. Emergency admissions were excluded as these are less likely to be impacted by contractual agreements between sectors, and historically only accounted for a small proportion of patients treated at ISPs.

Study outcomes

Broadly the health care system in England, can be understood to have four market quadrants: publicly-funded care delivered by the NHS, publicly-funded care delivered by ISPs, privately-funded care delivered by the NHS, and privately-funded care delivered by ISPs. The primary outcomes in this study were the number of total hospital discharges following an elective hospitalisation by market quadrant, and separately for the ten specialties and procedures, which saw the largest and smallest percentage changes between the baseline period and the first wave of the COVID-19 pandemic, respectively. This was restricted to specialties with more than 1000 discharges, and procedures undertaken more than 200 times collectively during our baseline period and the first wave of the pandemic. All discharges were considered, irrespective of patient survival status.

The secondary outcomes studied relate to patient complexity, including patient age on admission and Charlson Comorbidity Index, and length of stay. We used the Charlson Comorbidity Index as a measure for patient complexity based on the number of comorbidities recorded in HES and PHIN data. The index is used widely for risk-stratification in health services research and was calculated based on diagnosis codes recorded at admission.(20) Length of stay was calculated as the difference between day of admission and day of discharge. Patients that were admitted and discharged on the same day, or without staying overnight were recorded with a zero length of stay.

Statistical analysis

We estimated the total number of patient discharges by market quadrant for the period of 1st of April 2019, and 31st of July 2019, and the same period in 2020. We calculated percentage change between study periods for the top 15 specialities in terms of total discharges for both publicly and privately-funded care across time periods for each market quadrant. We also identified the procedures with the largest percentage change for each market quadrant, with procedures classified based on OPCS-4 codes.(21) To assess differences in patient complexity and length of stay, we performed paired-sample t-tests and report p-values with 0.05 considered as threshold for statistical significance. Sensitivity analysis investigated changes in patient case-mix by specialty group. All data cleaning and analyses were performed using STATA SE 15.

Patient and public involvement

No patients were involved in the development of the research question or the outcome measures. Patients were not involved in developing strategies for design or implementation of the study. The authors plan to disseminate results to patients and policymakers through virtual outreach activities, and platforms provided by PHIN and the Global Surgery Policy Unit, a new partnership between the London School of Economics and Political Science and the Royal College of Surgeons of England.

3. RESULTS

Elective care service delivery before and during the COVID-19 pandemic

When analysing trends in activity levels during the first wave of the COVID-19 pandemic compared to the same period in 2019, we find that that there was significant reduction of publicly-funded health care activity (see Figure 1), though changes were more pronounced in ISPs (-65.1%) compared with the NHS (-52.7%), whereas reductions in privately-funded health care activity were similar in both ISPs (-74.2%) and NHS hospitals (-72.9%). Hospital admissions remained significantly below historic levels during the first wave of the COVID-19 pandemic, impacting all specialities, irrespective of sector or funding mechanisms.

While NHS hospitals experienced reductions across all specialties for publicly funded elective care (see Table 1), with the largest decreases in trauma and orthopaedics (-82.3 percent), ear, nose, and throat (-82.8%), and ophthalmology (-73.5 percent), we find that ISPs compensated some of the loss in activity with increases in volume for several specialities, in particular medical oncology, clinical oncology, clinical haematology, and cardiology. We also find that reductions in the provision of publicly-funded elective care for many specialties were less severe in ISPs compared to NHS hospitals for several specialities, including general surgery (-30.4% vs -69.4%), general medicine (-19.7% vs -58.6%), urology (-20.3% vs -61.5%), and plastic surgery (-6.3% vs -56.9%).

All specialties experienced reductions in privately-funded elective care provision in both ISPs and NHS hospitals (see Table 2), although clinical oncology, medical oncology, and clinical haematology experienced some of the smallest reductions in activity for privately-funded care in ISPs and NHS hospitals, suggesting continuation of cancer care was prioritised during the first wave of the pandemic irrespective of funding mechanism. Plastic surgery was the specialty with the largest reduction in privately-funded elective care provision in ISPs (90.9%), which contrasted with only a small reduction in publicly-funded elective care provision in ISPs for this specialty (-6.3%). This is likely to reflect how most privately-funded plastic surgery is of a cosmetic nature in contrast to publicly-funded plastic surgery which is often of a non-cosmetic nature. Specific procedures or treatments with largest increases for publicly-funded care by ISPs included partial excision of breast, transurethral resection of bladder tumour (TURBT), and mastectomy, even though in absolute numbers, these procedures recouped only a small proportion of the loss in high-volume publicly-funded activity observed at ISPs (see Supplementary Material Tables 1 & 2). In relation to privately-funded care in ISPs, activity levels for both vaginal birth and caesarean section increased during the first wave of the pandemic compared to the previous year.

Table 1: Percentage change in hospitals spells for publicly-funded elective care by specialty and by sector*

Specialty	April-July 2019	April-July 2020	% Change	April-July 2019	April-July 2020	% Change
	Independent site/NHS funded			NHS site/NHS funded		
Nephrology	0	12	-	272695	251575	-7.7%
Gastroenterology	19789	5480	-72.3%	359821	137647	-61.7%
General surgery	32842	22872	-30.4%	351480	107427	-69.4%
Clinical haematology	0	461	-	248651	176376	-29.1%
Clinical oncology	0	1689	-	195461	143606	-26.5%
Ophthalmology	47762	11598	-75.7%	205564	54570	-73.5%
Medical oncology	0	1266	-	178737	132737	-25.7%
Trauma & orthopaedics	62169	6300	-89.9%	201652	35594	-82.3%
General medicine	1727	1387	-19.7%	191689	79443	-58.6%
Urology	9624	7667	-20.3%	167619	64470	-61.5%
Gynaecology	10229	4252	-58.4%	96330	31646	-67.1%
Cardiology	507	1117	120.3%	82814	37567	-54.6%
Ear, nose, & throat	3504	1360	-61.2%	80917	13917	-82.8%
Plastic surgery	2477	2321	-6.3%	66289	28574	-56.9%
Paediatrics	99	29	-70.7%	58004	37535	-35.3%

*top 15 specialties in terms of total volume of spells for publicly funded elective care

Table 2: Percentage change in hospitals spells for privately funded elective care by specialty and by sector*

Specialty	April-July 2019	April-July 2020	% Change	April-July 2019	April-July 2020	% Change
	Independent site/Privately funded			NHS site/Privately funded		
Trauma & orthopaedics	42751	7751	-81.9%	4037	466	-88.5%
Medical oncology	21134	15086	-28.6%	8236	5199	-36.9%
General surgery	30381	6453	-78.8%	4193	670	-84.0%
Ophthalmology	18108	2994	-83.5%	6452	581	-91.0%
Gastroenterology	19136	4108	-78.5%	1818	515	-71.7%
Urology	14218	3819	-73.1%	3204	587	-81.7%
Plastic surgery	16976	1540	-90.9%	1151	118	-89.7%
Gynaecology	10118	2481	-75.5%	2073	447	-78.4%
Ear, nose, & throat	8036	819	-89.8%	1594	101	-93.7%
Cardiology	3095	1093	-64.7%	5412	747	-86.2%
Clinical haematology	2402	1540	-35.9%	3722	2215	-40.5%
Anaesthetics	5415	663	-87.8%	604	61	-89.9%
Clinical oncology	1175	980	-16.6%	1890	773	-59.1%
Neurosurgery	2652	607	-77.1%	591	62	-89.5%
General medicine	2250	475	-78.9%	846	193	-77.2%

*top 15 specialties in terms of total volume of spells for privately funded elective care

Patient complexity and length of stay

Previous evidence has suggested that ISPs treat patients that are less clinically complex, leaving incumbent NHS sites with sicker, and costlier patients.(22,23) It remains contested whether these observed differences in patient case mix are a true reflection of patients seen in practice, which would point to cream skimming behaviour,(24) or are a fallacy resulting from data recording.(22) Despite this, our analysis indicates that ISPs shifted care towards treating more clinically complex patients during the first wave of the pandemic (Figure 2). The mean age of patients treated in all market quadrants increased with the exception of privately-funded care by NHS hospitals (54.77 years versus 52.91 years, p-value=<0.001), with the largest increase seen in publicly-funded care by ISPs (59.56 years versus 61.15 years, p-value=<0.001). Mean length of stay increased by ISPs, but decreased in NHS hospitals, potentially reflecting a lower threshold for discharge by NHS hospitals because of increased risk of hospital acquired COVID-19 infection. The largest increase for length of stay was for publicly-funded care by ISPs (0.36 versus 0.81, p-value=<0.001). This is likely to reflect the suspension of high-volume elective procedures such as cataract surgery and hernia repair typically delivered as a day case. Mean Charlson comorbidity index increased in all market quadrants, with the largest increase seen in privately-funded care by NHS hospitals (1.15 versus 2.00, p-value=<0.001) (see Figure 2). This could possibly reflect cancer care (as cancer diagnoses are incorporated in the Charlson comorbidity index), accounting for a larger proportion of total elective care during the first wave of the pandemic, as medical and clinical oncology consistently had the smallest reductions in activity irrespective of market quadrant (see Table 2).

Sub-analysis at the specialty level (see Supplementary Material Table 3) revealed these changes during the first wave of the COVID-19 pandemic were exemplified for certain specialities when focusing on publicly-funded care by ISPs. For general surgery, patients were on average significantly older (52.01 versus 57.63, p-value=<0.001), had a longer length of stay (0.08 versus 1.05, p-value=<0.001), and had a higher Charlson comorbidity index (0.231 versus 0.263, p-value=<0.001). Similarly for urology, patients were also on average significantly older (51.88 versus 64.28, p-value=<0.001), stayed longer (0.76 versus 1.14, p-value=<0.001), and had a higher Charlson comorbidity index (0.25 versus 0.93, p-value=<0.001). Interestingly, the opposite is seen for orthopaedics, where in all market quadrants, with the exception of privately-funded care by NHS hospitals, patients were on average younger, had a shorter length of stay, and a lower Charlson comorbidity index. It is possible this may reflect how reductions in orthopaedic care for paediatric patients were less severe than those experienced for adult patients during the first wave of the pandemic. When testing this hypothesis, we found reductions in volume of orthopaedic elective care provision for patients younger than 18 were smaller than those for patients aged 18 or older in all market quadrants (see Supplementary Table 4). In total, hospital spells reduced by 70.6% for paediatric patients compared to 84.6% for adult patients.

Geographical variation in the use of independent sector capacity

Throughout the first wave of the pandemic there was regional variation in COVID-19 related hospital admissions, with London and the North West approaching almost 100% occupancy for general and acute beds, with other regions such as the South West, Yorkshire and Humber, and the North East, less impacted.(16) It is therefore not surprising we have identified regional variation in the provision of elective care during the first wave of the pandemic in our analysis (see Figure 3).

The highest degree of variation experienced by STP was for publicly-funded care by the independent sector, ranging from an increase of 280.8% at the Frimley Health and Care Integrated

Care System (ICS) STP, to a reduction of -99.8% at the Shropshire, Telford and Wrekin STP. A total of six STPs observed a net increase in publicly-funded activity by the independent sector compared with the baseline period (*i.e.,* Frimley Health and Care ICS, North West London Health and Care Partnership, Dorset, Our Healthier South East London, Herefordshire and Worcestershire, and Coventry and Warwickshire). Almost two-thirds of STPs saw provisions of volume linked to oncology and cardiology increase (*e.g.*, at the Devon STP, activity increased from 1 case in 2019, to 1892 cases in 2020), with 19 STPs introducing these specialties for the first time due to the emergency contracting with NHSEI.

4. DISCUSSION

In England, ISPs have treated publicly-funded elective patients for almost two decades, mostly specialising in high volume surgical procedures such as cataract repair, inguinal hernia repair, and joint replacements.(2) With a growing proportion of the health care budget spent on the independent sector, rather than investments into existing NHS infrastructure, the reliance on independent hospitals to treat NHS patients has raised concerns amongst the medical profession and the general public.(4) When the COVID-19 pandemic started in 2020, NHSEI secured ISP capacity in England through emergency block contracts with the independent sector via the Independent Healthcare Providers Network, fostering a greater collaboration than ever seen before. While these contracts covered both COVID-19 and non-COVID-19 care, fortunately ISP capacity was ultimately not required for COVID-19 patients and instead ISPs were used as sites to deliver elective care to non-COVID-19 patients on growing waiting lists.(12) While we cannot establish a casual impact of this policy, this study provides insights into trends in the delivery of elective care across the NHS and ISPs while this block contract was in place.

To our knowledge, this is the first analysis that provides a complete assessment of changes in patient care during the first wave of the pandemic as it links patient-level data for all four market quadrants, including NHS funded care and privately-funded care within NHS providers and ISPs. In doing so, we found that reductions in elective care activity in ISPs were more pronounced for privately-funded care than for publicly-funded care. However, we cannot state whether this is evidence of ISPs prioritising publicly-funded care during our period of analysis, differences in case-mix, or differences in patient pathways. Understanding trends in elective care provision by both ISPs and NHS hospitals is also complicated by the existence of several other factors experienced by both sectors including a reduced availability of staff and equipment, and reduced patient demand due to shifts in patients' willingness to attend for an operation due to fear of infection.

Moreover, ISPs and NHS hospitals draw upon a common workforce of hospital consultants, and it is possible that some hospital consultants chose to suspend or limit their work in the independent sector during the initial months of the pandemic due to concerns regarding infection prevention and control when operating across multiple sites, or whether hospital consultants were redeployed within their NHS hospitals to assist the wider response to the COVID-19 pandemic.

In contrast to previous research which suggests that ISPs appear to treat less clinically complex patients,(22,23,25,26) our analysis finds significant increases in average patient complexity within the independent sector during the first wave of the pandemic in terms of age, and comorbidities. This could reflect a shift towards delivering higher volumes of more complex types of care, for example cancer care, to patients who are more likely to be older and have higher comorbidity. However, the suspension of less complex types of care, such as cataract and hernia operations, and cosmetic surgery, which typically involves younger patients with fewer comorbidities may have also contributed to the apparent increase in patient complexity. As these are typically high-volume procedures in ISPs, and changes in cancer care were relatively low-volume, this is likely to have contributed to the majority of changes seen in terms of average patient complexity. We also saw average length of stay increase in ISPs and reduce in NHS hospitals. This is likely to reflect a combination of factors including the aforementioned reduction in operations such as cataract and hernia surgery, which is typically performed as a day case, and the imperative to discharge earlier in NHS hospitals to increase hospital capacity and reduce risk of hospital acquired COVID-19 infection.

Strengths and limitations

Our analysis was based on administrative hospital data and is subject to residual error resulting from misclassification. However, HES data is generally considered of high quality, as it is derived from data used for hospital reimbursement and has been used in the study of quality of care,(27) and policy evaluations linked to specific emergency and elective patient groups.(28,29) The collection of information on admitted patient care by PHIN has been based upon the HES dataset, and therefore shares such limitations, however PHIN remains the only source of data on privately-funded care in the independent sector. While this is the first study, which has utilised PHIN data, it has been used routinely by the healthcare sector for several years as a source of information on trends in the independent sector.(30) Moreover, a significant strength of our analysis is that we can provide a complete pictures of healthcare market, taking account of both privately and publicly-funded care by the independent sector and the NHS.

One limitation of data submitted by the independent sector seen in both HES and PHIN data, is the quality of coding in relation to patient comorbidities. It is notable in our analysis that age and length of stay is on average higher in ISPs compared to NHS hospitals, but the Charlson Comorbidity Index is lower. This would suggest some degree of coding inaccuracy rather than this being a true reflection of case-mix, and therefore any comparisons between ISPs and NHS hospital related to patient comorbidities must be interpreted with caution. However, even if comorbidities are poorly recorded in ISPs, there is still merit in comparing trends before and during the pandemic, if the degree of coding accuracy has not significantly changed during the study period.

Finally, a further limitation of our analysis is that we chose to restrict our analysis to a four-month period between April and July 2020 compared to the previous year. There will of course be further insights from analysing additional time periods during subsequent waves of COVID-19, and this should indeed be the focus on additional work. However, we chose to restrict our analysis to this time period as the focus on this paper is to understand trends in elective care provision across the English healthcare system during a period with national block contracts between the NHS and independent sector in place.

Policy implications and conclusion

The NHS has struggled to keep up with demands for its services even preceding the COVID-19 pandemic.(31) Due to a combination of policy failures that encouraged cost cutting and discouraged long-term capital investment, capacity constraints have adversely impacted on patients, from long waiting times at Accident & Emergency departments,(32) to cancelled elective surgeries,(33) and poor patient outcomes.(34) The pandemic has uncovered a lack of resilience in the NHS driven by poor capacity, that weakened its ability to cope with a stressor such as the COVID-19 pandemic. If utilised effectively, the availability of additional capacity at ISPs can therefore be a crucial resource to serve those that have been struggling to receive the care they need. Until substantial investments into NHS infrastructure materialise, contracting with the independent sector may be one of the only available solutions to expand service provision at a scale required to tackle the five million patient-strong waiting list, in the short to medium term.(35)

Our analysis has shown that during the first wave of the COVID-19 pandemic, ISPs increased activity for a few select specialties and procedures, although these increases were relatively small in comparison to total reductions in publicly-funded elective care and were concentrated in certain regions. Despite a national block contract being in place, a significant amount of capacity in the independent sector remained underutilised, although reductions in publicly-funded care were less pronounced than for privately-funded care. While it is challenging to understand the impact of this contracting arrangement during a period of time when ISPs also experienced many capacity issues similar to NHS hospitals, it is possible that block contracts did not sufficiently incentivise publicly-funded elective activity in the independent sector. Future contracts with the independent sector should incentivise activity where it is most needed to release pressure from the NHS. There are also opportunities for the regions which successfully achieved significant increases in publicly-funded elective care in the independent sector to share their experiences and provide insights into how to realise effective collaboration at the local level.

