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Samantha Burn
Carol Propper
George Stoye
Max Warner
with
Paul Aylin
Alex Bottle

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Economic and Social Research Council

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Samantha Burn (Harvard University, Imperial College London and IFS)
Carol Propper (Imperial College London and IFS)
George Stoye (IFS and Imperial College London)
Max Warner (IFS and Imperial College London)

with
Paul Aylin (Imperial College London)
Alex Bottle (Imperial College London)

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Executive summary

The COVID-19 pandemic has had profound effects on healthcare systems around the world, including the UK National Health Service (NHS). As a result of a reorganisation of services and changes in the care needs and care-seeking behaviour of patients, the use of hospitals in England has changed drastically. However, exactly how much and what type of care has taken place, and the extent to which these patterns vary across different groups of individuals, has not yet been comprehensively documented. Better evidence on this is required to address backlogs in care, and to understand to which groups resources should be particularly targeted after the acute phase of the pandemic is over.

In this briefing note, we use administrative hospital data from across the NHS in England to describe how the use of inpatient (elective and emergency) and outpatient hospital care in 2020 compared with that in the previous year. We first show how overall levels of care changed in the period after the start of the pandemic in March until the end of December 2020 and then examine how changes in activity varied across regions and clinical specialties. We finally examine how these patterns differ across patient age, ethnicity and local area deprivation.

Our findings suggest a complex response to the pandemic driven by large drops in supply for non-COVID services and demand-side responses to the pandemic. They also underline the need to increase available resources to address care backlogs and to direct resources to the people, local areas and groups that have been most affected.

Key findings

1 Between March and December 2020, there were 2.9 million (34.4%) fewer elective (planned) inpatient admissions, 1.2 million (21.4%) fewer non-COVID emergency inpatient admissions, and 17.1 million (21.8%) fewer outpatient appointments compared with the same period in 2019.

2 There was a sharp reduction in hospital activity in March 2020. Although emergency inpatient admissions had almost returned to their 2019 level by August, elective and outpatient volumes remained substantially below their 2019 levels for the rest of 2020. Emergency inpatient admissions began to decline again (relative to 2019) in September.

3 All regions of England saw large reductions in hospital activity relative to the same period in 2019, with some variation between different regions and by type of admission. At the extremes, Yorkshire and the Humber had 39.5% fewer elective admissions between March and December 2020, compared with a reduction of 30.3% in the South West. London had 24.4% fewer emergency admissions, compared with a fall of 15.6% in the South West. Across all care types, the North and the Midlands had larger reductions in hospital activity than the South and the East of England.

4 Reductions in volumes of care varied across clinical specialties. There were 57.4% (332,000) fewer trauma and orthopaedic elective admissions, compared with only 6.6% (46,000) fewer for nephrology. Paediatrics saw by far the largest reduction in emergency admissions, a reduction of 41.0% (242,000) compared with the same period the year before.

5 Individuals from the most deprived local areas had 23.3% fewer emergency admissions in March to December, compared with a 20.2% reduction for those in the least deprived areas. In absolute terms, the gap in activity between areas is substantially larger, since more deprived areas have more emergency admissions. There is little

difference in the percentage falls for elective admissions and outpatient appointments between more and less deprived areas.

6 Since older people are the largest users of hospital care, older people were, unsurprisingly, the most affected in per-capita terms. The drops were, however, very large: for those aged 80+, there were 122.5 fewer elective admissions per 1,000 population, 82.4 fewer emergency admissions and 835.7 fewer outpatient appointments between March and December. But when looking in relative terms, children (under-18s) had the largest percentage declines in both elective (37.0%) and emergency (38.5%) inpatient admissions.

7 There are substantial differences by ethnicity. The largest percentage decreases in elective inpatient admissions were among white and Asian individuals, while the largest percentage decreases in emergency inpatient admissions were among Asian, black and mixed ethnicity individuals.

1. Introduction

The COVID-19 pandemic has had profound effects on healthcare systems around the world, including the National Health Service (NHS) in England. Since the start of the pandemic, there has been a large reduction in the overall use of hospital care, and there are growing concerns over the medium- and longer-term consequences of such a reduction. Waiting lists for elective care have reached the highest level since the current definition began in 2007, with a total of 4.7 million waiting for treatment, and 388,000 waiting for more than a year for this treatment, by February 2021 (NHS Digital, 2021). Reductions in supply, coupled with a reluctance on the part of patients to seek care for acute problems during the pandemic, are likely to result in worse longer-run health outcomes and higher costs of eventually treating these problems. Understanding how healthcare patterns have changed – and, in particular, what types of care have been most affected and who has been most affected – is central to addressing these shortfalls post-pandemic.

In this briefing note, we use patient-level administrative hospital data (Hospital Episode Statistics) on all NHS-funded hospital care in England to describe how the use of NHS-funded hospital care changed in 2020 compared with the previous year.[1] The use of patient-level data allows us to explore in detail how different types of care changed and how this varied across groups. This detailed focus complements previous work that examined trends in national activity across a range of NHS services (see, for example, Thorlby, Fraser and Gardner (2020), Gardner and Fraser (2021) and Deputy et al. (2021)).[2]

We focus on the 10-month period from March to December in 2020 and 2019, and on changes in the number of elective (planned) and emergency inpatient admissions, and outpatient appointments. Elective inpatient admissions are those where the decision to admit was made in advance of the admission itself (for

[1] This includes hospital care provided in NHS hospitals and treatment that is funded by the government but takes place in non-NHS hospitals (including private and not-for-profit hospitals).

[2] NHS Digital publishes aggregated hospital activity measures on a monthly basis: https://digital.nhs.uk/data-and-information/publications/statistical/hospital-episode-statistics-for-admitted-patient-care-outpatient-and-accident-and-emergency-data/april-2020---january-2021.

example, admissions for surgery following a period on a waiting list). Emergency inpatient admissions are unplanned admissions (for example, patients who are admitted following an attendance at an Accident and Emergency department). We do not consider maternity admissions in detail because, compared with the other types of hospital care, they are relatively unchanged during this period. We do not examine Accident and Emergency (A&E) attendances due to a lack of consistent patient-level data covering all NHS hospitals over the two-year period. The available data also end prior to the beginning of 2021 when NHS hospitals were again placed under increasing pressure from a large number of COVID-19 admissions, and when we would expect another decrease in other hospital activity (NHS England, 2021a).

We begin by showing the overall changes in use of each service over the course of 2020 relative to 2019. To identify places and specific types of care where activity was most affected, we then examine how reductions in hospital activity varied across regions and by clinical specialty. Finally, to provide evidence about whose care has been most affected during the pandemic, we examine how changes in inpatient and outpatient care varied across patient age, sex, ethnicity and the deprivation of the local area where the patient lives.

The patterns of changing hospital use that we describe here are the product of the interaction between demand and supply factors. On the supply side, the large amount of resource required to treat patients suffering directly from the virus has led to a temporary reorganisation of services, with a shift of staff and equipment away from other areas of care. As a result, the ability of hospitals to provide broader services has been severely reduced during this period.

Demand for care is also likely to have changed over this period. The pandemic and policy responses to reduce the spread of the virus (such as the national lockdown) have changed day-to-day life for millions of people and their daily activity. This is likely to have reduced genuine need for many forms of (emergency) healthcare. For example, lower road traffic as a result of home working is likely to have reduced car collisions and improved air quality (Brodeur, Cook and Wright, 2021), while the construction closures for a period in Spring 2020 will have reduced building site accidents. In the other direction, the lockdown has been shown to have led to a worsening in reported levels of mental health (Banks, Fancourt and Xu, 2021).

In addition to the change in underlying need, patients may also have changed their attitude towards seeking care even in cases when, prior to the pandemic, they would have sought care. For example, in the first three months of the pandemic, 14% of patients aged 50 years or older reported not seeking help from a GP even when they felt they needed such care (Propper, Stockton and Stoye, 2020). Given desires not to overburden already pressured hospitals and concerns about infection at hospitals, we would expect patient demand for hospital services to fall even if need for such care did not.

In this briefing note, we do not separate out the roles of supply and demand, but this will be an important priority for future research as policymakers seek to address shortfalls in care among particular groups.

2. Overall changes in hospital use

Table 2.1 compares the number of elective inpatient admissions, emergency inpatient admissions, maternity inpatient admissions and outpatient appointments that took place between March and December in 2019 and 2020. For each care type, activity in 2020 was considerably below that recorded over the same period in 2019. Between March and December 2020, there were 5.5 million elective inpatient admissions. This is 2.9 million fewer admissions than the same period in 2019 – a reduction of 51.0 admissions per 1,000 people in England – or a reduction of 34.4%.

In addition to changes in planned inpatient activity, there was also a large reduction in the number of emergency admissions. Between March and December 2020, there were 4.6 million emergency admissions to NHS hospitals, of which 155,000 had COVID-19 as their primary diagnosis. Excluding those with a primary COVID-19 diagnosis, this is 1.2 million fewer emergency admissions than for the same period in 2019 (or 21.4 fewer per 1,000 people in England), a reduction of 21.4%.

The number of maternity admissions fell by 70,000 in 2020 compared with 2019. Between March and December 2020, there were a total of 822,000 maternity admissions compared with 892,000 in the same period in the previous year, a drop of 7.9%. Of course, for the majority of this period, most of the maternity admissions relate to conceptions occurring prior to the pandemic and therefore should be unaffected by it.

The number of outpatient appointments fell in 2020 compared with 2019. Between March and December 2020, a total of 61.1 million outpatient appointments took place. This is 17.1 million fewer than in the same period in 2019 – a fall of 303.1 per 1,000 people in England – or a reduction of 21.8%.

Table 2.1. Changes in national volumes of care in March to December 2020 compared with the same period in 2019

Care type	Percentage change	Absolute change	Absolute change per 1,000 people
Elective inpatient admissions (non-primary-COVID-19)	–34.4%	–2,872,000	–51.0
Emergency inpatient admissions (non-primary-COVID-19)	–21.4%	–1,203,000	–21.4
Maternity inpatient admissions (non-primary-COVID-19)	–7.9%	–70,000	–1.2
Outpatient appointments	–21.8%	–17,059,000	–303.1
In-person	–40.5%	–30,484,000	–541.6
Remote	+468.1%	+13,425,000	+238.5
First outpatient appointments	–27.0%	–6,824,000	–121.2

Note: Data from April to December 2020 are provisional and may differ from later versions of Hospital Episode Statistics. Results may differ from other published Hospital Episode Statistics aggregates. In all calculations, counts of patients are rounded to the nearest 10 (with 1–9 omitted). In results, all counts of patients are rounded to the nearest 1,000. Per-capita numbers (per 1,000) use England as the denominator: a small number of patients who live in other countries will be included in the sample. We only include provider codes that start with 'R' (NHS trusts) and 'N' (Independent Sector Providers working for the NHS), and NHS patients (admincat 01). Inpatient admissions with a primary diagnosis (included suspected) of COVID-19 (U071, U072) are excluded. Patients are classified as elective inpatient if they have any elective admission method (11, 12, 13), emergency inpatient if they have any emergency admission method, except emergency transfers from other providers (21, 22, 23, 24, 25, 2A, 2C, 2D, 28), and maternity if they have a maternity delivery admission (31, 32). Only outpatient appointments that were attended are counted. March to December comparisons compare Monday 4 March 2019 to Sunday 29 December 2019 with Monday 2 March 2020 to Sunday 27 December 2020.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics and Office for National Statistics (2020).