Figure 1: **Total number of hospital spells by market quadrant in April-July 2020 versus April-July 2019**

Figure 2A: **Mean age by market quadrant for April-July 2019 and April-July 2020**

Figure 2B: **Mean length of stay (LOS) by market quadrant for April-July 2019 and April-July 2020**

Figure 2C: **Mean Charlson comorbidity index by market quadrant for April-July 2019 and April-July 2020**

Figure 3: **Growth rate on the number of admissions for NHS funded care for NHS Hospitals and Independent Sector Providers (ISPs) by Sustainability and Transformation Partnerships (STP) - April-July 2019 v April-July 2020 (%)**

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Contributors

RF and MA drafted the manuscript, and MA and LM undertook the data analysis. RF, MA, LM and JF commented and edited iterative drafts of the manuscript.

Competing interests

RF received financial support from AstraZeneca for work unrelated to this study. RF is a scientific advisor to Circle Cardiovascular Imaging Inc. and receives regular financial support for his services. No further competing interest to declare.

Ethical approval

No ethical approval was required for this study.

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Data sharing

The data controller of the data analysed on publicly-funded care is NHS Digital, whereas the data controller of data analysed on privately-funded is the Private Health Information Network. Patient-level data are available subject to their information governance requirements. The authors will be able to share aggregate data and coding scripts upon request.

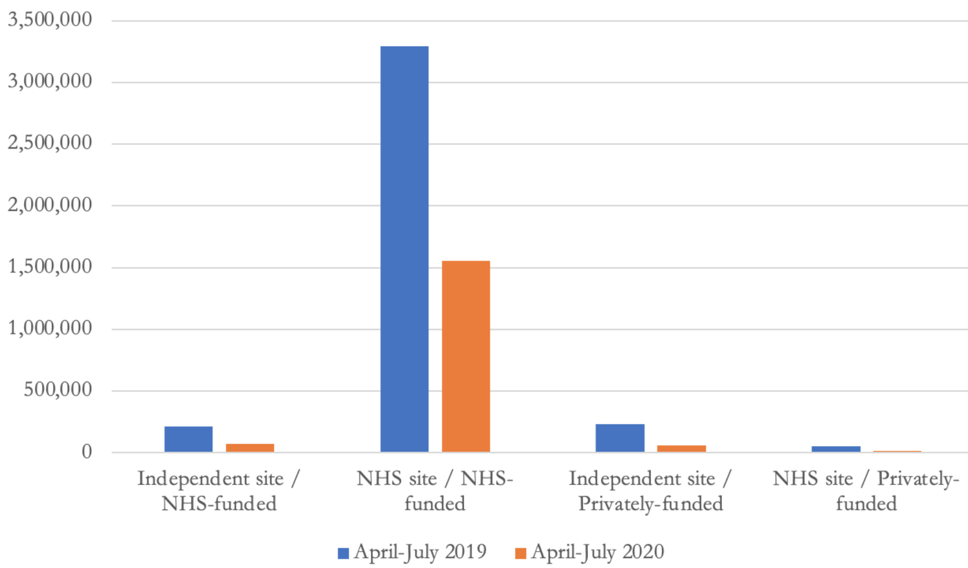


Figure 1: Total number of hospital spells by market quadrant in April-July 2020 versus April-July 2019

223x127mm (144 x 144 DPI)

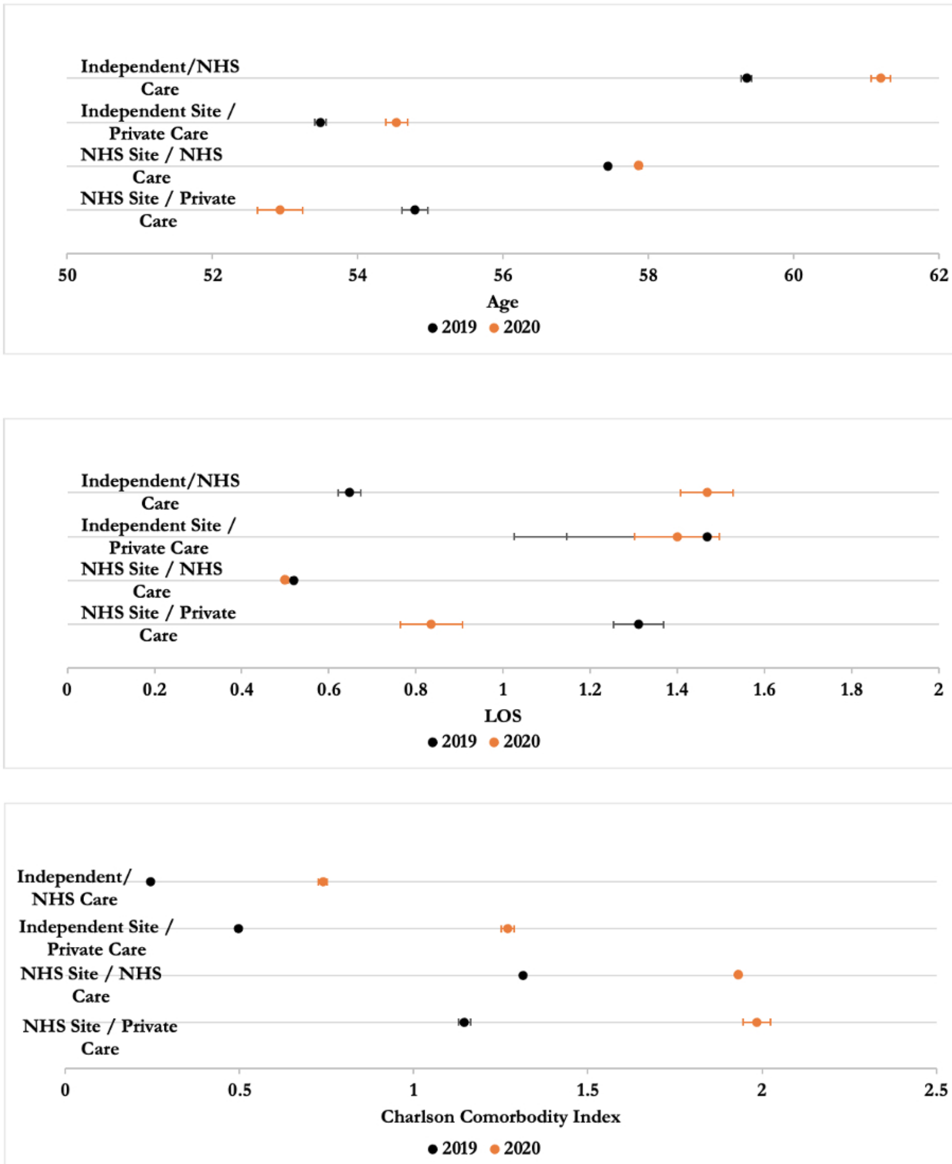
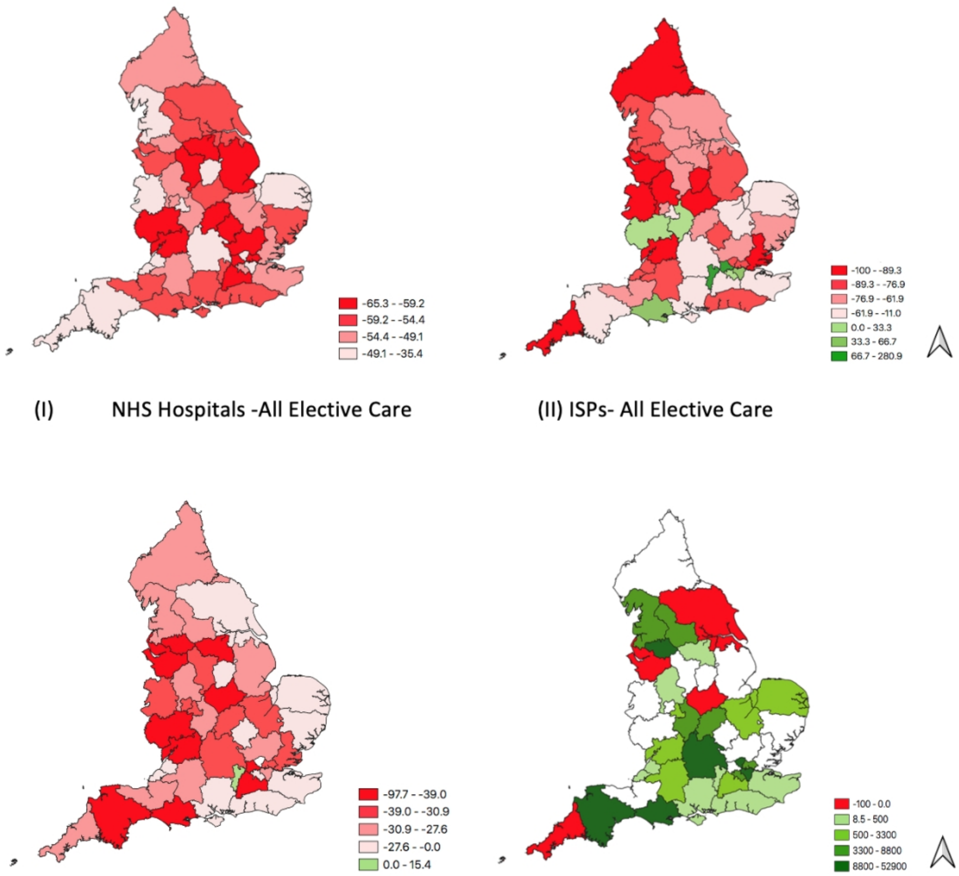


Figure 2: Mean age, length of stay and Charlson comorbidity index by market quadrant for April-July 2019 and April-July 2020

163x199mm (144 x 144 DPI)



(I) NHS Hospitals -All Elective Care (II) ISPs- All Elective Care

(III) NHS Hospitals – Oncology & Cardiology (IV) ISPs – Oncology & Cardiology

Figure 3: Growth rate on the number of admissions for NHS funded care for NHS Hospitals and Independent Sector Providers (ISPs) by Sustainability and Transformation Partnerships (STP) - April-July 2019 v April-July 2020 (%)

230x215mm (144 x 144 DPI)

Supplementary table 1: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Largest Reductions in Volume and Market Quadrant *

Procedure	April-July 2019	April-July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Bursa excision (surgical)	275	6	-97.8%	Varicose vein treatment (avulsion)	1018	39	-96.2%
Bursa treatment (non-surgical)	944	22	-97.7%	Halo procedure	383	19	-95.0%
Metatarsal osteotomy	770	24	-96.9%	Varicose vein treatment (laser ablation)	1023	53	-94.8%
Vasectomy	1068	40	-96.3%	Rhinoplasty	729	38	-94.8%
Spinal injection (facet joint injection or paravertebral block)	3059	119	-96.1%	Spinal injection (facet joint injection or paravertebral block)	8773	462	-94.7%
Joint injections for pain	8772	384	-95.6%	Varicose vein combined treatments	853	45	-94.7%
Septoplasty	1011	49	-95.2%	Vasectomy	1761	97	-94.5%
Knee replacement (primary)	8796	446	-94.9%	Breast enlargement	937	53	-94.3%
Haemorrhoid treatment	2166	112	-94.8%	Ankle replacement (primary)	316	18	-94.3%
Knee replacement (primary - unicompartmental)	1073	63	-94.1%	Breast lift	271	16	-94.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Cosmetic Rhinoplasty	275	3	-98.9%	Eardrum surgery	342	1	-99.7%
Weight loss surgery (gastric banding)	324	8	-97.5%	Joint injections for pain	205	4	-98.0%
Varicose vein treatment (ligation and stripping)	294	8	-97.3%	Tonsillectomy	368	14	-96.2%
Face lift	579	16	-97.2%	Knee replacement (primary)	437	17	-96.1%
Varicose vein treatment (avulsion)	459	14	-96.9%	Hip replacement (primary)	718	32	-95.5%
External ear plastic surgery (pinna)	423	15	-96.5%	Knee arthroscopy	281	14	-95.0%
Septoplasty	1166	46	-96.1%	Circumcision	236	16	-93.2%
Labiaplasty	344	14	-95.9%	Cardiac surgery (coronary artery bypass graft - CABG)	255	19	-92.5%
Rhinoplasty	1200	50	-95.8%	Cataract surgery	4299	358	-91.7%
Eye lift (blepharoplasty)	1139	49	-95.7%	Cardiac Ablation	819	71	-91.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary table 2: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Smallest Reductions in Volume and Market Quadrant *

Procedure	April -July 2019	April -July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Partial excision of breast (wide local excision)	1	1671	167000.0%	Percutaneous bile duct procedure	216	211	-2.3%
Bladder tumour resection (TURBT)	59	1000	1594.9%	Ascitic drain	5717	5503	-3.7%
Prostate needle biopsy	69	977	1315.9%	TAVI (Transcatheter Aortic Valve Implantation)	916	840	-8.3%
Mastectomy	115	1281	1013.9%	Therapeutic spinal tap	3459	3171	-8.3%
Kidney stone treatment - keyhole (PCNL)	61	576	844.3%	Right hemicolectomy	855	766	-10.4%
Excision lesion of breast (lumpectomy)	50	413	726.0%	Percutaneous liver blood vessel procedure	389	329	-15.4%
Prostate surgery (prostatectomy)	48	316	558.3%	Cervical suture in pregnancy	187	152	-18.7%
Thyroidectomy	55	311	465.5%	Spinal biopsy	171	136	-20.5%
Rectal lesion removal	60	322	436.7%	Intrathecal drug delivery system procedure	1523	1202	-21.1%
Bladder lesion treatment (endoscopy)	88	359	308.0%	Appendix removal - emergency keyhole	174	132	-24.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Vaginal birth	116	146	25.9%	Caesarean delivery	272	269	-1.1%
Caesarean delivery	233	273	17.2%	Vaginal birth	176	101	-42.6%
Partial excision of breast (wide local excision)	513	451	-12.1%	Partial excision of breast (wide local excision)	165	69	-58.2%
Mastectomy	554	434	-21.7%	Prostate surgery (prostatectomy)	259	85	-67.2%
Ascitic drain	173	128	-26.0%	Prostate needle biopsy	184	51	-72.3%
Excision lesion of breast (lumpectomy)	271	192	-29.2%	Skin lesion removal	399	87	-78.2%
Prostate surgery (prostatectomy)	264	178	-32.6%	Epidural injection	416	85	-79.6%
Bladder tumour resection (TURBT)	372	217	-41.7%	Inguinal hernia repair	341	66	-80.6%
Pacemaker - insertion, removal or attention	240	132	-45.0%	Pacemaker - insertion, removal or attention	459	89	-80.8%
Removal of products of conception (RPOC)	279	143	-48.7%	Spinal decompression (lumbar)	459	89	-81.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary table 3: Mean Age, Length of Stay (LOS), Charlson Comorbidity Index (CCI) by Speciality for top 10 highest volume specialities and by Market Quadrant in April-July 2020 and April-July 2019*