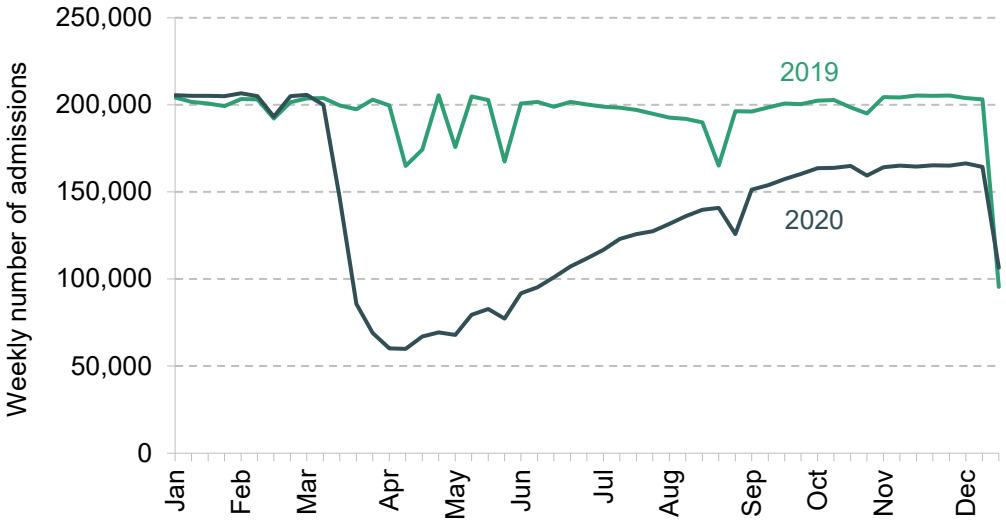
The nature of outpatient appointments also changed drastically during this period. The number of in-person appointments fell by a much sharper amount, with 30.5 million (40.5%) fewer in-person appointments in the 10-month period in 2020 than in the same period in 2019. But there was a huge increase in the number of remote outpatient appointments, rising by 13.4 million appointments from 2.9 million appointments in 2019 to 16.3 million in 2020. This is equivalent to a 468.1% increase in remote appointments. This reflects a very large shift in the way that doctors and patients interact since the beginning of the pandemic, and in some (but not all) cases may reflect a more effective way for doctors to see patients.

We can also distinguish between first and subsequent outpatient appointments. First outpatient appointments represent the flow into the treatment pathway for elective care, and arise mostly due to referrals from GPs or other hospital consultants (for example, following an attendance at A&E). Between March and December 2020, the number of first outpatient appointments fell by 6.8 million compared with the same period in 2019, equivalent to a 27.0% reduction, or a reduction of 121.2 per 1,000 English population. This is a larger proportional decline than overall reductions in outpatient appointments, suggesting that new outpatients were more affected than existing outpatients in terms of the number of appointments attended.

The timing of the changes in activity is also important. Figure 2.1 shows the number of elective inpatient admissions for each week in 2019 and 2020. Initially, the number of admissions was very similar in both years, before falling sharply in mid March 2020. This sharp fall follows the guidance issued by NHS England and NHS Improvement on 17 March to 'postpone all non-urgent elective operations from 15th April at the latest, for a period of at least three months' but with 'full local discretion to wind down elective activity over the next 30 days' (NHS England and NHS Improvement, 2020). The lowest levels of elective activity were in the first week of April, with the number of elective admissions down by an astonishing 70.0% on their 2019 values.[3] Elective activity subsequently increased steadily, reaching 80.9% of the 2019 level in the week before Christmas. In 2019, the impact of Bank Holidays on weekly volumes can be seen, with sharp temporary drops in certain weeks in May, August and, most notably, at the end of December around the Christmas period. These patterns are smaller but are still present in 2020.

[3] Another reason for these particularly low levels is that Easter occurred in this week in 2020, but not in 2019.

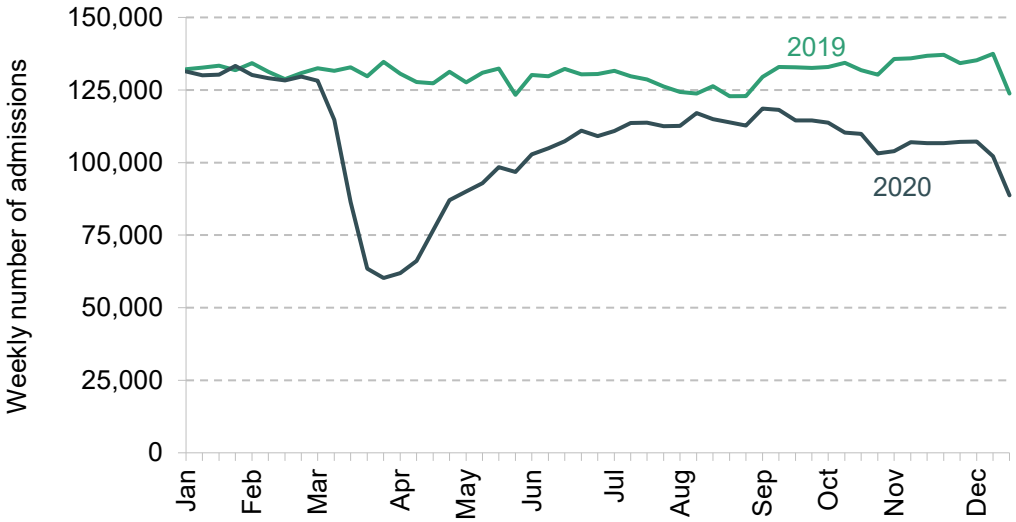
Figure 2.1. Weekly non-primary-COVID-19 elective inpatient admissions in 2019 and 2020



Note: See note to Table 2.1. When comparing 2019 with 2020, the closest week is used starting from week beginning 7 January 2019 and week beginning 6 January 2020.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Figure 2.2. Weekly non-primary-COVID-19 emergency inpatient admissions in 2019 and 2020



Note: See note to Figure 2.1.