Specialty	Age			LOS			CCI		
	2019	2020	P value	2019	2020	P value	2019	2020	P value
Independent site/NHS-funded									
General surgery	52.012	57.626	0	0.082	1.046	0	0.231	1.001	0
Gastroenterology	51.271	56.91	0	0.007	0.177	0	0.266	0.247	0.043
Nephrology	N/A	56.67	N/A	N/A	1.00	N/A	N/A	2.33	N/A
Haematology	N/A	65.11	N/A	N/A	1.92	N/A	N/A	0.79	N/A
Medical oncology	N/A	63.84	N/A	N/A	0.81	N/A	N/A	1.83	N/A
Orthopaedics	59.611	54.688	0	0.931	0.774	0	0.262	0.208	0
Ophthalmology	74.877	74.703	0.088	0.002	0.003	0.183	0.206	0.12	0
Clinical oncology	N/A	62.36	N/A	N/A	0.15	N/A	N/A	5.91	N/A
General medicine	64.433	57.035	0	1.04	0.795	0.14	0.18	0.561	0
Urology	51.877	64.487	0	0.224	0.645	0	0.245	0.931	0
NHS site/NHS-funded									
General surgery	59.012	59.619	0	0.765	1.139	0	0.699	1.113	0
Gastroenterology	56.422	53.788	0	0.091	0.13	0	0.372	0.467	0
Nephrology	63.522	62.964	0	0.072	0.055	0	2.006	2.033	0
Haematology	62.776	61.398	0	0.335	0.332	0.761	1.621	1.63	0.05
Medical oncology	61.401	59.936	0	0.104	0.105	0.806	5.408	5.529	0
Orthopaedics	54.891	47.366	0	1.294	1.111	0	0.34	0.306	0
Ophthalmology	70.112	69.53	0	0.028	0.035	0.025	0.37	0.354	0
Clinical oncology	63.236	61.921	0	0.084	0.071	0.001	5.226	5.439	0
General medicine	59.883	59.941	0.431	0.214	0.295	0	0.827	1.09	0
Urology	62.364	63.583	0	0.514	0.542	0.009	0.961	1.189	0
Independent site/ Privately-funded									
General surgery	53.289	52.994	0.155	0.627	0.899	0	0.278	0.635	0
Gastroenterology	50.002	49.7	0.29	0.088	0.203	0	0.17	0.284	0
Nephrology	55.579	63.647	0.035	8.748	13.353	0.54	1.284	1.441	0.711
Haematology	59.954	60.419	0.391	1.393	0.879	0.018	1.38	1.857	0
Medical oncology	58.114	57.853	0.052	4.426	2.785	0	2.712	3.2	0
Orthopaedics	54.525	52.276	0	1.02	1.011	0.771	0.124	0.114	0.036
Ophthalmology	71.881	71.59	0.214	0.044	0.021	0.589	0.141	0.113	0.002
Clinical oncology	60.017	60.247	0.671	0.764	1.919	0.02	3.383	4.476	0
General medicine	57.258	60.477	0.002	2.652	3.619	0.205	0.42	0.732	0
Urology	59.47	61.758	0	0.476	0.562	0.011	0.403	0.586	0
NHS Site/ Privately-funded									
General surgery	53.602	0.011	2.16	2.132	0.908	1.044	1.608	0	53.602
Gastroenterology	50.151	0.018	0.701	0.178	0.071	0.588	0.642	0.517	50.151
Nephrology	52.392	0	1.141	0.003	0.007	2.065	2.303	0	52.392
Haematology	49.033	0	1.376	0.879	0.008	1.179	1.169	0.802	49.033
Medical oncology	55.317	0.007	0.488	0.412	0.235	3.258	3.413	0.001	55.317
Orthopaedics	47.634	0	2.353	2.442	0.687	0.279	0.331	0.206	47.634
Ophthalmology	62.573	0.001	0.062	0.057	0.81	0.18	0.182	0.952	62.573
Clinical oncology	55.393	0	0.64	0.317	0.198	3.671	3.674	0.977	55.393
General medicine	57.828	0.77	1.595	0.777	0.19	0.939	0.917	0.899	57.828
Urology	58.632	0.278	0.964	0.844	0.267	0.93	1.281	0	58.632

*P values were produced using t-test to undertake a comparison of means

N/A as <=1 admissions during 2019

Supplementary table 4: % Change in Hospitals Spells for Elective Care by Age and Market Quadrant for Orthopaedics

Age	April-July 2019	April-July 2020	% Change	Age	April-July 2019	April-July 2020	% Change
Independent site/NHS Care				NHS site/NHS Care			
Age <18	22	44	100.0%	Age <18	14120	4183	-70.4%
Age>=18	62147	7650	-87.7%	Age>=18	187532	31411	-83.2%
Independent site/ Private Care				NHS Site/ Private Care			
Age <18	854	217	-74.6%	Age <18	369	67	-81.8%
Age>=18	41897	7534	-82.0%	Age>=18	3668	399	-89.1%
All Market Quadrants							
Age< 18	15365	4511	-70.6%				
Age>=18	295244	45600	-84.6%				

Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: retrospective cohort study

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Word count: 3627

STROBE Statement

Checklist of items that should be included in reports of observational studies

Section/Topic	Item No	Recommendation	Reported on Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4, 5
Objectives	3	State specific objectives, including any prespecified hypotheses	4, 5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5, 6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5, 6
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	5, 13
Study size	10	Explain how the study size was arrived at	5, 6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6

		(*c*) Explain how missing data were addressed	-
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	6

Section/Topic	Item No	Recommendation	Reported on Page No
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7, 8, 9, 10, 11
		(b) Indicate number of participants with missing data for each variable of interest	
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7, 8, 9, 10, 11
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7, 8,9,10,11
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11, 12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11, 12, 13,14
Generalisability	21	Discuss the generalisability (external validity) of the study results	13

Other Information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

**Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.*

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: a descriptive analysis

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Secondary Subject Heading:	Health services research, Health economics, Surgery
Keywords:	COVID-19, SURGERY, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: a descriptive analysis

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Keywords: COVID-19; Elective Care; English National Health Service; Private Providers; Block Contracts

Word count: 3914

ABSTRACT

Background: Following a virtual standstill in the delivery of elective procedures in England, a national block contract between the NHS and the independent sector aimed to help restart surgical care. This study aims to describe subsequent changes in trends in elective care service delivery following implementation of the initial iteration of this contract.

Methods: Population-based retrospective cohort study, assessing the delivery of all publicly-funded and privately-funded elective care delivered in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. Discharge data from the Hospital Episode Statistics and private health care data from the Private Health Information Network was stratified by specialty, procedure, length of stay and patient complexity in terms of age, and charlson comorbidity index.

Results: COVID-19 significantly reduced publicly-funded elective care activity, though changes were more pronounced in the independent sector (-65.1 percent) compared with the NHS (-52.7 percent), whereas reductions in privately-funded elective care activity were similar in both independent sector hospitals (-74.2%) and NHS hospitals (-72.9%). Patient complexity increased in the independent sector compared to the previous year, with mixed findings in NHS hospitals. Most specialties, irrespective of sector or funding mechanisms, experienced a reduction in hospital admissions. However, some specialities, including medical oncology, clinical oncology, clinical haematology, and cardiology, experienced an increase in publicly-funded elective care activity in the independent sector.

Conclusion: Elective care delivered by the independent sector remained significantly below historic levels, although this overlooks significant variation between regions and specialities. There may be opportunities to learn from regions which achieved more significant increases in publicly-funded elective care in ISPs as a strategy to address the growing backlog of elective care.

Article summary

Strengths and limitations of this study

- Assessment of hospital activity across the entire independent sector and public sector in England.
- Implications of the national block contracts used during the first wave of the COVID-19 pandemic to generate additional resources and increase capacity within the National Health Service.
- Identifying regional variation in the use of independent sector capacity before and during COVID-19.
- Observational study without natural control group.

1. INTRODUCTION

Independent sector providers (ISPs) have played a role in the provision of publicly-funded elective health care services in England since the early 2000s.(1) Private, for-profit surgical centres have provided routine, high volume elective procedures to National Health Service (NHS) patients, supporting incumbent governments to tackle waiting times for surgery. Although the overall contribution of ISPs to NHS funded care was around six percent of total NHS elective activity before COVID-19,(2) for some elective procedures such as cataract removal, inguinal hernia repair, and hip and knee replacement, close to one in every three publicly-funded treatment was performed by ISPs. In total, it is estimated that NHS commissioners spent £9.7 billion on services delivered by ISPs in 2019/20, accounting for approximately 7.2% of the annual health care budget.(3)

For years, the financing of private health care through public funds has been controversial and has sparked criticism, including from professional bodies and medical staff.(4) There remain uncertainties about the value of care provided by ISPs, the impact they might have on the NHS through its correlates like staffing, and a lack of transparency and governance of contracts struck between payers and providers of care.(5) Despite opposition to further expand ISPs provision of publicly-funded services, it was ISPs that promised a refuge for a struggling NHS to provide additional capacity at the start of the pandemic in 2020.

Effective from 1st of April 2020, NHS England and NHS Improvement (NHSEI) agreed an emergency contract with ISPs via the Independent Healthcare Providers Network,(6, 7,8) which was originally envisaged as covering the treatment of both COVID-19 and non-COVID-19 patients. The complete terms and conditions of the contract have yet to be publicly published, however it is known that activity based payments were suspended and instead the NHS agreed to purchase 100% of capacity available in ISPs on an "at cost" basis.(9) ISPs were also free to utilise unused capacity for privately-funded patients and a rebate system agreed to refund payments to the NHS in this circumstance.(9) It is estimated this contracting arrangement cost the NHS £200 million per month.(10) Fortunately, NHS hospitals were not overwhelmed with COVID-19 during the first wave of the pandemic, and the focus shifted towards utilising the independent sector to reconvene non-urgent elective operations.(7) ISP sites acted as designated COVID-19-free facilities,(12) increasing available capacity within the NHS, and offering care to patients on growing waiting lists.(13)

The introduction of block contracts with the independent sector was necessitated by the unprecedented situation faced by the NHS, and a departure from usual agreements commonly struck locally.(14) The initial iteration of this national block contract ran until July 31st 2020 and was then renegotiated in favour of a greater emphasis on local agreements between NHS commissioners and independent sector hospitals. While establishing the casual impact of this national block contract is difficult as ISPs struggled with many capacity issues also experienced by NHS hospitals during the COVID-19 pandemic, the aim of this paper is to provide a descriptive analysis of elective care service delivery during the implementation of this contracting arrangement. Understanding how NHS providers and ISPs delivered care during a period of severe disruption, and to what extend the independent sector was able to alleviate pressures from the NHS will be imperative to develop sustainable strategies that will help address the backlog of over six million people on a waiting list in England. (15) It will inform discussions on how to design effective financing mechanisms, regulation and governance of ISPs when contracting with the NHS to safeguard public funds and incentivise activity

2. METHODS

Study cohort

We analysed trends in elective care for publicly and privately-funded healthcare activity in both NHS hospitals and ISPs during the first wave of pandemic in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. We focused on differences in patient case-mix, specialties, procedures, and region (*i.e.*, Sustainability and Transformation Partnerships, or STPs). The decision was made to analyse changes at STP level as this has featured in other analysis of the impact of the COVID-19 pandemic on hospital bed capacity in the NHS,(16) and also reflects efforts by NHS England to encourage the coordination of local policy at the STP rather than CCG level since 2019.(17) The study period was chosen to capture service delivery across market quadrants during a period unaffected by COVID-19, compared with a period impacted by the COVID-19 pandemic and applicable to the national block contract in place between sectors. Moreover, the study period allowed to control for any bias resulting from seasonality.

Data for publicly-funded care was retrieved from the Hospital Episode Statistics database provided by NHS Digital (*i.e.,* the non-departmental public body responsible for information, data and IT systems in England). This national administrative database contains pseudonymised and unidentifiable information on all patients accessing care in the English NHS, including at Accident and Emergency departments, as inpatients and in outpatient settings. Privately-funded care was retrieved from the Private Health Information Network (PHIN). PHIN has been mandated by the Competition and Market Authority (CMA) as being responsible for collection and reporting of activity in the private health care sector since 2016.(18) Both datasets contain patient information including demographics, diagnosis, and treatment. The data is recorded in finished episodes of care, which relates to the clinician responsible for the respective aspect of care. When analysing numbers of hospital admissions, to avoid multiple counting, we linked episodes from patient admission to discharge into complete spells. However, when analysing numbers of procedures, we utilised finished episodes of care. Specialty was coded according to main specialty codes, as defined by NHS Digital and the UK Royal Colleges,(19) which is applied in both the HES and PHIN datasets. Hospitals spells were counted according to the specialty of the admitting consultant. Our analysis focused specifically on elective care. Emergency admissions were excluded as these are less likely to be impacted by contractual agreements between sectors, and historically only accounted for a small proportion of patients treated at ISPs.

Study outcomes

Broadly the health care system in England, can be understood to have four market quadrants: publicly-funded care delivered by the NHS, publicly-funded care delivered by ISPs, privately-funded care delivered by the NHS, and privately-funded care delivered by ISPs. The primary outcomes in this study were the number of total hospital discharges following an elective hospitalisation by market quadrant, and separately for the ten specialties and procedures, which saw the largest and smallest percentage changes between the baseline period and the first wave of the COVID-19 pandemic, respectively. This was restricted to specialties with more than 1000 discharges, and procedures undertaken more than 200 times collectively during our baseline period and the first wave of the pandemic. All discharges were considered, irrespective of patient survival status.

The secondary outcomes studied relate to patient complexity, including patient age on admission and Charlson Comorbidity Index, and length of stay. We used the Charlson Comorbidity Index as a measure for patient complexity based on the number of comorbidities recorded in HES and PHIN data. The index is used widely for risk-stratification in health services research and was calculated based on diagnosis codes recorded at admission.(20) Length of stay was calculated as the difference between day of admission and day of discharge. Patients that were admitted and discharged on the same day, or without staying overnight were recorded with a zero length of stay.

Statistical analysis

We estimated the total number of patient discharges by market quadrant for the period of 1st of April 2019, and 31st of July 2019, and the same period in 2020. We calculated percentage change between study periods for the top 15 specialities in terms of total discharges for both publicly and privately-funded care across time periods for each market quadrant. We also identified the procedures with the largest percentage change for each market quadrant, with procedures classified based on OPCS-4 codes.(21) To assess differences in patient complexity and length of stay, we performed paired-sample t-tests and report p-values with 0.05 considered as threshold for statistical significance. Sensitivity analysis investigated changes in patient case-mix by specialty group. All data cleaning and analyses were performed using STATA SE 15.

Patient and public involvement

No patients were involved in the development of the research question or the outcome measures. Patients were not involved in developing strategies for design or implementation of the study. The authors plan to disseminate results to patients and policymakers through virtual outreach activities, and platforms provided by PHIN and the Global Surgery Policy Unit, a new partnership between the London School of Economics and Political Science and the Royal College of Surgeons of England.

3. RESULTS

Elective care service delivery before and during the COVID-19 pandemic

When analysing trends in total hospital admissions for elective care during the first wave of the COVID-19 pandemic compared to the same period in 2019, we find that there was significant reduction of publicly-funded health care activity (see Figure 1), though changes were more pronounced in ISPs (-65.1%) compared with the NHS (-52.7%), whereas reductions in privately-funded health care activity were similar in both ISPs (-74.2%) and NHS hospitals (-72.9%). Hospital admissions for elective care remained significantly below historic levels during the first wave of the COVID-19 pandemic, impacting all specialities, irrespective of sector or funding mechanisms. However, when we analyse total bed days (Supplementary Material 1), we find that reductions in publicly-funded health care activity were less pronounced in ISPs (-19.5%) compared with NHS hospitals (-54.5%). We also find reductions in privately-funded total bed days were less pronounced in private hospitals (-66.3%) compared with NHS hospitals (-82.8%). This reflects how ISPs performed less day case surgery during the first wave of the pandemic and shifted to more complex care involving greater length of stay (see below: patient complexity and length of stay).

While NHS hospitals experienced reductions across all specialties for publicly funded elective care (see Table 1), with the largest decreases in trauma and orthopaedics (-82.3 percent), ear, nose, and throat (-82.8%), and ophthalmology (-73.5 percent), we find that ISPs prioritised cancer care (medical oncology, clinical oncology), and cardiology. ISPs compensated some of the loss in activity but at a lower level, possibly due to higher resource intensity (*e.g.,* staffing requirements) linked to the treatment of more complex patients.

We also find that reductions in the provision of publicly-funded elective care for many specialties were less pronounced in ISPs compared to NHS hospitals for several specialities, including general surgery (-30.4% vs -69.4%), general medicine (-19.7% vs -58.6%), urology (-20.3% vs -61.5%), and plastic surgery (-6.3% vs -56.9%). All specialties experienced reductions in privately-funded elective care provision in both ISPs and NHS hospitals (see Table 2), although clinical oncology, medical oncology, and clinical haematology experienced some of the smallest reductions in activity for privately-funded care in ISPs and NHS hospitals, suggesting continuation of cancer care was prioritised during the first wave of the pandemic irrespective of funding mechanism. Plastic surgery was the specialty with the largest reduction in privately-funded elective care provision in ISPs (90.9%), which contrasted with only a small reduction in publicly-funded elective care provision in ISPs for this specialty (-6.3%). This is likely to reflect how most privately-funded plastic surgery is of a cosmetic nature in contrast to publicly-funded plastic surgery which is often of a non-cosmetic nature. Specific procedures or treatments with largest increases for publicly-funded care by ISPs included partial excision of breast, transurethral resection of bladder tumour (TURBT), and mastectomy, even though in absolute numbers, these procedures recouped only a small proportion of the loss in high-volume publicly-funded activity observed at ISPs (see Supplementary Material 2 & 3). In relation to privately-funded care in ISPs, activity levels for both vaginal birth and caesarean section increased during the first wave of the pandemic compared to the previous year.