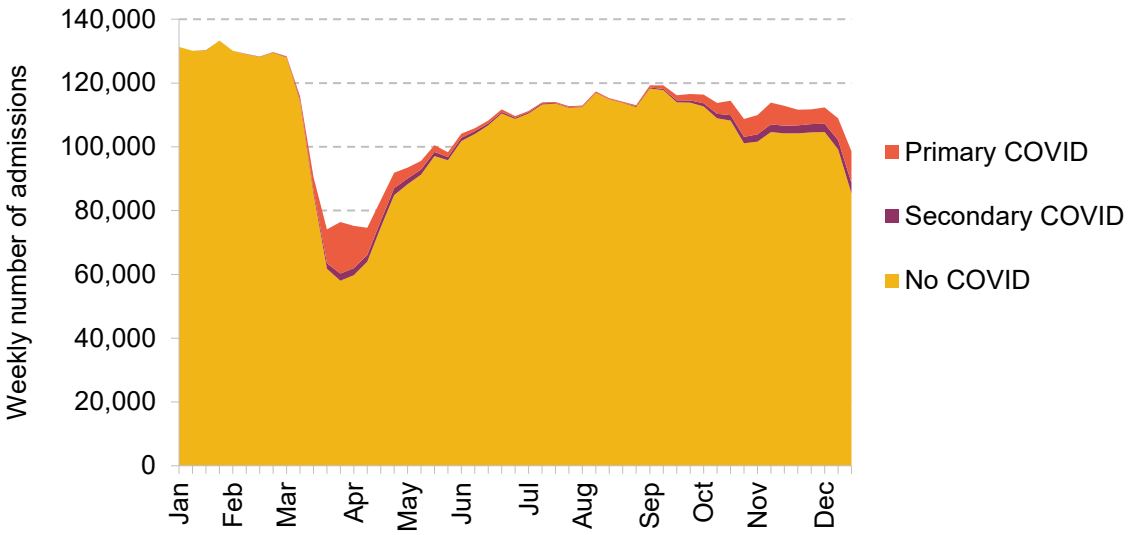
Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Figure 2.2 shows weekly emergency inpatient admissions in 2019 and 2020. Again, admissions were similar at the start of the year before falling sharply in March 2020. In this case, the substantial fall started in the week beginning 9 March, a week earlier than the fall in elective inpatient admissions noted above and a full two weeks before the UK national lockdown began. Emergency admissions hit their lowest point in the week beginning 30 March, with admissions at just 44.7% of their 2019 level, and only 56.7% when patients admitted for COVID-19 are also included. From April onwards, non-primary-COVID emergency admissions slowly increased to a peak of 94.6% of their 2019 level in the second week of August, before declining again to 74.3% of their 2019 level in the week before Christmas.

The sharp decreases in emergency admissions also occurred during a period when COVID-19 admissions were rapidly rising. Figure 2.3 shows the composition of emergency inpatient admissions in each week of 2020, distinguishing between patients without COVID-19 ('No COVID'), those with a primary recorded diagnosis of COVID-19 ('Primary COVID') and patients who have COVID-19 recorded as a secondary diagnosis ('Secondary COVID').[4] In all periods, the vast majority of emergency admissions are not related to COVID-19. During the peak of COVID admissions in the first wave (in the week beginning 30 March 2020), 21.1% of emergency patients had a primary COVID-19 diagnosis. However, these patients require a far greater amount of resources to treat than many emergency patients in NHS hospitals, with far greater lengths of stay (an average of 8.9 days for primary-COVID-19 patients compared with 4.2 days for other patients in March to December 2020) and more intensive treatment. This illustrates that even while total numbers of patients present in NHS hospitals at this time were far below usual case numbers, this still put extreme pressure on the health system.

[4] To some extent, we would expect those with a primary diagnosis of COVID-19 to be patients who attended hospital primarily for treatment from the virus, while patients with a secondary (but not primary) COVID diagnosis (initially) attended hospital for other reasons. Patients in this second group may have an incidental diagnosis or acquire the infection in hospital. They may also be affected by coding issues (for example, a patient with COVID may be treated initially for pneumonia but a later diagnosis reveals COVID-19). We do not attempt to distinguish between these separate channels.

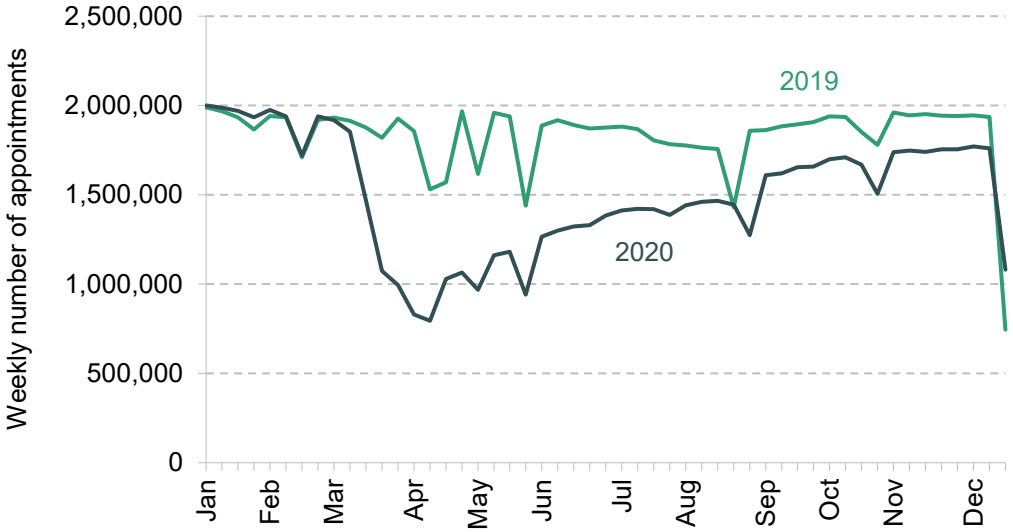
Figure 2.3. Composition of weekly emergency inpatient admissions in 2020



Note: See note to Figure 2.1. Primary COVID patients are those with a primary diagnosis (including suspected) of COVID-19. Secondary COVID patients are those with a non-primary diagnosis (including suspected) of COVID-19.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Figure 2.4. Weekly outpatient appointments in 2019 and 2020



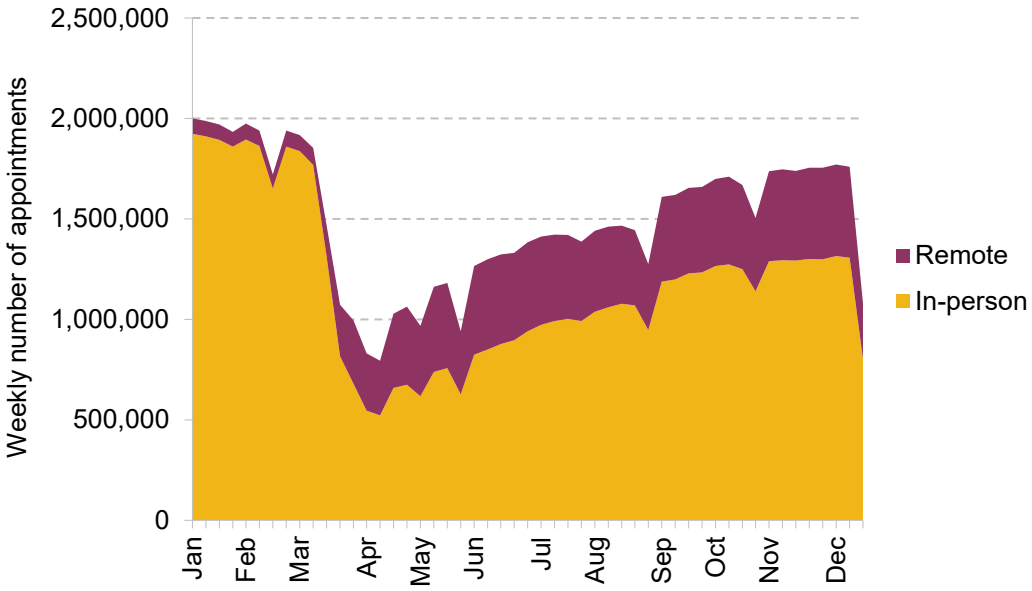
Note: See note to Figure 2.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Figure 2.4 shows the number of outpatient appointments in each week in 2019 and 2020. As with inpatient activity, the numbers of outpatient appointments were similar in January and February in both years. In line with changes to elective admissions, outpatient appointments started to fall substantially in the week beginning 16 March 2020, reaching a low of 44.7% of the 2019 level in the week beginning 6 April. The number of appointments then slowly increased over time, reaching 90.9% of the 2019 level in the week before Christmas.

As noted above, the composition of outpatient appointments – between in-person and remote consultations – changed substantially during this period. Figure 2.5 shows this composition on a weekly basis throughout 2020. In January and February 2020, just 3.9% of outpatient appointments were delivered remotely. This share surged in the spring, with 36.6% of appointments undertaken remotely by the end of April, and then slowly decreased to 25.7% in the week before Christmas as the number of in-person appointments increased.

Figure 2.5. Composition of weekly outpatient appointments in 2020



Note: See note to Figure 2.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Taken together, these figures show the scale and timing of the reduction in hospital use since the start of the pandemic, with large falls in activity across all three types of care.

The reductions in elective and a large proportion of outpatient activity are unsurprising given the guidance to reduce this activity at the start of the pandemic in order to concentrate resources on COVID patients. However, the scale of these falls is substantial and therefore important. In most cases, this cancelled elective care will need to be rescheduled in future. The fall in elective activity (just under 2.9 million admissions, or 51.0 per 1,000 people in England) therefore gives a rough indication of the number of additional elective procedures the NHS will need to provide in the near future in order to address rising waiting lists. Using the 2018–19 NHS Reference Costs, we can also estimate the cost of this 'missing' treatment, by assigning the average cost of providing treatment to the estimated fall in elective activity. This suggests that providing this treatment will cost roughly £3.5 billion.[5] The exact figure could be lower if a significant proportion of this treatment is no longer required or the missed treatment was less complex than average, while it could be substantially higher if more complex treatment is required for patients who have waited a long time, or if additional payments are needed to purchase enough capacity (either from the private sector or by paying for more staff time and resources within the NHS) to meet extra demand for elective care.

Noticeably, even during the summer months when COVID-19 case numbers were low, elective activity remained significantly below 2019 levels. This suggests that even with growing waiting lists, hospitals may struggle to scale up elective activity immediately once the acute pressures of the pandemic ease. Furthermore, importantly, this activity is in addition to any new demand for care that will arise over time (including any additional demand from recovering COVID patients, or those who require additional care as a result of delayed care since March 2020), and comes on the back of rising demand even prior to the pandemic (Royal College of

[5] Our measure of elective admissions includes elective inpatient, day case and regular attender treatment. In 2018–19, the average cost of elective inpatient treatment was £4,078, the average cost of day case treatment was £752 and the average cost of regular attender treatment was £341 (NHS England, 2020). The 2.9 million fewer elective admissions are split into 0.4 million fewer elective inpatient stays, 2.3 million fewer day cases and 0.2 million fewer regular attender stays. The figure in the text does not include any outpatient costs associated with these elective treatment pathways.

Surgeons of England, 2019). Making up for this lost activity will therefore be very challenging and will need to be a major focus for the NHS in the coming years.

In addition, the fact that first outpatient appointments fell at a much higher rate than follow-up appointments suggests that the inflow of patients to elective pathways was reduced during this period (potentially due to patients being reluctant to seek care for longer-standing health issues then). This means that current waiting lists are likely to be an underestimate of the true numbers of patients who are waiting for treatment.

The changes in emergency care are perhaps more surprising than the reductions in elective admissions, given their unplanned nature. These changes were also not limited to the early months of the pandemic: while emergency admissions did increase after Spring 2020 and the lifting of the first national lockdown, they never reached the same levels as in 2019.

These patterns in emergency admissions could be explained by a range of factors, which we are unable to separate here. First, the underlying need for emergency care may have been reduced due to changes in people's lives as a result of the pandemic. This includes, for example, reductions in respiratory admissions as a result of better air quality following on from lower traffic levels on roads, fewer workplace or traffic accidents as more people worked from home, and lower transmission of other infectious diseases (most obviously influenza). Second, patients may have changed their care-seeking behaviours, becoming more reluctant to seek care for a given health complaint (for example, if they are nervous about visiting a hospital during the pandemic).