Table 1: Percentage change in hospitals spells for publicly-funded elective care by specialty and by sector*

Specialty	April-July 2019	April-July 2020	% Change	April-July 2019	April-July 2020	% Change
	Independent site/NHS funded			NHS site/NHS funded		
Nephrology	0	12	-	272695	251575	-7.7%
Gastroenterology	19789	5480	-72.3%	359821	137647	-61.7%
General surgery	32842	22872	-30.4%	351480	107427	-69.4%
Clinical haematology	0	461	-	248651	176376	-29.1%
Clinical oncology	0	1689	-	195461	143606	-26.5%
Ophthalmology	47762	11598	-75.7%	205564	54570	-73.5%
Medical oncology	0	1266	-	178737	132737	-25.7%
Trauma & orthopaedics	62169	6300	-89.9%	201652	35594	-82.3%
General medicine	1727	1387	-19.7%	191689	79443	-58.6%
Urology	9624	7667	-20.3%	167619	64470	-61.5%
Gynaecology	10229	4252	-58.4%	96330	31646	-67.1%
Cardiology	507	1117	120.3%	82814	37567	-54.6%
Ear, nose, & throat	3504	1360	-61.2%	80917	13917	-82.8%
Plastic surgery	2477	2321	-6.3%	66289	28574	-56.9%
Paediatrics	99	29	-70.7%	58004	37535	-35.3%

*top 15 specialties in terms of total volume of spells for publicly funded elective care

Table 2: Percentage change in hospitals spells for privately funded elective care by specialty and by sector*

Specialty	April-July 2019	April-July 2020	% Change	April-July 2019	April-July 2020	% Change
	Independent site/Privately funded			NHS site/Privately funded		
Trauma & orthopaedics	42751	7751	-81.9%	4037	466	-88.5%
Medical oncology	21134	15086	-28.6%	8236	5199	-36.9%
General surgery	30381	6453	-78.8%	4193	670	-84.0%
Ophthalmology	18108	2994	-83.5%	6452	581	-91.0%
Gastroenterology	19136	4108	-78.5%	1818	515	-71.7%
Urology	14218	3819	-73.1%	3204	587	-81.7%
Plastic surgery	16976	1540	-90.9%	1151	118	-89.7%
Gynaecology	10118	2481	-75.5%	2073	447	-78.4%
Ear, nose, & throat	8036	819	-89.8%	1594	101	-93.7%
Cardiology	3095	1093	-64.7%	5412	747	-86.2%
Clinical haematology	2402	1540	-35.9%	3722	2215	-40.5%
Anaesthetics	5415	663	-87.8%	604	61	-89.9%
Clinical oncology	1175	980	-16.6%	1890	773	-59.1%
Neurosurgery	2652	607	-77.1%	591	62	-89.5%
General medicine	2250	475	-78.9%	846	193	-77.2%

*top 15 specialties in terms of total volume of spells for privately funded elective care

Patient complexity and length of stay

Previous evidence has suggested that ISPs treat patients that are less clinically complex, leaving incumbent NHS sites with sicker, and costlier patients.(22,23) It remains contested whether these observed differences in patient case mix are a true reflection of patients seen in practice, which would point to cream skimming behaviour,(24) or are a fallacy resulting from data recording.(22) Our analysis indicates that ISPs shifted care towards treating more clinically complex patients during the first wave of the pandemic (Figure 2), likely to be a reflection of the prioritisation of cancer care and cardiology. The mean age of patients treated in all market quadrants increased with the exception of privately-funded care by NHS hospitals (54.77 years versus 52.91 years, p-value=<0.001), with the largest increase seen in publicly-funded care by ISPs (59.56 years versus 61.15 years, p-value=<0.001). Mean length of stay increased by ISPs in line with focus on more urgent and complex cases, but decreased in NHS hospitals, possibly reflecting a lower threshold for discharge by NHS hospitals to avoid unnecessary exposure to hospital acquired COVID-19 infection. The largest increase for length of stay was for publicly-funded care by ISPs (0.36 versus 0.81, p-value=<0.001). This could reflect the suspension of high-volume elective procedures such as cataract surgery and hernia repair typically delivered as a day case. Mean Charlson comorbidity index increased in all market quadrants, with the largest increase seen in privately-funded care by NHS hospitals (1.15 versus 2.00, p-value=<0.001) (see Figure 2). Again, this likely reflects cancer care (as cancer diagnoses are incorporated in the Charlson comorbidity index), accounting for a larger proportion of total elective care during the first wave of the pandemic, as medical and clinical oncology consistently had the smallest reductions in activity irrespective of market quadrant (see Table 2).

Sub-analysis at the specialty level (see Supplementary Material Table 3) revealed these changes during the first wave of the COVID-19 pandemic were exemplified for certain specialities when focusing on publicly-funded care by ISPs. For general surgery, patients were on average significantly older (52.01 versus 57.63, p-value=<0.001), had a longer length of stay (0.08 versus 1.05, p-value=<0.001), and had a higher Charlson comorbidity index (0.231 versus 0.263, p-value=<0.001). Similarly for urology, patients were also on average significantly older (51.88 versus 64.28, p-value=<0.001), stayed longer (0.76 versus 1.14, p-value=<0.001), and had a higher Charlson comorbidity index (0.25 versus 0.93, p-value=<0.001). Interestingly, the opposite is seen for orthopaedics, where in all market quadrants, with the exception of privately-funded care by NHS hospitals, patients were on average younger, had a shorter length of stay, and a lower Charlson comorbidity index. It is possible this may reflect how reductions in orthopaedic care for paediatric patients were less severe than those experienced for adult patients during the first wave of the pandemic. When testing this hypothesis, we found reductions in volume of orthopaedic elective care provision for patients younger than 18 were smaller than those for patients aged 18 or older in all market quadrants (see Supplementary Table 4). In total, hospital spells reduced by 70.6% for paediatric patients compared to 84.6% for adult patients.

Geographical variation in the use of independent sector capacity

Throughout the first wave of the pandemic there was regional variation in COVID-19 related hospital admissions, with London and the North West approaching almost 100% occupancy for general and acute beds, with other regions such as the South West, Yorkshire and Humber, and the North East, less impacted.(16) It is therefore not surprising we have identified regional variation in the provision of elective care during the first wave of the pandemic in our analysis (see Figure 3).

The highest degree of variation experienced by STP was for publicly-funded care by the independent sector, ranging from an increase of 280.8% at the Frimley Health and Care Integrated Care System (ICS) STP, to a reduction of -99.8% at the Shropshire, Telford and Wrekin STP. A total of six STPs observed a net increase in publicly-funded activity by the independent sector compared with the baseline period (*i.e.,* Frimley Health and Care ICS, North West London Health and Care Partnership, Dorset, Our Healthier South East London, Herefordshire and Worcestershire, and Coventry and Warwickshire). Almost two-thirds of STPs saw provisions of volume linked to oncology and cardiology increase (*e.g.*, at the Devon STP, activity increased from 1 case in 2019, to 1892 cases in 2020), with 19 STPs introducing these specialties for the first time due to the emergency contracting with NHSEI.

4. DISCUSSION

In England, ISPs have treated publicly-funded elective patients for almost two decades, mostly specialising in high volume surgical procedures such as cataract removal, inguinal hernia repair, and joint replacements.(2) With a growing proportion of the health care budget spent on the independent sector, rather than investments into existing NHS infrastructure, the reliance on independent hospitals to treat NHS patients has raised concerns amongst the medical profession and the general public.(4) When the COVID-19 pandemic started in 2020, NHSEI secured ISP capacity in England through emergency block contracts with the independent sector via the Independent Healthcare Providers Network, fostering a greater collaboration than ever seen before. While these contracts covered both COVID-19 and non-COVID-19 care, fortunately ISP capacity was ultimately not required for COVID-19 patients and instead ISPs were used as sites to deliver elective care to non-COVID-19 patients on growing waiting lists.(12) While we cannot establish a casual impact of this policy, this study provides insights into trends in the delivery of elective care across the NHS and ISPs while this block contract was in place.

To our knowledge, this is the first analysis that provides a complete assessment of changes in patient care during the first wave of the pandemic as it links patient-level data for all four market quadrants, including NHS funded care and privately-funded care within NHS providers and ISPs. In doing so, we found that reductions in elective care activity in ISPs were more pronounced for privately-funded care than for publicly-funded care. However, we cannot state whether this is evidence of ISPs prioritising publicly-funded care during our period of analysis, differences in case-mix, or differences in patient pathways. Understanding trends in elective care provision by both ISPs and NHS hospitals is also complicated by the existence of several other factors experienced by both sectors including a reduced availability of staff and equipment, and reduced patient demand due to shifts in patients' willingness to attend for an operation due to fear of infection. Moreover, ISPs and NHS hospitals draw upon a common workforce of hospital consultants, and it is possible that some hospital consultants chose to suspend or limit their work in the independent sector during the initial months of the pandemic due to concerns regarding infection prevention and control when operating across multiple sites, or whether hospital consultants were redeployed within their NHS hospitals to assist the wider response to the COVID-19 pandemic.

In contrast to previous research which suggests that ISPs appear to treat less clinically complex patients,(22,23,25,26) our analysis finds significant increases in average patient complexity within the independent sector during the first wave of the pandemic in terms of age, and comorbidities. This likely reflects the shift towards delivering higher volumes of more complex types of cancer and cardiology care to older patients with higher comorbidity. However, the suspension of less complex types of care, such as cataract and hernia operations, and cosmetic surgery, which typically involves younger patients with fewer comorbidities may have also contributed to the apparent increase in patient complexity. As these are typically high-volume procedures in ISPs, and changes in cancer care were relatively low-volume, this is likely to have contributed to the majority of changes seen in terms of average patient complexity and length of stay, which increased in ISPs and reduced in NHS hospitals. This is likely to reflect a combination of factors including the reduction in operations such as cataract and hernia surgery, which is typically performed as a day case, and the imperative to discharge earlier in NHS hospitals to increase hospital capacity and reduce risk of hospital acquired COVID-19 infection.

Strengths and limitations

Our analysis was based on administrative hospital data and is subject to residual error resulting from misclassification. However, HES data is generally considered of high quality, as it is derived from data used for hospital reimbursement and has been used in the study of quality of care,(27) and policy evaluations linked to specific emergency and elective patient groups.(28,29) The collection of information on admitted patient care by PHIN has been based upon the HES dataset, and therefore shares such limitations, however PHIN remains the only source of data on privately-funded care in the independent sector. While this is the first study, which has utilised PHIN data, it has been used routinely by the healthcare sector for several years as a source of information on trends in the independent sector.(30) Moreover, a significant strength of our analysis is that we can provide a complete pictures of healthcare market, taking account of both privately and publicly-funded care by the independent sector and the NHS.

One limitation of data submitted by the independent sector seen in both HES and PHIN data, is the quality of coding in relation to patient comorbidities. It is notable in our analysis that age and length of stay is on average higher in ISPs compared to NHS hospitals, but the Charlson Comorbidity Index is lower. This would suggest some degree of coding inaccuracy rather than this being a true reflection of case-mix, and therefore any comparisons between ISPs and NHS hospital related to patient comorbidities must be interpreted with caution. However, even if comorbidities are poorly recorded in ISPs, there is still merit in comparing trends before and during the pandemic, if the degree of coding accuracy has not significantly changed during the study period.

Finally, a further limitation of our analysis is that we chose to restrict our analysis to a four-month period between April and July 2020 compared to the previous year. There will of course be further insights from analysing additional time periods during subsequent waves of COVID-19, and this should indeed be the focus on additional work. However, we chose to restrict our analysis to this time period as the focus on this paper is to understand trends in elective care provision across the English healthcare system during a period with national block contracts between the NHS and independent sector in place.

Policy implications and conclusion

The NHS has struggled to keep up with demands for its services even preceding the COVID-19 pandemic.(31) Due to a combination of policy failures that encouraged cost cutting and discouraged long-term capital investment, capacity constraints have adversely impacted on patients, from long waiting times at Accident & Emergency departments,(32) to cancelled elective surgeries,(33) and poor patient outcomes.(34) The pandemic has uncovered a lack of resilience in the NHS driven by poor capacity, that weakened its ability to cope with a stressor such as the COVID-19 pandemic. If utilised effectively, the availability of additional capacity at ISPs can therefore be a crucial resource to serve those that have been struggling to receive the care they need. Until substantial investments into NHS infrastructure materialise, contracting with the independent sector may be one of the only available solutions to expand service provision at a scale required to tackle the six million patient-strong waiting list, in the short to medium term.(35)

Our analysis has shown that during the first wave of the COVID-19 pandemic, ISPs increased activity for a few select specialties and procedures, although these increases were relatively small in comparison to total reductions in publicly-funded elective care and were concentrated in certain regions. Despite a national block contract being in place, a significant amount of capacity in the independent sector remained underutilised, although reductions in publicly-funded care were less pronounced than for privately-funded care. While it is challenging to understand the impact of this contracting arrangement during a period of time when ISPs also experienced many capacity issues similar to NHS hospitals, it is possible that block contracts did not sufficiently incentivise publicly-funded elective activity in the independent sector. Moreover, it is also possible that due to the urgent nature of the patients' clinical condition, many patients treated at ISPs during the study period were direct referrals from NHS consultants, rather than patients accessing ISPs via the patient choice mechanism commonly pursued for high-volume, low-complexity procedures pre-COVID-19. Future contracts with the independent sector should therefore take into consideration the integration between care pathways within NHS providers and ISPs, particularly for complex and urgent conditions, in addition to incentivising activity where it is most needed to release pressure from the NHS. Our analysis shows also that there are opportunities for the regions which successfully achieved significant increases in publicly-funded elective care in the independent sector to share their experiences and provide insights into how to realise effective collaboration at the local level.

Figure 1: **Total number of hospital spells by market quadrant in April-July 2020 versus April-July 2019**

Figure 2A: **Mean age by market quadrant for April-July 2019 and April-July 2020**

Figure 2B: **Mean length of stay (LOS) by market quadrant for April-July 2019 and April-July 2020**

Figure 2C: **Mean Charlson comorbidity index by market quadrant for April-July 2019 and April-July 2020**

Figure 3: **Growth rate on the number of admissions for NHS funded care for NHS Hospitals and Independent Sector Providers (ISPs) by Sustainability and Transformation Partnerships (STP) - April-July 2019 v April-July 2020 (%)**

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Contributors

RF and MA drafted the manuscript, and MA and LM undertook the data analysis. RF, MA, LM and JF commented and edited iterative drafts of the manuscript.

Competing interests

RF received financial support from AstraZeneca for work unrelated to this study. RF is a scientific advisor to Circle Cardiovascular Imaging Inc. and receives regular financial support for his services. No further competing interest to declare.

Ethical approval

No ethical approval was required for this study.

Funding

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Data sharing

The data controller of the data analysed on publicly-funded care is NHS Digital, whereas the data controller of data analysed on privately-funded is the Private Health Information Network. Patient-level data are available subject to their information governance requirements. The authors will be able to share aggregate data and coding scripts upon request.

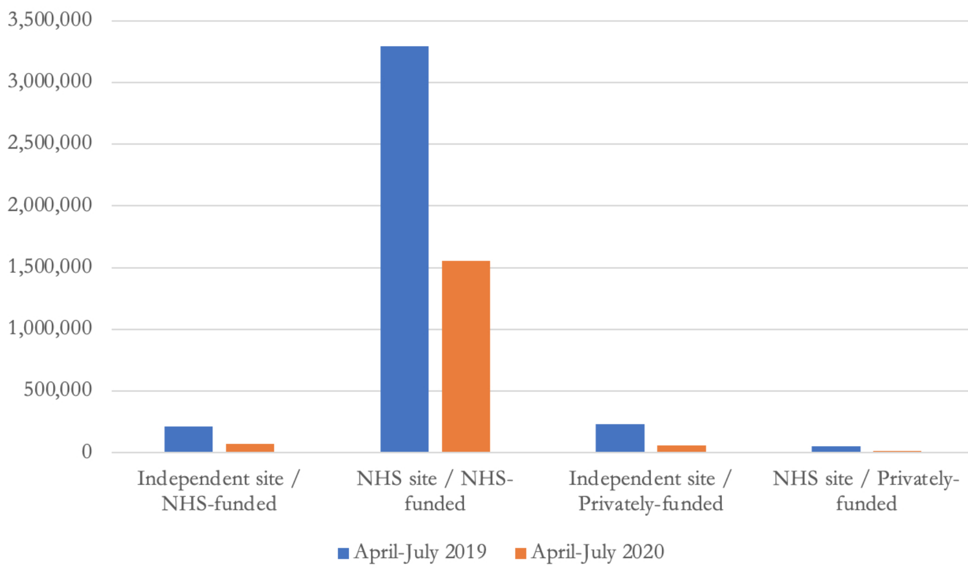


Figure 1: Total number of hospital spells by market quadrant in April-July 2020 versus April-July 2019

223x127mm (144 x 144 DPI)

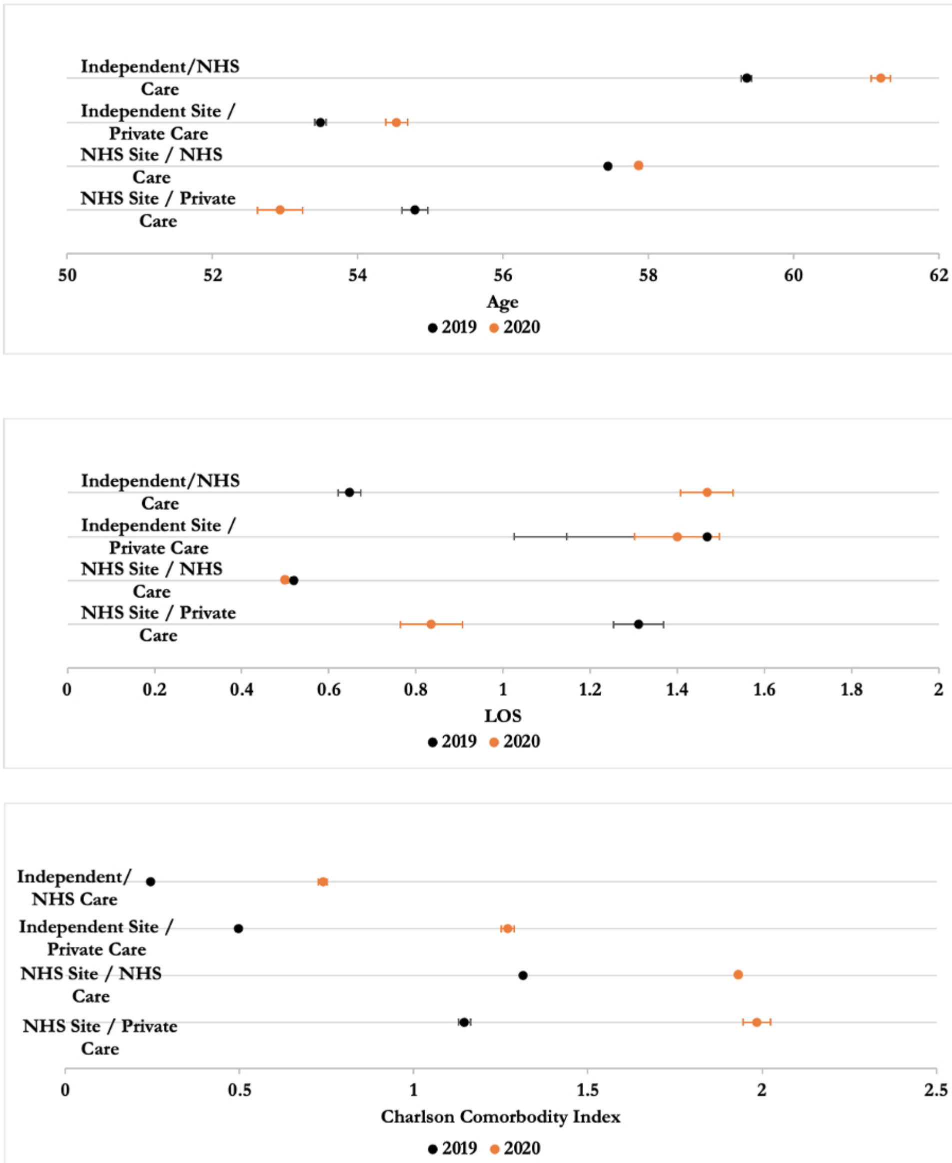


Figure 2: Mean age, length of stay and Charlson comorbidity index by market quadrant for April-July 2019 and April-July 2020

163x199mm (144 x 144 DPI)

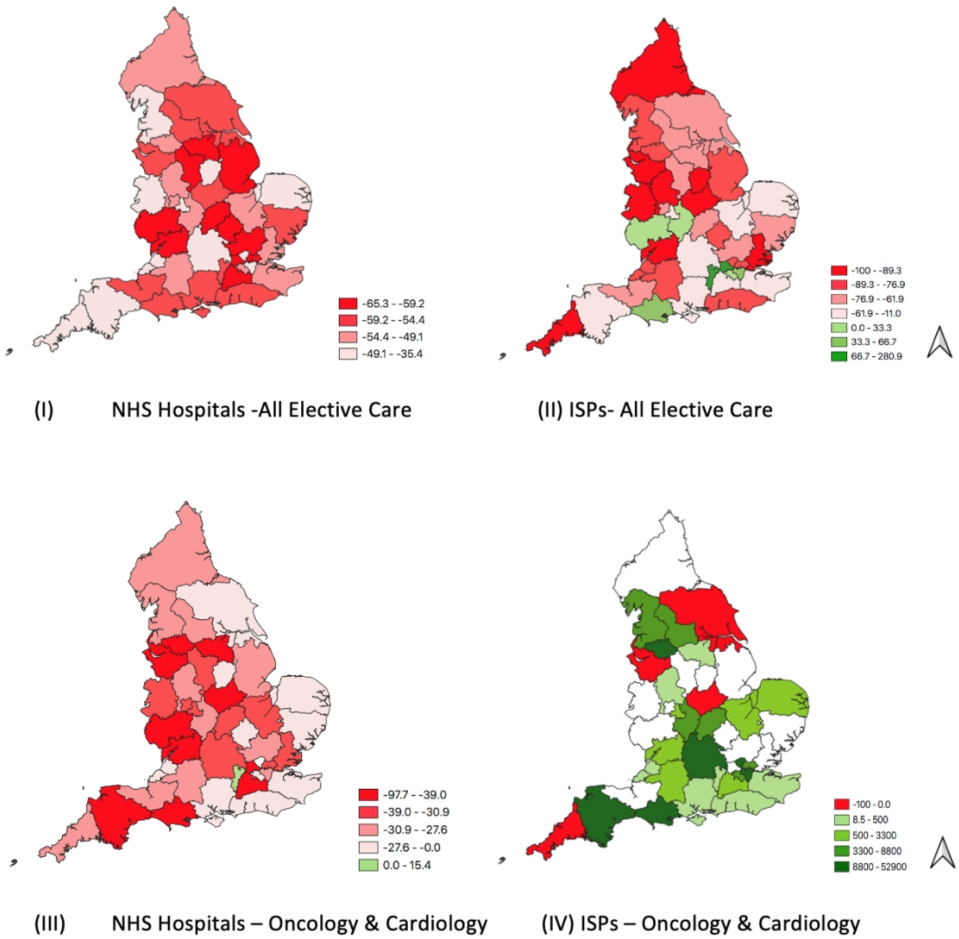
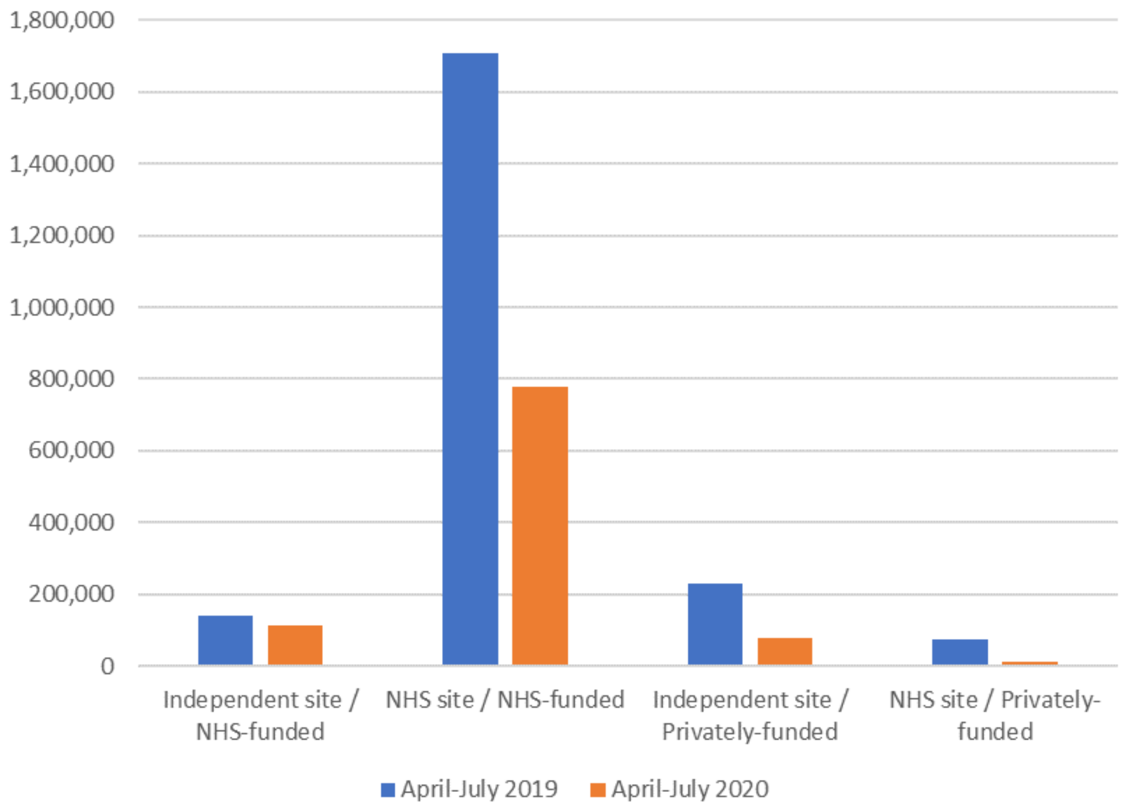


Figure 3: Growth rate on the number of admissions for NHS funded care for NHS Hospitals and Independent Sector Providers (ISPs) by Sustainability and Transformation Partnerships (STP) - April-July 2019 v April-July 2020 (%)

230x215mm (144 x 144 DPI)

Supplementary material 1: Total bed days in independent sector providers and NHS hospitals by funding mechanism in the first wave of the COVID-19 pandemic compared to the previous year*



Note: *Day case surgery is coded as zero length of stay

Supplementary material 2: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Largest Reductions in Volume and Market Quadrant *

Procedure	April-July 2019	April-July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Bursa excision (surgical)	275	6	-97.8%	Varicose vein treatment (avulsion)	1018	39	-96.2%
Bursa treatment (non-surgical)	944	22	-97.7%	Halo procedure	383	19	-95.0%
Metatarsal osteotomy	770	24	-96.9%	Varicose vein treatment (laser ablation)	1023	53	-94.8%
Vasectomy	1068	40	-96.3%	Rhinoplasty	729	38	-94.8%
Spinal injection (facet joint injection or paravertebral block)	3059	119	-96.1%	Spinal injection (facet joint injection or paravertebral block)	8773	462	-94.7%
Joint injections for pain	8772	384	-95.6%	Varicose vein combined treatments	853	45	-94.7%
Septoplasty	1011	49	-95.2%	Vasectomy	1761	97	-94.5%
Knee replacement (primary)	8796	446	-94.9%	Breast enlargement	937	53	-94.3%
Haemorrhoid treatment	2166	112	-94.8%	Ankle replacement (primary)	316	18	-94.3%
Knee replacement (primary - unicompartmental)	1073	63	-94.1%	Breast lift	271	16	-94.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Cosmetic Rhinoplasty	275	3	-98.9%	Eardrum surgery	342	1	-99.7%
Weight loss surgery (gastric banding)	324	8	-97.5%	Joint injections for pain	205	4	-98.0%
Varicose vein treatment (ligation and stripping)	294	8	-97.3%	Tonsillectomy	368	14	-96.2%
Face lift	579	16	-97.2%	Knee replacement (primary)	437	17	-96.1%
Varicose vein treatment (avulsion)	459	14	-96.9%	Hip replacement (primary)	718	32	-95.5%
External ear plastic surgery (pinna)	423	15	-96.5%	Knee arthroscopy	281	14	-95.0%
Septoplasty	1166	46	-96.1%	Circumcision	236	16	-93.2%
Labiaplasty	344	14	-95.9%	Cardiac surgery (coronary artery bypass graft - CABG)	255	19	-92.5%
Rhinoplasty	1200	50	-95.8%	Cataract surgery	4299	358	-91.7%
Eye lift (blepharoplasty)	1139	49	-95.7%	Cardiac Ablation	819	71	-91.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary material 3: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Smallest Reductions in Volume and Market Quadrant *

Procedure	April -July 2019	April -July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Partial excision of breast (wide local excision)	1	1671	167000.0%	Percutaneous bile duct procedure	216	211	-2.3%
Bladder tumour resection (TURBT)	59	1000	1594.9%	Ascitic drain	5717	5503	-3.7%
Prostate needle biopsy	69	977	1315.9%	TAVI (Transcatheter Aortic Valve Implantation)	916	840	-8.3%
Mastectomy	115	1281	1013.9%	Therapeutic spinal tap	3459	3171	-8.3%
Kidney stone treatment - keyhole (PCNL)	61	576	844.3%	Right hemicolectomy	855	766	-10.4%
Excision lesion of breast (lumpectomy)	50	413	726.0%	Percutaneous liver blood vessel procedure	389	329	-15.4%
Prostate surgery (prostatectomy)	48	316	558.3%	Cervical suture in pregnancy	187	152	-18.7%
Thyroidectomy	55	311	465.5%	Spinal biopsy	171	136	-20.5%
Rectal lesion removal	60	322	436.7%	Intrathecal drug delivery system procedure	1523	1202	-21.1%
Bladder lesion treatment (endoscopy)	88	359	308.0%	Appendix removal - emergency keyhole	174	132	-24.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Vaginal birth	116	146	25.9%	Caesarean delivery	272	269	-1.1%
Caesarean delivery	233	273	17.2%	Vaginal birth	176	101	-42.6%
Partial excision of breast (wide local excision)	513	451	-12.1%	Partial excision of breast (wide local excision)	165	69	-58.2%
Mastectomy	554	434	-21.7%	Prostate surgery (prostatectomy)	259	85	-67.2%
Ascitic drain	173	128	-26.0%	Prostate needle biopsy	184	51	-72.3%
Excision lesion of breast (lumpectomy)	271	192	-29.2%	Skin lesion removal	399	87	-78.2%
Prostate surgery (prostatectomy)	264	178	-32.6%	Epidural injection	416	85	-79.6%
Bladder tumour resection (TURBT)	372	217	-41.7%	Inguinal hernia repair	341	66	-80.6%
Pacemaker - insertion, removal or attention	240	132	-45.0%	Pacemaker - insertion, removal or attention	459	89	-80.8%
Removal of products of conception (RPOC)	279	143	-48.7%	Spinal decompression (lumbar)	459	89	-81.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary material 4: Mean Age, Length of Stay (LOS), Charlson Comorbidity Index (CCI) by Speciality for top 10 highest volume specialities and by Market Quadrant in April-July 2020 and April-July 2019*

Specialty	Age			LOS			CCI		
	2019	2020	P value	2019	2020	P value	2019	2020	P value
Independent site/NHS-funded									
General surgery	52.012	57.626	0	0.082	1.046	0	0.231	1.001	0
Gastroenterology	51.271	56.91	0	0.007	0.177	0	0.266	0.247	0.043
Nephrology	N/A	56.67	N/A	N/A	1.00	N/A	N/A	2.33	N/A
Haematology	N/A	65.11	N/A	N/A	1.92	N/A	N/A	0.79	N/A
Medical oncology	N/A	63.84	N/A	N/A	0.81	N/A	N/A	1.83	N/A
Orthopaedics	59.611	54.688	0	0.931	0.774	0	0.262	0.208	0
Ophthalmology	74.877	74.703	0.088	0.002	0.003	0.183	0.206	0.12	0
Clinical oncology	N/A	62.36	N/A	N/A	0.15	N/A	N/A	5.91	N/A
General medicine	64.433	57.035	0	1.04	0.795	0.14	0.18	0.561	0
Urology	51.877	64.487	0	0.224	0.645	0	0.245	0.931	0
NHS site/NHS-funded									
General surgery	59.012	59.619	0	0.765	1.139	0	0.699	1.113	0
Gastroenterology	56.422	53.788	0	0.091	0.13	0	0.372	0.467	0
Nephrology	63.522	62.964	0	0.072	0.055	0	2.006	2.033	0
Haematology	62.776	61.398	0	0.335	0.332	0.761	1.621	1.63	0.05
Medical oncology	61.401	59.936	0	0.104	0.105	0.806	5.408	5.529	0
Orthopaedics	54.891	47.366	0	1.294	1.111	0	0.34	0.306	0
Ophthalmology	70.112	69.53	0	0.028	0.035	0.025	0.37	0.354	0
Clinical oncology	63.236	61.921	0	0.084	0.071	0.001	5.226	5.439	0
General medicine	59.883	59.941	0.431	0.214	0.295	0	0.827	1.09	0
Urology	62.364	63.583	0	0.514	0.542	0.009	0.961	1.189	0
Independent site/ Privately-funded									
General surgery	53.289	52.994	0.155	0.627	0.899	0	0.278	0.635	0
Gastroenterology	50.002	49.7	0.29	0.088	0.203	0	0.17	0.284	0
Nephrology	55.579	63.647	0.035	8.748	13.353	0.54	1.284	1.441	0.711
Haematology	59.954	60.419	0.391	1.393	0.879	0.018	1.38	1.857	0
Medical oncology	58.114	57.853	0.052	4.426	2.785	0	2.712	3.2	0
Orthopaedics	54.525	52.276	0	1.02	1.011	0.771	0.124	0.114	0.036
Ophthalmology	71.881	71.59	0.214	0.044	0.021	0.589	0.141	0.113	0.002
Clinical oncology	60.017	60.247	0.671	0.764	1.919	0.02	3.383	4.476	0
General medicine	57.258	60.477	0.002	2.652	3.619	0.205	0.42	0.732	0
Urology	59.47	61.758	0	0.476	0.562	0.011	0.403	0.586	0
NHS Site/ Privately-funded									
General surgery	53.602	0.011	2.16	2.132	0.908	1.044	1.608	0	53.602
Gastroenterology	50.151	0.018	0.701	0.178	0.071	0.588	0.642	0.517	50.151
Nephrology	52.392	0	1.141	0.003	0.007	2.065	2.303	0	52.392
Haematology	49.033	0	1.376	0.879	0.008	1.179	1.169	0.802	49.033
Medical oncology	55.317	0.007	0.488	0.412	0.235	3.258	3.413	0.001	55.317
Orthopaedics	47.634	0	2.353	2.442	0.687	0.279	0.331	0.206	47.634
Ophthalmology	62.573	0.001	0.062	0.057	0.81	0.18	0.182	0.952	62.573
Clinical oncology	55.393	0	0.64	0.317	0.198	3.671	3.674	0.977	55.393
General medicine	57.828	0.77	1.595	0.777	0.19	0.939	0.917	0.899	57.828
Urology	58.632	0.278	0.964	0.844	0.267	0.93	1.281	0	58.632

*P values were produced using t-test to undertake a comparison of means
N/A as <=1 admissions during 2019

Supplementary material 5: % Change in Hospitals Spells for Elective Care by Age and Market Quadrant for Orthopaedics

Age	April-July 2019	April-July 2020	% Change	Age	April-July 2019	April-July 2020	% Change
Independent site/NHS Care				NHS site/NHS Care			
Age <18	22	44	100.0%	Age <18	14120	4183	-70.4%
Age>=18	62147	7650	-87.7%	Age>=18	187532	31411	-83.2%
Independent site/ Private Care				NHS Site/ Private Care			
Age <18	854	217	-74.6%	Age <18	369	67	-81.8%
Age>=18	41897	7534	-82.0%	Age>=18	3668	399	-89.1%
All Market Quadrants							
Age< 18	15365	4511	-70.6%				
Age>=18	295244	45600	-84.6%				

Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: retrospective cohort study

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Word count: 3627

STROBE Statement

Checklist of items that should be included in reports of observational studies

Section/Topic	Item No	Recommendation	Reported on Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4, 5
Objectives	3	State specific objectives, including any prespecified hypotheses	4, 5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5, 6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5, 6
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	5, 13
Study size	10	Explain how the study size was arrived at	5, 6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6

		(*c*) Explain how missing data were addressed	-
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	6

Section/Topic	Item No	Recommendation	Reported on Page No
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7, 8, 9, 10, 11
		(b) Indicate number of participants with missing data for each variable of interest	
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7, 8, 9, 10, 11
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7, 8,9,10,11
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11, 12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11, 12, 13,14
Generalisability	21	Discuss the generalisability (external validity) of the study results	13

Other Information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

**Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.*

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: a descriptive analysis

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Primary Subject Heading:	Health policy
Secondary Subject Heading:	Health services research, Health economics, Surgery
Keywords:	COVID-19, SURGERY, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: a descriptive analysis

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ABSTRACT

Background: Following a virtual standstill in the delivery of elective procedures in England, a national block contract between the NHS and the independent sector aimed to help restart surgical care. This study aims to describe subsequent changes in trends in elective care service delivery following implementation of the initial iteration of this contract.