These two factors combined may explain the reduction in the number of patients attending A&E departments over the period of the pandemic. Between March and December 2020, there were 31.9% fewer visits to A&E than during the same period in 2019 (NHS England, 2021b).

In addition to this, hospitals may have been more reluctant to admit patients who attended A&E departments during the pandemic, both because of concerns for those patients over potential infection while in hospital and the possibility that asymptomatic cases could cause infections among existing hospital patients, and because of the need to generate greater capacity to treat COVID-19 patients. This

would reduce the number of patients admitted even if the number of patients seeking care did not change.

The implications of the reduction in emergency admissions are also somewhat unclear. In part, reduced emergency activity may imply benefits both to patients (if they avoided a hospital admission) and to NHS hospitals (which have long sought ways to reduce pressure on A&E departments and inpatient wards). However, it also risks patients not receiving appropriate treatment for health conditions. This could lead to worse outcomes for the patients in the short run, and create longer-term issues both for patients if health conditions worsen and for the NHS if treating such patients at a later stage is costlier.

3. Variation by region

We now examine how changes in hospital activity have varied across the regions of England. When considering how the pandemic has affected different regions or population groups, we want to answer two main questions. First, where has activity fallen the most? Absolute changes in activity measure the places or groups where the number of admissions and appointments have decreased the most, and where the greatest amount of resources will likely be required to make up for lost care. This is important in planning where resources are required to make up for backlogs in care.

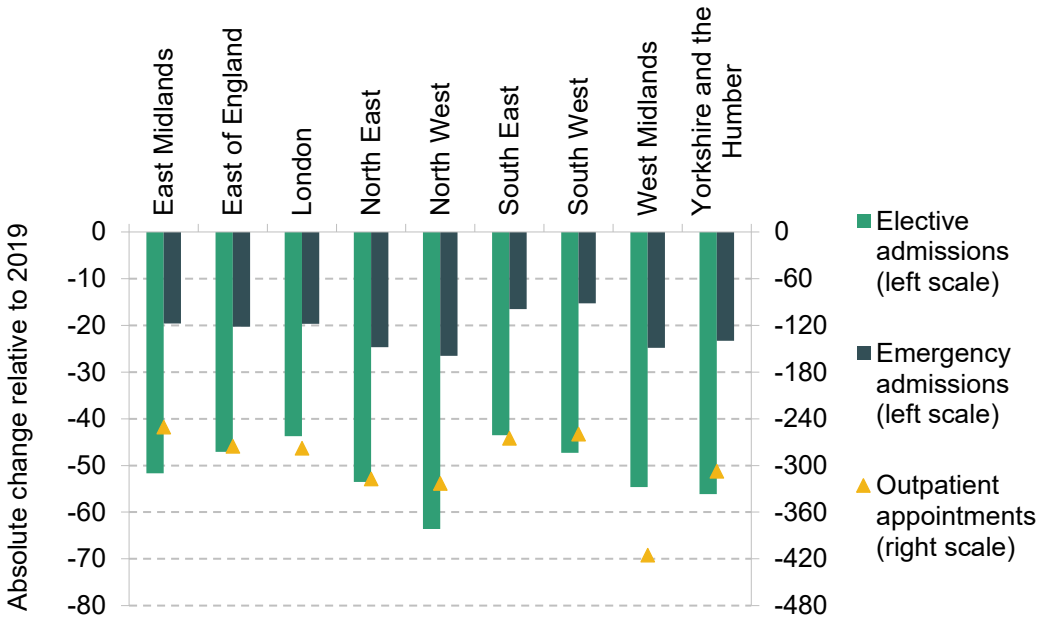
Second, we want to examine the extent to which falls in activity have been evenly spread across different regions or groups of users. Absolute changes will in large part reflect patterns of prior care: for example, an area with a larger population would have had a greater number of admissions than a smaller area (all other things being equal), so if both experienced the same proportional cut in activity, absolute falls would be greater in the more populated area. But large differences in the relative changes in hospital use across areas or groups may also reveal differences in their experiences of the pandemic. While we cannot uncover why these differences occur, identifying which groups have been *relatively* more or less affected is important in identifying potential increases in inequalities across places or population groups.

To examine relative changes in hospital use, we consider two measures. The first is per-capita changes in activity, which directly address variation in the size of the population, allowing comparison of falls in activity for a given number of people living in different areas. But areas vary not only in the size of their population but also in their need for care: similar-sized populations with a greater or lesser share of healthy individuals will require different levels (and types) of hospital care. The second measure we examine is therefore the percentage change in hospital use (from 2019 levels). This shows whether places with higher or lower activity prior to the pandemic, which will reflect pre-pandemic differences in local need, experienced different relative falls in hospital use in 2020.

Taken together, the three measures paint a more complete picture of the regional variation in hospital care use over the past year than looking at one measure in isolation.

Figure A.1 in the appendix shows the absolute changes in number of admissions and appointments between March–December 2019 and March–December 2020 for patients living in different regions of England. There is considerable variation in the size of changes across regions, with the greatest absolute reduction in elective and emergency activity in the North West (467,000 fewer elective admissions and 194,000 fewer emergency admissions over the 10-month period) and the smallest reductions in the North East (143,000 and 66,000 respectively). The greatest absolute fall in outpatient admissions was in London (2.5 million), while the smallest fall was again in the North East (848,000).