Methods: Population-based retrospective cohort study, assessing the delivery of all publicly-funded and privately-funded elective care delivered in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. Discharge data from the Hospital Episode Statistics and private health care data from the Private Health Information Network was stratified by specialty, procedure, length of stay and patient complexity in terms of age, and charlson comorbidity index.

Results: COVID-19 significantly reduced publicly-funded elective care activity, though changes were more pronounced in the independent sector (-65.1 percent) compared with the NHS (-52.7 percent), whereas reductions in privately-funded elective care activity were similar in both independent sector hospitals (-74.2%) and NHS hospitals (-72.9%). Patient complexity increased in the independent sector compared to the previous year, with mixed findings in NHS hospitals. Most specialties, irrespective of sector or funding mechanisms, experienced a reduction in hospital admissions. However, some specialities, including medical oncology, clinical oncology, clinical haematology, and cardiology, experienced an increase in publicly-funded elective care activity in the independent sector.

Conclusion: Elective care delivered by the independent sector remained significantly below historic levels, although this overlooks significant variation between regions and specialities. There may be opportunities to learn from regions which achieved more significant increases in publicly-funded elective care in independent sector providers as a strategy to address the growing backlog of elective care.

Article summary

Strengths and limitations of this study

- Assessment of hospital activity across the entire independent sector and public sector in England.
- Implications of the national block contracts used during the first wave of the COVID-19 pandemic to generate additional resources and increase capacity within the National Health Service.
- Identifying regional variation in the use of independent sector capacity before and during COVID-19.
- Observational study without natural control group.

1. INTRODUCTION

Independent sector providers (ISPs) have played a role in the provision of publicly-funded elective health care services in England since the early 2000s.(1) Private, for-profit surgical centres have provided routine, high volume elective procedures to National Health Service (NHS) patients, supporting incumbent governments to tackle waiting times for surgery. Although the overall contribution of ISPs to NHS funded care was around six percent of total NHS elective activity before COVID-19,(2) for some elective procedures such as cataract removal, inguinal hernia repair, and hip and knee replacement, close to one in every three publicly-funded treatment was performed by ISPs. In total, it is estimated that NHS commissioners spent £9.7 billion on services delivered by ISPs in 2019/20, accounting for approximately 7.2% of the annual health care budget.(3)

For years, the financing of private health care through public funds has been controversial and has sparked criticism, including from professional bodies and medical staff.(4) There remain uncertainties about the value of care provided by ISPs, the impact they might have on the NHS through its correlates like staffing, and a lack of transparency and governance of contracts struck between payers and providers of care.(5) Despite opposition to further expand ISPs provision of publicly-funded services, it was ISPs that promised a refuge for a struggling NHS to provide additional capacity at the start of the pandemic in 2020.

Effective from 1st of April 2020, NHS England and NHS Improvement (NHSEI) agreed an emergency contract with ISPs via the Independent Healthcare Providers Network,(6, 7,8) which was originally envisaged as covering the treatment of both COVID-19 and non-COVID-19 patients. The complete terms and conditions of the contract have yet to be publicly published, however it is known that activity based payments were suspended and instead the NHS agreed to purchase 100% of capacity available in ISPs on an "at cost" basis.(9) ISPs were also free to utilise unused capacity for privately-funded patients and a rebate system agreed to refund payments to the NHS in this circumstance.(9) It is estimated this contracting arrangement cost the NHS £200 million per month.(10) Fortunately, NHS hospitals were not overwhelmed with COVID-19 during the first wave of the pandemic,(11) and the focus shifted towards utilising the independent sector to reconvene non-urgent elective operations.(7) ISP sites acted as designated COVID-19-free facilities,(12) increasing available capacity within the NHS, and offering care to patients on growing waiting lists.(13)

The introduction of block contracts with the independent sector was necessitated by the unprecedented situation faced by the NHS, and a departure from usual agreements commonly struck locally.(14) The initial iteration of this national block contract ran until July 31st 2020 and was then renegotiated in favour of a greater emphasis on local agreements between NHS commissioners and independent sector hospitals. While establishing the casual impact of this national block contract is difficult as ISPs struggled with many capacity issues also experienced by NHS hospitals during the COVID-19 pandemic, the aim of this paper is to provide a descriptive analysis of elective care service delivery during the implementation of this contracting arrangement. Understanding how NHS providers and ISPs delivered care during a period of severe disruption, and to what extend the independent sector was able to alleviate pressures from the NHS will be imperative to develop sustainable strategies that will help address the backlog of over six million people on a waiting list in England. (15) It will inform discussions on how to design effective financing mechanisms, regulation and governance of ISPs when contracting with the NHS to safeguard public funds and incentivise activity

2. METHODS

Study cohort

We analysed trends in elective care for publicly and privately-funded healthcare activity in both NHS hospitals and ISPs during the first wave of pandemic in England between 1st of April 2020, and 31st of July 2020, compared to the same period in 2019. We focused on differences in patient case-mix, specialties, procedures, and region (*i.e.*, Sustainability and Transformation Partnerships, or STPs). The decision was made to analyse changes at STP level as this has featured in other analysis of the impact of the COVID-19 pandemic on hospital bed capacity in the NHS,(16) and also reflects efforts by NHS England to encourage the coordination of local policy at the STP rather than CCG level since 2019.(17) The study period was chosen to capture service delivery across market quadrants during a period unaffected by COVID-19, compared with a period impacted by the COVID-19 pandemic and applicable to the national block contract in place between sectors. Moreover, the study period allowed to control for any bias resulting from seasonality.

Data for publicly-funded care was retrieved from the Hospital Episode Statistics database provided by NHS Digital (*i.e.,* the non-departmental public body responsible for information, data and IT systems in England). This national administrative database contains pseudonymised and unidentifiable information on all patients accessing care in the English NHS, including at Accident and Emergency departments, as inpatients and in outpatient settings. Privately-funded care was retrieved from the Private Health Information Network (PHIN). PHIN has been mandated by the Competition and Market Authority (CMA) as being responsible for collection and reporting of activity in the private health care sector since 2016.(18) Both datasets contain patient information including demographics, diagnosis, and treatment. The data is recorded in finished episodes of care, which relates to the clinician responsible for the respective aspect of care. When analysing numbers of hospital admissions, to avoid multiple counting, we linked episodes from patient admission to discharge into complete spells. However, when analysing numbers of procedures, we utilised finished episodes of care. Specialty was coded according to main specialty codes, as defined by NHS Digital and the UK Royal Colleges,(19) which is applied in both the HES and PHIN datasets. Hospitals spells were counted according to the specialty of the admitting consultant. Our analysis focused specifically on elective care. Emergency admissions were excluded as these are less likely to be impacted by contractual agreements between sectors, and historically only accounted for a small proportion of patients treated at ISPs.

Study outcomes

Broadly the health care system in England, can be understood to have four market quadrants: publicly-funded care delivered by the NHS, publicly-funded care delivered by ISPs, privately-funded care delivered by the NHS, and privately-funded care delivered by ISPs. The primary outcomes in this study were the number of total hospital discharges following an elective hospitalisation by market quadrant, and separately for the ten specialties and procedures, which saw the largest and smallest percentage changes between the baseline period and the first wave of the COVID-19 pandemic, respectively. This was restricted to specialties with more than 1000 discharges, and procedures undertaken more than 200 times collectively during our baseline period and the first wave of the pandemic. All discharges were considered, irrespective of patient survival status.

The secondary outcomes studied relate to patient complexity, including patient age on admission and Charlson Comorbidity Index, and length of stay. We used the Charlson Comorbidity Index as a measure for patient complexity based on the number of comorbidities recorded in HES and PHIN data. The index is used widely for risk-stratification in health services research and was calculated based on diagnosis codes recorded at admission.(20) Length of stay was calculated as the difference between day of admission and day of discharge. Patients that were admitted and discharged on the same day, or without staying overnight were recorded with a zero length of stay.

Statistical analysis

We estimated the total number of patient discharges by market quadrant for the period of 1st of April 2019, and 31st of July 2019, and the same period in 2020. We calculated percentage change between study periods for the top 15 specialities in terms of total discharges for both publicly and privately-funded care across time periods for each market quadrant. We also identified the procedures with the largest percentage change for each market quadrant, with procedures classified based on OPCS-4 codes.(21) To assess differences in patient complexity and length of stay, we performed paired-sample t-tests and report p-values with 0.05 considered as threshold for statistical significance. Sensitivity analysis investigated changes in patient case-mix by specialty group. All data cleaning and analyses were performed using STATA SE 15.

Patient and public involvement

No patients were involved in the development of the research question or the outcome measures. Patients were not involved in developing strategies for design or implementation of the study. The authors plan to disseminate results to patients and policymakers through virtual outreach activities, and platforms provided by PHIN and the Global Surgery Policy Unit, a new partnership between the London School of Economics and Political Science and the Royal College of Surgeons of England.

3. RESULTS

Elective care service delivery before and during the COVID-19 pandemic

When analysing trends in total hospital admissions for elective care during the first wave of the COVID-19 pandemic compared to the same period in 2019, we find that there was significant reduction of publicly-funded health care activity (see Figure 1), though changes were more pronounced in ISPs (-65.1%) compared with the NHS (-52.7%), whereas reductions in privately-funded health care activity were similar in both ISPs (-74.2%) and NHS hospitals (-72.9%). Hospital admissions for elective care remained significantly below historic levels during the first wave of the COVID-19 pandemic, impacting all specialities, irrespective of sector or funding mechanisms. However, when we analyse total bed days (Supplementary Material 1), we find that reductions in publicly-funded health care activity were less pronounced in ISPs (-19.5%) compared with NHS hospitals (-54.5%). We also find reductions in privately-funded total bed days were less pronounced in private hospitals (-66.3%) compared with NHS hospitals (-82.8%). This reflects how ISPs performed less day case surgery during the first wave of the pandemic and shifted to more complex care involving greater length of stay (see below: patient complexity and length of stay).

While NHS hospitals experienced reductions across all specialties for publicly funded elective care (see Table 1), with the largest decreases in trauma and orthopaedics (-82.3 percent), ear, nose, and throat (-82.8%), and ophthalmology (-73.5 percent), we find that ISPs prioritised cancer care (medical oncology, clinical oncology), and cardiology. ISPs compensated some of the loss in activity but at a lower level, possibly due to higher resource intensity (*e.g.,* staffing requirements) linked to the treatment of more complex patients.

We also find that reductions in the provision of publicly-funded elective care for many specialties were less pronounced in ISPs compared to NHS hospitals for several specialities, including general surgery (-30.4% vs -69.4%), general medicine (-19.7% vs -58.6%), urology (-20.3% vs -61.5%), and plastic surgery (-6.3% vs -56.9%). All specialties experienced reductions in privately-funded elective care provision in both ISPs and NHS hospitals (see Table 2), although clinical oncology, medical oncology, and clinical haematology experienced some of the smallest reductions in activity for privately-funded care in ISPs and NHS hospitals, suggesting continuation of cancer care was prioritised during the first wave of the pandemic irrespective of funding mechanism. Plastic surgery was the specialty with the largest reduction in privately-funded elective care provision in ISPs (90.9%), which contrasted with only a small reduction in publicly-funded elective care provision in ISPs for this specialty (-6.3%). This is likely to reflect how most privately-funded plastic surgery is of a cosmetic nature in contrast to publicly-funded plastic surgery which is often of a non-cosmetic nature. Specific procedures or treatments with largest increases for publicly-funded care by ISPs included partial excision of breast, transurethral resection of bladder tumour (TURBT), and mastectomy, even though in absolute numbers, these procedures recouped only a small proportion of the loss in high-volume publicly-funded activity observed at ISPs (see Supplementary Material 2 & 3). In relation to privately-funded care in ISPs, activity levels for both vaginal birth and caesarean section increased during the first wave of the pandemic compared to the previous year.

Table 1: Percentage change in hospitals spells for publicly-funded elective care by specialty and by sector*

Specialty	April-July 2019	April-July 2020	% Change	April-July 2019	April-July 2020	% Change
	Independent site/NHS funded			NHS site/NHS funded		
Nephrology	0	12	-	272695	251575	-7.7%
Gastroenterology	19789	5480	-72.3%	359821	137647	-61.7%
General surgery	32842	22872	-30.4%	351480	107427	-69.4%
Clinical haematology	0	461	-	248651	176376	-29.1%
Clinical oncology	0	1689	-	195461	143606	-26.5%
Ophthalmology	47762	11598	-75.7%	205564	54570	-73.5%
Medical oncology	0	1266	-	178737	132737	-25.7%
Trauma & orthopaedics	62169	6300	-89.9%	201652	35594	-82.3%
General medicine	1727	1387	-19.7%	191689	79443	-58.6%
Urology	9624	7667	-20.3%	167619	64470	-61.5%
Gynaecology	10229	4252	-58.4%	96330	31646	-67.1%
Cardiology	507	1117	120.3%	82814	37567	-54.6%
Ear, nose, & throat	3504	1360	-61.2%	80917	13917	-82.8%
Plastic surgery	2477	2321	-6.3%	66289	28574	-56.9%
Paediatrics	99	29	-70.7%	58004	37535	-35.3%

*top 15 specialties in terms of total volume of spells for publicly funded elective care

Table 2: Percentage change in hospitals spells for privately funded elective care by specialty and by sector*

Specialty	April-July 2019	April-July 2020	% Change	April-July 2019	April-July 2020	% Change
	Independent site/Privately funded			NHS site/Privately funded		
Trauma & orthopaedics	42751	7751	-81.9%	4037	466	-88.5%
Medical oncology	21134	15086	-28.6%	8236	5199	-36.9%
General surgery	30381	6453	-78.8%	4193	670	-84.0%
Ophthalmology	18108	2994	-83.5%	6452	581	-91.0%
Gastroenterology	19136	4108	-78.5%	1818	515	-71.7%
Urology	14218	3819	-73.1%	3204	587	-81.7%
Plastic surgery	16976	1540	-90.9%	1151	118	-89.7%
Gynaecology	10118	2481	-75.5%	2073	447	-78.4%
Ear, nose, & throat	8036	819	-89.8%	1594	101	-93.7%
Cardiology	3095	1093	-64.7%	5412	747	-86.2%
Clinical haematology	2402	1540	-35.9%	3722	2215	-40.5%
Anaesthetics	5415	663	-87.8%	604	61	-89.9%
Clinical oncology	1175	980	-16.6%	1890	773	-59.1%
Neurosurgery	2652	607	-77.1%	591	62	-89.5%
General medicine	2250	475	-78.9%	846	193	-77.2%

*top 15 specialties in terms of total volume of spells for privately funded elective care

Patient complexity and length of stay

Previous evidence has suggested that ISPs treat patients that are less clinically complex, leaving incumbent NHS sites with sicker, and costlier patients.(22,23) It remains contested whether these observed differences in patient case mix are a true reflection of patients seen in practice, which would point to cream skimming behaviour,(24) or are a fallacy resulting from data recording.(22) It is also possible that variation in patient profiles may be influenced by patient preferences, possibly as a function of clinical advice provided by primary care physicians, or other NHS workers along the patient pathway. Our analysis indicates that ISPs shifted care towards treating more clinically complex patients during the first wave of the pandemic (Figure 2), likely to reflect the prioritisation of cancer care and cardiology. The mean age of patients treated in all market quadrants increased with the exception of privately-funded care by NHS hospitals (54.77 years versus 52.91 years, p-value=<0.001), with the largest increase seen in publicly-funded care by ISPs (59.56 years versus 61.15 years, p-value=<0.001). Mean length of stay increased by ISPs in line with focus on more urgent and complex cases, but decreased in NHS hospitals, possibly reflecting a lower threshold for discharge by NHS hospitals to avoid unnecessary exposure to hospital acquired COVID-19 infection. The largest increase for length of stay was for publicly-funded care by ISPs (0.36 versus 0.81, p-value=<0.001). This could reflect the suspension of high-volume elective procedures such as cataract surgery and hernia repair typically delivered as a day case. Mean Charlson comorbidity index increased in all market quadrants, with the largest increase seen in privately-funded care by NHS hospitals (1.15 versus 2.00, p-value=<0.001) (see Figure 2). Again, this likely reflects cancer care (as cancer diagnoses are incorporated in the Charlson comorbidity index), accounting for a larger proportion of total elective care during the first wave of the pandemic, as medical and clinical oncology consistently had the smallest reductions in activity irrespective of market quadrant (see Table 2).

Sub-analysis at the specialty level (see Supplementary Material 3) revealed these changes during the first wave of the COVID-19 pandemic were exemplified for certain specialities when focusing on publicly-funded care by ISPs. For general surgery, patients were on average significantly older (52.01 versus 57.63, p-value=<0.001), had a longer length of stay (0.08 versus 1.05, p-value=<0.001), and had a higher Charlson comorbidity index (0.231 versus 0.263, p-value=<0.001). Similarly for urology, patients were also on average significantly older (51.88 versus 64.28, p-value=<0.001), stayed longer (0.76 versus 1.14, p-value=<0.001), and had a higher Charlson comorbidity index (0.25 versus 0.93, p-value=<0.001). Interestingly, the opposite is seen for orthopaedics, where in all market quadrants, with the exception of privately-funded care by NHS hospitals, patients were on average younger, had a shorter length of stay, and a lower Charlson comorbidity index. It is possible this may reflect how reductions in orthopaedic care for paediatric patients were less severe than those experienced for adult patients during the first wave of the pandemic. When testing this hypothesis, we found reductions in volume of orthopaedic elective care provision for patients younger than 18 were smaller than those for patients aged 18 or older in all market quadrants (see Supplementary Material 4). In total, hospital spells reduced by 70.6% for paediatric patients compared to 84.6% for adult patients (see Supplementary Material 5).

Geographical variation in the use of independent sector capacity

Throughout the first wave of the pandemic there was regional variation in COVID-19 related hospital admissions, with London and the North West approaching almost 100% occupancy for general and acute beds, with other regions such as the South West, Yorkshire and Humber, and the North East, less impacted.(16) It is therefore not surprising we have identified regional variation in the provision of elective care during the first wave of the pandemic in our analysis (see Figure 3).

The highest degree of variation experienced by STP was for publicly-funded care by the independent sector, ranging from an increase of 280.8% at the Frimley Health and Care Integrated Care System (ICS) STP, to a reduction of -99.8% at the Shropshire, Telford and Wrekin STP. A total of six STPs observed a net increase in publicly-funded activity by the independent sector compared with the baseline period (*i.e.,* Frimley Health and Care ICS, North West London Health and Care Partnership, Dorset, Our Healthier South East London, Herefordshire and Worcestershire, and Coventry and Warwickshire). Almost two-thirds of STPs saw provisions of volume linked to oncology and cardiology increase (*e.g.*, at the Devon STP, activity increased from 1 case in 2019, to 1892 cases in 2020), with 19 STPs introducing these specialties for the first time due to the emergency contracting with NHSEI.

4. DISCUSSION

In England, ISPs have treated publicly-funded elective patients for almost two decades, mostly specialising in high volume surgical procedures such as cataract removal, inguinal hernia repair, and joint replacements.(2) With a growing proportion of the health care budget spent on the independent sector, rather than investments into existing NHS infrastructure, the reliance on independent hospitals to treat NHS patients has raised concerns amongst the medical profession and the general public.(4) When the COVID-19 pandemic started in 2020, NHSEI secured ISP capacity in England through emergency block contracts with the independent sector via the Independent Healthcare Providers Network, fostering a greater collaboration than ever seen before. While these contracts covered both COVID-19 and non-COVID-19 care, fortunately ISP capacity was ultimately not required for COVID-19 patients and instead ISPs were used as sites to deliver elective care to non-COVID-19 patients on growing waiting lists.(12) While we cannot establish a casual impact of this policy, this study provides insights into trends in the delivery of elective care across the NHS and ISPs while this block contract was in place.

To our knowledge, this is the first analysis that provides a complete assessment of changes in patient care during the first wave of the pandemic as it links patient-level data for all four market quadrants, including NHS funded care and privately-funded care within NHS providers and ISPs. In doing so, we found that reductions in elective care activity in ISPs were more pronounced for privately-funded care than for publicly-funded care. However, we cannot state whether this is evidence of ISPs prioritising publicly-funded care during our period of analysis, differences in case-mix, or differences in patient pathways. Understanding trends in elective care provision by both ISPs and NHS hospitals is also complicated by the existence of several other factors experienced by both sectors including a reduced availability of staff and equipment, and reduced patient demand due to shifts in patients' willingness to attend for an operation due to fear of infection. Moreover, ISPs and NHS hospitals draw upon a common workforce of hospital consultants, and it is possible that some hospital consultants chose to suspend or limit their work in the independent sector during the initial months of the pandemic due to concerns regarding infection prevention and control when operating across multiple sites, or whether hospital consultants were redeployed within their NHS hospitals to assist the wider response to the COVID-19 pandemic.

In contrast to previous research which suggests that ISPs appear to treat less clinically complex patients,(22,23,25,26) our analysis finds significant increases in average patient complexity within the independent sector during the first wave of the pandemic in terms of age, and comorbidities. This likely reflects the shift towards delivering higher volumes of more complex types of cancer and cardiology care to older patients with higher comorbidity. However, the suspension of less complex types of care, such as cataract and hernia operations, and cosmetic surgery, which typically involves younger patients with fewer comorbidities may have also contributed to the apparent increase in patient complexity. As these are typically high-volume procedures in ISPs, and changes in cancer care were relatively low-volume, this is likely to have contributed to the majority of changes seen in terms of average patient complexity and length of stay, which increased in ISPs and reduced in NHS hospitals. This is likely to reflect a combination of factors including the reduction in operations such as cataract and hernia surgery, which is typically performed as a day case, and the imperative to discharge earlier in NHS hospitals to increase hospital capacity and reduce risk of hospital acquired COVID-19 infection.

Strengths and limitations

Our analysis was based on administrative hospital data and is subject to residual error resulting from misclassification. However, HES data is generally considered of high quality, as it is derived from data used for hospital reimbursement and has been used in the study of quality of care,(27) and policy evaluations linked to specific emergency and elective patient groups.(28,29) The collection of information on admitted patient care by PHIN has been based upon the HES dataset, and therefore shares such limitations, however PHIN remains the only source of data on privately-funded care in the independent sector. While this is the first study, which has utilised PHIN data, it has been used routinely by the healthcare sector for several years as a source of information on trends in the independent sector.(30) Moreover, a significant strength of our analysis is that we can provide a complete pictures of healthcare market, taking account of both privately and publicly-funded care by the independent sector and the NHS.

One limitation of data submitted by the independent sector seen in both HES and PHIN data, is the quality of coding in relation to patient comorbidities. It is notable in our analysis that age and length of stay is on average higher in ISPs compared to NHS hospitals, but the Charlson Comorbidity Index is lower. This would suggest some degree of coding inaccuracy rather than this being a true reflection of case-mix, and therefore any comparisons between ISPs and NHS hospital related to patient comorbidities must be interpreted with caution. However, even if comorbidities are poorly recorded in ISPs, there is still merit in comparing trends before and during the pandemic, if the degree of coding accuracy has not significantly changed during the study period.

Finally, a further limitation of our analysis is that we chose to restrict our analysis to a four-month period between April and July 2020 compared to the previous year. There will of course be further insights from analysing additional time periods during subsequent waves of COVID-19, and this should indeed be the focus on additional work. However, we chose to restrict our analysis to this time period as the focus on this paper is to understand trends in elective care provision across the English healthcare system during a period with national block contracts between the NHS and independent sector in place.

Policy implications and conclusion

The NHS has struggled to keep up with demands for its services even preceding the COVID-19 pandemic.(31) Due to a combination of policy failures that encouraged cost cutting and discouraged long-term capital investment, capacity constraints have adversely impacted on patients, from long waiting times at Accident & Emergency departments,(32) to cancelled elective surgeries,(33) and poor patient outcomes.(34) The pandemic has uncovered a lack of resilience in the NHS driven by poor capacity, that weakened its ability to cope with a stressor such as the COVID-19 pandemic. If utilised effectively, the availability of additional capacity at ISPs can therefore be a crucial resource to serve those that have been struggling to receive the care they need. Until substantial investments into NHS infrastructure materialise, contracting with the independent sector may be one of the only available solutions to expand service provision at a scale required to tackle the six million patient-strong waiting list, in the short to medium term.(35)

Our analysis has shown that during the first wave of the COVID-19 pandemic, ISPs increased activity for a few select specialties and procedures, although these increases were relatively small in comparison to total reductions in publicly-funded elective care and were concentrated in certain regions. Despite a national block contract being in place, a significant amount of capacity in the independent sector remained underutilised, although reductions in publicly-funded care were less pronounced than for privately-funded care. While it is challenging to understand the impact of this contracting arrangement during a period of time when ISPs also experienced many capacity issues similar to NHS hospitals, it is possible that block contracts did not sufficiently incentivise publicly-funded elective activity in the independent sector. Moreover, it is also possible that due to the urgent nature of the patients' clinical condition, many patients treated at ISPs during the study period were direct referrals from NHS consultants, rather than patients accessing ISPs via the patient choice mechanism commonly pursued for high-volume, low-complexity procedures pre-COVID-19. Future contracts with the independent sector should therefore take into consideration the integration between care pathways within NHS providers and ISPs, particularly for complex and urgent conditions, in addition to incentivising activity where it is most needed to release pressure from the NHS. Our analysis shows also that there are opportunities for the regions which successfully achieved significant increases in publicly-funded elective care in the independent sector to share their experiences and provide insights into how to realise effective collaboration at the local level.

Figure 1: **Total number of hospital spells by market quadrant in April-July 2020 versus April-July 2019**

Figure 2A: **Mean age by market quadrant for April-July 2019 and April-July 2020**

Figure 2B: **Mean length of stay (LOS) by market quadrant for April-July 2019 and April-July 2020**

Figure 2C: **Mean Charlson comorbidity index by market quadrant for April-July 2019 and April-July 2020**

Figure 3: **Growth rate on the number of admissions for NHS funded care for NHS Hospitals and Independent Sector Providers (ISPs) by Sustainability and Transformation Partnerships (STP) - April-July 2019 v April-July 2020 (%)**

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Contributors

RF and MA drafted the manuscript, and MA and LM undertook the data analysis. RF, MA, LM and JF commented and edited iterative drafts of the manuscript.

Competing interests

RF received financial support from AstraZeneca for work unrelated to this study. RF is a scientific advisor to Circle Cardiovascular Imaging Inc. and receives regular financial support for his services. No further competing interest to declare.

Ethical approval

No ethical approval was required for this study.

Funding

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Data sharing

The data controller of the data analysed on publicly-funded care is NHS Digital, whereas the data controller of data analysed on privately-funded is the Private Health Information Network. Patient-level data are available subject to their information governance requirements. The authors will be able to share aggregate data and coding scripts upon request.

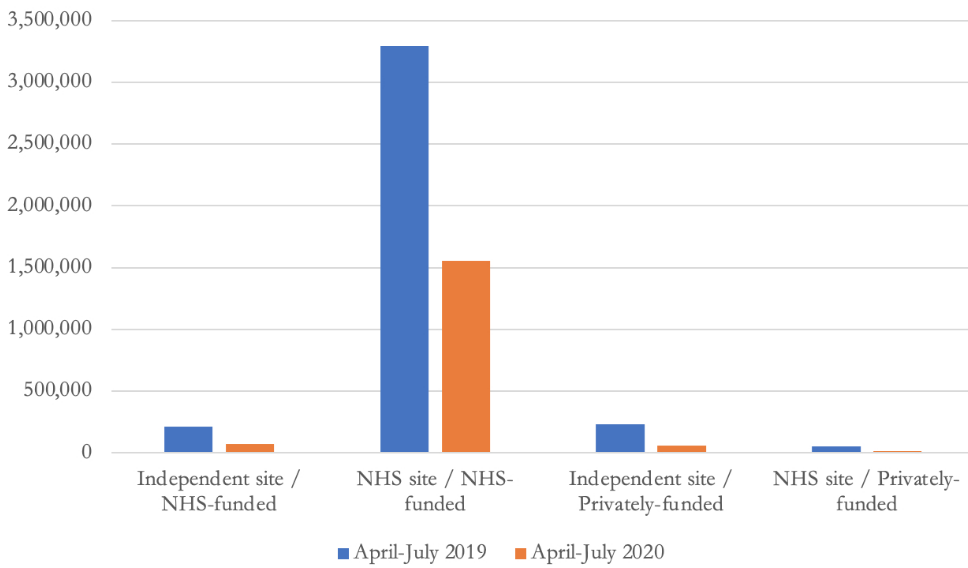


Figure 1: Total number of hospital spells by market quadrant in April-July 2020 versus April-July 2019

223x127mm (144 x 144 DPI)

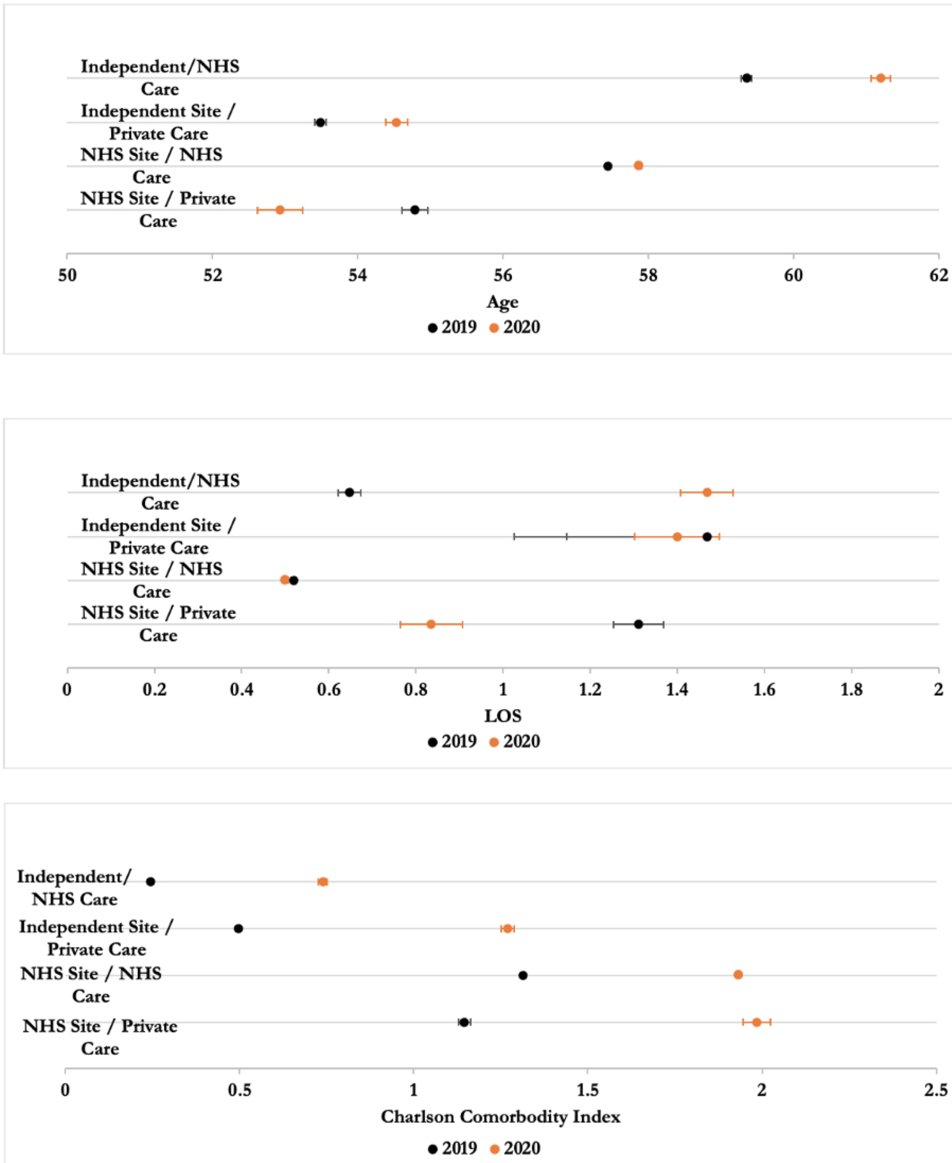


Figure 2: Mean age, length of stay and Charlson comorbidity index by market quadrant for April-July 2019 and April-July 2020

163x199mm (144 x 144 DPI)