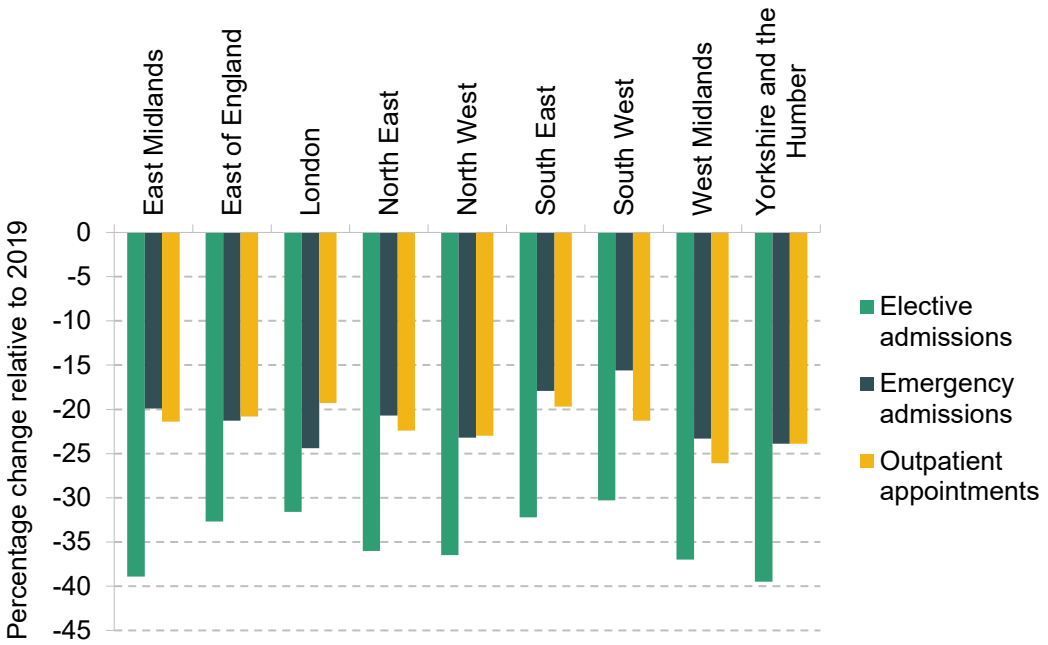
Figure 3.1. Absolute change in volumes of care per 1,000 population, March–December 2019 to March–December 2020, by region



Note: See note to Table 2.1. Regions are based on the patient's home address rather than the region of the hospital where they receive treatment. Patients without a valid home address are omitted.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics and Office for National Statistics (2020).

Figure 3.2. Percentage change in volumes of care, March–December 2019 to March–December 2020, by region



Note: See note to Figure 3.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

To a great extent, these differences will reflect large differences in population size. For example, the North East had the smallest absolute fall in each of the care types, but had a population of less than a third that of London (2.7 million compared with 9.0 million in 2019). To account for different population sizes across regions, Figure 3.1 shows the change in volumes of care per 1,000 people who live in the region. This alters the pattern considerably. The South East experienced the smallest reduction (43.5 per 1,000) in elective admissions and the North West the largest reduction (63.6 per 1,000), a nearly 50% greater reduction. In the case of emergency inpatient admissions, the largest reduction (26.5 per 1,000) was again in the North West and the smallest reduction was in the South West (15.3 per 1,000). For outpatient appointments, the East Midlands saw the smallest reduction (251.0 per 1,000) and the West Midlands the largest (415.3 per 1,000 people).

The sizeable differences in per-capita changes will, in part, reflect differences in the underlying health of the local population: areas with many healthy people will not use as many services as areas with many unhealthy people if the total population size is the same. One way to account partially for differences in need is to examine

changes as a percentage of their 2019 level. Figure 3.2 shows the percentage change between March–December 2019 and the same period in 2020 for patients living in different regions of England. The percentage reduction in elective admissions varied from 30.3% in the South West to 39.5% in Yorkshire and the Humber. The smallest percentage decrease in emergency admissions over this period was in the South West (15.6%) while the biggest fall was in London (24.4%). The greatest percentage reduction in outpatient appointments was seen in the West Midlands (26.1%). This compares with the smallest percentage reduction of 19.3% in London.

Taken together, Figures A.1, 3.1 and 3.2 suggest that the impacts of the pandemic on wider use of hospital care varied across regions. Variation remains even after adjusting for population size or prior level of activity, although the regions most affected on each measure are not always the same: for example, London saw some of the largest reductions in absolute activity but some of the smallest decreases in elective and outpatient activity as a percentage of previous admissions and appointments. However, when considering percentage falls in activity, there are some clear regional patterns. The North and the Midlands had the largest reductions in elective admissions. The North and West Midlands also had substantially larger reductions in emergency admissions and outpatient appointments than the South of England. London is somewhat of an outlier, with a relatively small reduction in outpatients and elective admissions but the largest reduction in emergency admissions.

There is also a strong positive relationship between the reductions in different types of care within each region, with areas with greater reductions in elective admissions also experiencing greater falls in emergency admissions and outpatient appointments. This relationship holds when using absolute, per-capita or percentage changes. This suggests that the areas most affected on one margin of care have also been highly affected on others, and will require additional resources across a broad set of hospital activities to tackle backlogs in care, rather than resources being specifically channelled to certain regions for specific categories of care.

These patterns raise the important question of *why* hospital use has changed in different ways across the country. One potential driver of this variation is regional differences in both the number and the timing of COVID-19 cases and patients who have required hospital treatment as a direct result of the virus. The impacts of the pandemic on the use of wider hospital care are likely to have varied as a result, with

regions with a greater number of people requiring hospital treatment for COVID-19 having to focus more on treating these patients, and potentially providing less of other types of care.

A second, but related, potential factor that may explain the geographic patterns is that regions will have had very different levels of spare capacity available to hospitals prior to the pandemic. Areas where hospitals were already close to capacity would therefore be expected to cancel more non-COVID treatment in order to treat COVID-19 patients. For example, in a national COVID-19 press conference on 31 October 2020, Professor Chris Whitty, the Chief Medical Officer of England, noted that 'some areas, including the South West, are likely to get pressure on beds really relatively early because of the way the NHS is constructed in those areas' (The Northern Echo, 2020).