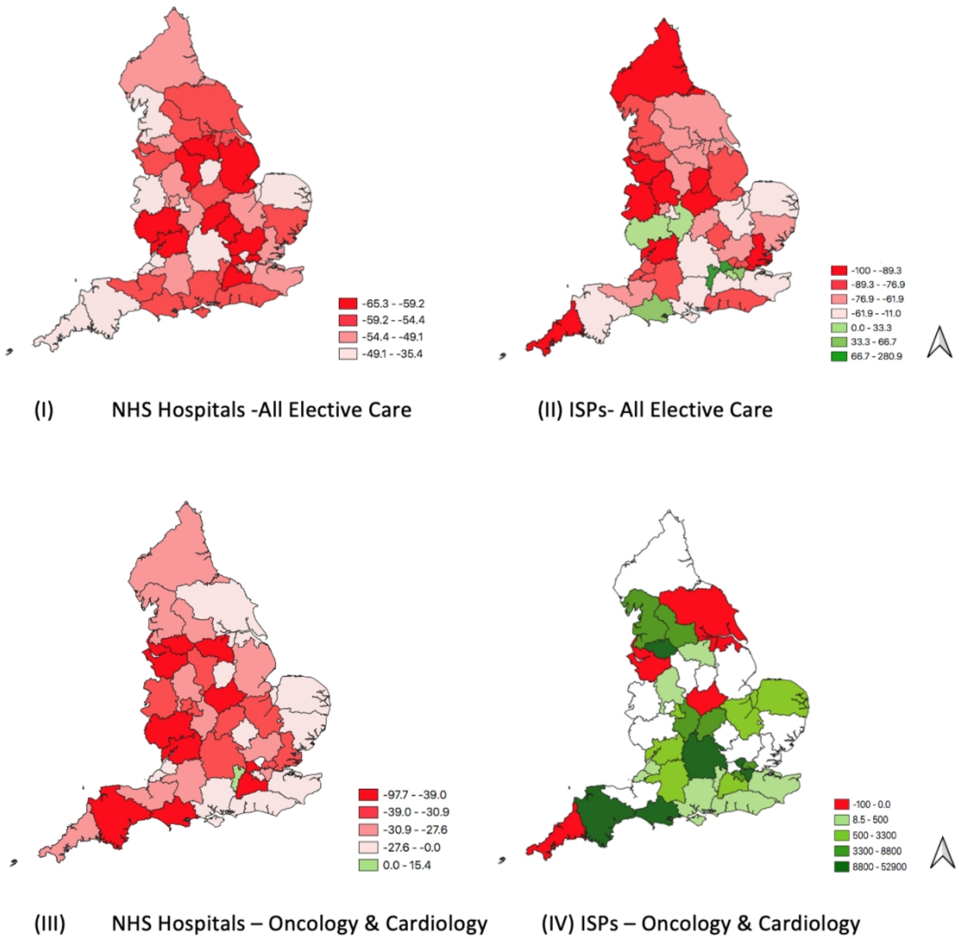
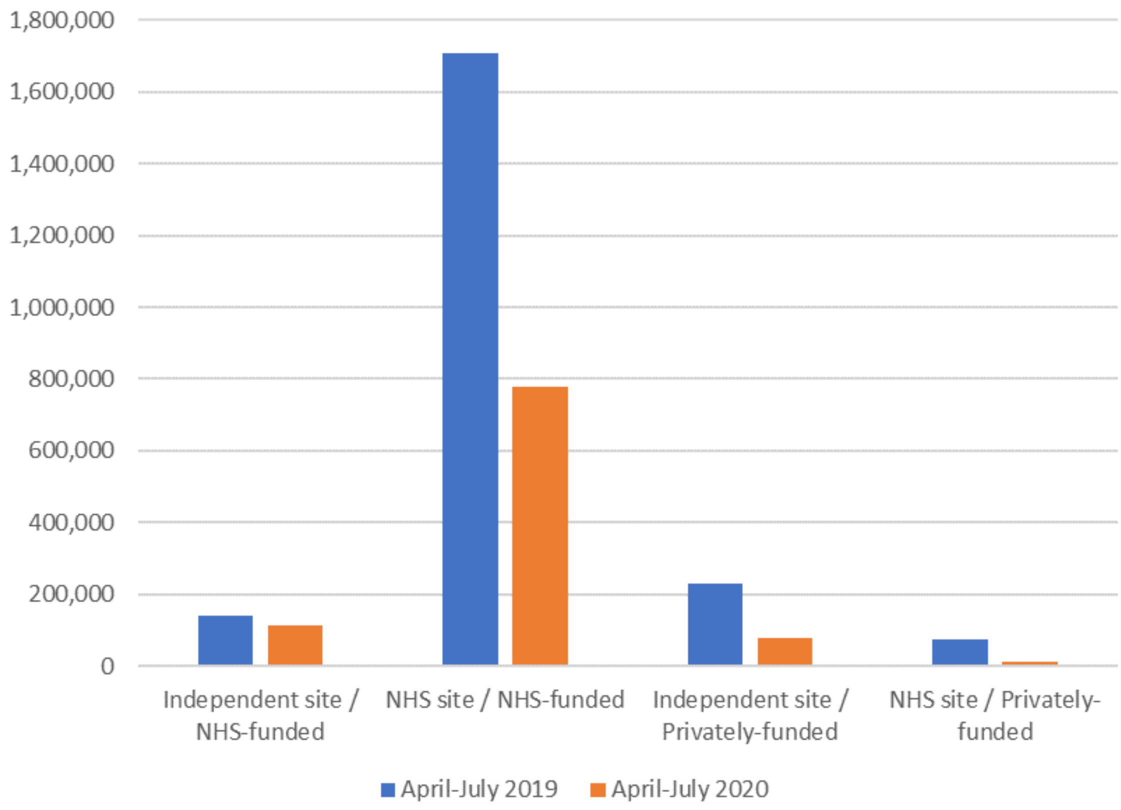


Figure 3: Growth rate on the number of admissions for NHS funded care for NHS Hospitals and Independent Sector Providers (ISPs) by Sustainability and Transformation Partnerships (STP) - April-July 2019 v April-July 2020 (%)

230x215mm (144 x 144 DPI)

Supplementary material 1: Total bed days in independent sector providers and NHS hospitals by funding mechanism in the first wave of the COVID-19 pandemic compared to the previous year*



Note: *Day case surgery is coded as zero length of stay

Supplementary material 2: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Largest Reductions in Volume and Market Quadrant *

Procedure	April-July 2019	April-July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Bursa excision (surgical)	275	6	-97.8%	Varicose vein treatment (avulsion)	1018	39	-96.2%
Bursa treatment (non-surgical)	944	22	-97.7%	Halo procedure	383	19	-95.0%
Metatarsal osteotomy	770	24	-96.9%	Varicose vein treatment (laser ablation)	1023	53	-94.8%
Vasectomy	1068	40	-96.3%	Rhinoplasty	729	38	-94.8%
Spinal injection (facet joint injection or paravertebral block)	3059	119	-96.1%	Spinal injection (facet joint injection or paravertebral block)	8773	462	-94.7%
Joint injections for pain	8772	384	-95.6%	Varicose vein combined treatments	853	45	-94.7%
Septoplasty	1011	49	-95.2%	Vasectomy	1761	97	-94.5%
Knee replacement (primary)	8796	446	-94.9%	Breast enlargement	937	53	-94.3%
Haemorrhoid treatment	2166	112	-94.8%	Ankle replacement (primary)	316	18	-94.3%
Knee replacement (primary - unicompartmental)	1073	63	-94.1%	Breast lift	271	16	-94.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Cosmetic Rhinoplasty	275	3	-98.9%	Eardrum surgery	342	1	-99.7%
Weight loss surgery (gastric banding)	324	8	-97.5%	Joint injections for pain	205	4	-98.0%
Varicose vein treatment (ligation and stripping)	294	8	-97.3%	Tonsillectomy	368	14	-96.2%
Face lift	579	16	-97.2%	Knee replacement (primary)	437	17	-96.1%
Varicose vein treatment (avulsion)	459	14	-96.9%	Hip replacement (primary)	718	32	-95.5%
External ear plastic surgery (pinna)	423	15	-96.5%	Knee arthroscopy	281	14	-95.0%
Septoplasty	1166	46	-96.1%	Circumcision	236	16	-93.2%
Labiaplasty	344	14	-95.9%	Cardiac surgery (coronary artery bypass graft - CABG)	255	19	-92.5%
Rhinoplasty	1200	50	-95.8%	Cataract surgery	4299	358	-91.7%
Eye lift (blepharoplasty)	1139	49	-95.7%	Cardiac Ablation	819	71	-91.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary material 3: Admitted Consultant Episodes for Elective Care by Top 10 Procedures in terms of Smallest Reductions in Volume and Market Quadrant *

Procedure	April -July 2019	April -July 2020	% Change	Procedure	April-July 2019	April-July 2020	% Change
Independent site/NHS-funded				NHS site/NHS-funded			
Partial excision of breast (wide local excision)	1	1671	167000.0%	Percutaneous bile duct procedure	216	211	-2.3%
Bladder tumour resection (TURBT)	59	1000	1594.9%	Ascitic drain	5717	5503	-3.7%
Prostate needle biopsy	69	977	1315.9%	TAVI (Transcatheter Aortic Valve Implantation)	916	840	-8.3%
Mastectomy	115	1281	1013.9%	Therapeutic spinal tap	3459	3171	-8.3%
Kidney stone treatment - keyhole (PCNL)	61	576	844.3%	Right hemicolectomy	855	766	-10.4%
Excision lesion of breast (lumpectomy)	50	413	726.0%	Percutaneous liver blood vessel procedure	389	329	-15.4%
Prostate surgery (prostatectomy)	48	316	558.3%	Cervical suture in pregnancy	187	152	-18.7%
Thyroidectomy	55	311	465.5%	Spinal biopsy	171	136	-20.5%
Rectal lesion removal	60	322	436.7%	Intrathecal drug delivery system procedure	1523	1202	-21.1%
Bladder lesion treatment (endoscopy)	88	359	308.0%	Appendix removal - emergency keyhole	174	132	-24.1%
Independent site/ Privately-funded				NHS Site/ Privately-funded			
Vaginal birth	116	146	25.9%	Caesarean delivery	272	269	-1.1%
Caesarean delivery	233	273	17.2%	Vaginal birth	176	101	-42.6%
Partial excision of breast (wide local excision)	513	451	-12.1%	Partial excision of breast (wide local excision)	165	69	-58.2%
Mastectomy	554	434	-21.7%	Prostate surgery (prostatectomy)	259	85	-67.2%
Ascitic drain	173	128	-26.0%	Prostate needle biopsy	184	51	-72.3%
Excision lesion of breast (lumpectomy)	271	192	-29.2%	Skin lesion removal	399	87	-78.2%
Prostate surgery (prostatectomy)	264	178	-32.6%	Epidural injection	416	85	-79.6%
Bladder tumour resection (TURBT)	372	217	-41.7%	Inguinal hernia repair	341	66	-80.6%
Pacemaker - insertion, removal or attention	240	132	-45.0%	Pacemaker - insertion, removal or attention	459	89	-80.8%
Removal of products of conception (RPOC)	279	143	-48.7%	Spinal decompression (lumbar)	459	89	-81.3%

*For procedures with more than 200 episodes in total across both 2019 and 2020

Supplementary material 4: Mean Age, Length of Stay (LOS), Charlson Comorbidity Index (CCI) by Speciality for top 10 highest volume specialities and by Market Quadrant in April-July 2020 and April-July 2019*

Specialty	Age			LOS			CCI		
	2019	2020	P value	2019	2020	P value	2019	2020	P value
Independent site/NHS-funded									
General surgery	52.012	57.626	0	0.082	1.046	0	0.231	1.001	0
Gastroenterology	51.271	56.91	0	0.007	0.177	0	0.266	0.247	0.043
Nephrology	N/A	56.67	N/A	N/A	1.00	N/A	N/A	2.33	N/A
Haematology	N/A	65.11	N/A	N/A	1.92	N/A	N/A	0.79	N/A
Medical oncology	N/A	63.84	N/A	N/A	0.81	N/A	N/A	1.83	N/A
Orthopaedics	59.611	54.688	0	0.931	0.774	0	0.262	0.208	0
Ophthalmology	74.877	74.703	0.088	0.002	0.003	0.183	0.206	0.12	0
Clinical oncology	N/A	62.36	N/A	N/A	0.15	N/A	N/A	5.91	N/A
General medicine	64.433	57.035	0	1.04	0.795	0.14	0.18	0.561	0
Urology	51.877	64.487	0	0.224	0.645	0	0.245	0.931	0
NHS site/NHS-funded									
General surgery	59.012	59.619	0	0.765	1.139	0	0.699	1.113	0
Gastroenterology	56.422	53.788	0	0.091	0.13	0	0.372	0.467	0
Nephrology	63.522	62.964	0	0.072	0.055	0	2.006	2.033	0
Haematology	62.776	61.398	0	0.335	0.332	0.761	1.621	1.63	0.05
Medical oncology	61.401	59.936	0	0.104	0.105	0.806	5.408	5.529	0
Orthopaedics	54.891	47.366	0	1.294	1.111	0	0.34	0.306	0
Ophthalmology	70.112	69.53	0	0.028	0.035	0.025	0.37	0.354	0
Clinical oncology	63.236	61.921	0	0.084	0.071	0.001	5.226	5.439	0
General medicine	59.883	59.941	0.431	0.214	0.295	0	0.827	1.09	0
Urology	62.364	63.583	0	0.514	0.542	0.009	0.961	1.189	0
Independent site/ Privately-funded									
General surgery	53.289	52.994	0.155	0.627	0.899	0	0.278	0.635	0
Gastroenterology	50.002	49.7	0.29	0.088	0.203	0	0.17	0.284	0
Nephrology	55.579	63.647	0.035	8.748	13.353	0.54	1.284	1.441	0.711
Haematology	59.954	60.419	0.391	1.393	0.879	0.018	1.38	1.857	0
Medical oncology	58.114	57.853	0.052	4.426	2.785	0	2.712	3.2	0
Orthopaedics	54.525	52.276	0	1.02	1.011	0.771	0.124	0.114	0.036
Ophthalmology	71.881	71.59	0.214	0.044	0.021	0.589	0.141	0.113	0.002
Clinical oncology	60.017	60.247	0.671	0.764	1.919	0.02	3.383	4.476	0
General medicine	57.258	60.477	0.002	2.652	3.619	0.205	0.42	0.732	0
Urology	59.47	61.758	0	0.476	0.562	0.011	0.403	0.586	0
NHS Site/ Privately-funded									
General surgery	53.602	0.011	2.16	2.132	0.908	1.044	1.608	0	53.602
Gastroenterology	50.151	0.018	0.701	0.178	0.071	0.588	0.642	0.517	50.151
Nephrology	52.392	0	1.141	0.003	0.007	2.065	2.303	0	52.392
Haematology	49.033	0	1.376	0.879	0.008	1.179	1.169	0.802	49.033
Medical oncology	55.317	0.007	0.488	0.412	0.235	3.258	3.413	0.001	55.317
Orthopaedics	47.634	0	2.353	2.442	0.687	0.279	0.331	0.206	47.634
Ophthalmology	62.573	0.001	0.062	0.057	0.81	0.18	0.182	0.952	62.573
Clinical oncology	55.393	0	0.64	0.317	0.198	3.671	3.674	0.977	55.393
General medicine	57.828	0.77	1.595	0.777	0.19	0.939	0.917	0.899	57.828
Urology	58.632	0.278	0.964	0.844	0.267	0.93	1.281	0	58.632

*P values were produced using t-test to undertake a comparison of means

N/A as <=1 admissions during 2019

Supplementary material 5: % Change in Hospitals Spells for Elective Care by Age and Market Quadrant for Orthopaedics

Age	April-July 2019	April-July 2020	% Change	Age	April-July 2019	April-July 2020	% Change
Independent site/NHS Care				NHS site/NHS Care			
Age <18	22	44	100.0%	Age <18	14120	4183	-70.4%
Age>=18	62147	7650	-87.7%	Age>=18	187532	31411	-83.2%
Independent site/ Private Care				NHS Site/ Private Care			
Age <18	854	217	-74.6%	Age <18	369	67	-81.8%
Age>=18	41897	7534	-82.0%	Age>=18	3668	399	-89.1%
All Market Quadrants							
Age< 18	15365	4511	-70.6%				
Age>=18	295244	45600	-84.6%				

Emergency contracting and the delivery of elective care services across the English National Health Service and independent sector during COVID-19: retrospective cohort study

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Word count: 3627

STROBE Statement

Checklist of items that should be included in reports of observational studies

Section/Topic	Item No	Recommendation	Reported on Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4, 5
Objectives	3	State specific objectives, including any prespecified hypotheses	4, 5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5, 6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5, 6
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	5, 13
Study size	10	Explain how the study size was arrived at	5, 6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6

		(*c*) Explain how missing data were addressed	-
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	-
		(*e*) Describe any sensitivity analyses	6

Section/Topic	Item No	Recommendation	Reported on Page No
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7, 8, 9, 10, 11
		(b) Indicate number of participants with missing data for each variable of interest	
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7, 8, 9, 10, 11
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7, 8,9,10,11
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11, 12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11, 12, 13,14
Generalisability	21	Discuss the generalisability (external validity) of the study results	13

Other Information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

**Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.*

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.