Finally, the characteristics of the populations living in different regions will vary considerably. Populations with different compositions of age, ethnicity and pre-existing health conditions will have used hospitals in very different ways prior to the pandemic, and are also expected to have reacted to the pandemic differently. For example, areas with a greater number of people with serious chronic health conditions might expect to see smaller reductions in the level of hospital use during this period out of necessity (for example, regions with greater numbers of patients using cancer or oncology services may see smaller reductions in hospital use). We therefore now examine directly how changes in hospital use varied by clinical specialty, before examining how hospital use varied across different patient characteristics.

4. Variation by clinical specialty

In this section, we examine how changes in hospital activity varied by clinical specialty in order to understand which hospital services have been most affected by the pandemic. NHS hospitals provide a great variety of treatment, and it would be impossible to examine patterns across all clinical specialties. We therefore provide an overview of differences in changing use across specialties by examining variation in the largest inpatient and outpatient specialties, as measured by the amount of activity recorded in each specialty in 2019.

Table 4.1 shows, for the period between March and December, the changes in elective inpatient admissions between 2019 and 2020 for the 11 biggest clinical specialties (based on the total number of elective and emergency inpatients in 2019).[6] The numbers exclude any patients with a primary COVID-19 diagnosis, and the specialties are ranked by the total number of admissions in 2019. Together, they accounted for 68.0% of elective inpatients and 67.6% of emergency inpatients in 2019. The first column of the table shows the absolute change in elective inpatient admissions for the 10-month period, while the second column shows the change as a percentage of the 2019 volumes of the specialty. In all cases, specialties are those in which the responsible consultant was working when the patient passed into their care, as opposed to the main specialty under which the consultant is contracted.[7]

There is considerable variation in disruption to different specialties. The largest percentage falls were for trauma and orthopaedic (T&O) surgery (57.4%), ophthalmology (44.0%), general surgery (41.1%) and gastroenterology (39.9%), which also had the largest decrease in absolute numbers (435,000). The smallest

[6] We do not include maternity admissions. See Table 2.1 for changes in these admissions.

[7] The data record both treatment specialty and main contractural specialty. During the pandemic, it is likely that many consultants worked some shifts outside of their usual specialty. We use treatment specialty to capture changes in patient numbers being treated within specific clinical specialties rather than changes in the working patterns of consultants across specialties.

absolute fall was in paediatrics, despite a large percentage reduction in activity (27.1%), reflecting the relatively small number of paediatric elective admissions in normal years. The smallest percentage falls were seen in nephrology (6.6%), medical oncology (17.9%) and clinical oncology (18.3%).

Table 4.1. Changes in non-primary-COVID-19 elective inpatient admissions, March–December 2019 to March–December 2020, by clinical specialty

Clinical specialty	Absolute change	Percentage change
General medicine	–87,000	–37.8%
Gastroenterology	–435,000	–39.9%
General surgery	–209,000	–41.1%
Trauma and orthopaedic surgery	–332,000	–57.4%
Nephrology	–46,000	–6.6%
Clinical haematology	–129,000	–19.9%
Paediatrics	–16,000	–27.1%
Urology	–158,000	–38.3%
Ophthalmology	–255,000	–44.0%
Medical oncology	–81,000	–17.9%
Clinical oncology	–81,000	–18.3%

Note: See note to Table 2.1. Clinical specialties are defined as the treatment specialty of the responsible consultant for the admission episode. Specialties are ranked by their total number of elective and emergency admissions in 2019 (largest to smallest) excluding A&E.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Table 4.2. Changes in non-primary-COVID-19 emergency inpatient admissions, March–December 2019 to March–December 2020, by clinical specialty

Clinical specialty	Absolute change	Percentage change
General medicine	–356,000	–16.6%
Gastroenterology	–3,000	–6.4%
General surgery	–97,000	–18.0%
Trauma and orthopaedic surgery	–32,000	–13.6%
Nephrology	–7,000	–17.9%
Clinical haematology	–5,000	–17.6%
Paediatrics	–242,000	–41.0%
Urology	–17,000	–15.2%
Ophthalmology	–4,000	–30.4%
Medical oncology	–3,000	–9.4%
Clinical oncology	–4,000	–14.4%

Note: See note to Table 4.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Table 4.2 shows, for the same set of 11 specialties, the total changes in emergency inpatient admissions for the 10-month period in 2019 and 2020 (after excluding any patients with a primary COVID-19 diagnosis). There is again considerable variation across specialties. The most affected specialty in percentage terms was paediatrics, with a 41.0% fall in emergency admissions – or 242,000 fewer admissions – over the period. Some of the specialties that were most affected in terms of elective admissions were much less affected for emergency patients: for example, one of the smallest (absolute and percentage) drops in emergency patients is among those

treated within the gastroenterology specialty, while T&O surgery was also one of the least affected areas in percentage terms.

Table 4.3. Changes in outpatient appointments, March–December 2019 to March–December 2020, by clinical specialty

Clinical specialty	Absolute change	Percentage change
Ophthalmology	–2,301,000	–35.1%
Trauma and orthopaedic surgery	–2,077,000	–34.1%
Physiotherapy	–1,853,000	–45.3%
Diagnostic imaging	–1,189,000	–30.7%
Cardiology	–648,000	–21.2%
Obstetrics	–283,000	–9.3%
Dermatology	–830,000	–28.4%
Gynaecology	–602,000	–21.6%
Urology	–410,000	–17.4%
Ear, nose and throat	–842,000	–35.5%

Note: See note to Table 4.1. Specialties are ranked by their total number of appointments in 2019 (largest to smallest).

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Table 4.3 shows absolute and percentage changes in outpatient appointments among the 10 largest outpatient specialties, as measured by the number of appointments in 2019. Together, these accounted for 45.1 million (47.5%) of the 94.9 million outpatient appointments in 2019. There is once more considerable variation across specialties, with the largest falls – in both absolute and percentage terms – typically found among the most common specialties. For example, across

ophthalmology (35.1% reduction), T&O surgery (34.1%), physiotherapy (45.3%) and diagnostic imaging (30.7%), there were more than 7.4 million fewer appointments between March and December 2020 than in the same period in 2019. Alongside these specialties, ear, nose & throat and dermatology also had large reductions in percentage terms, of 35.5% and 28.4% respectively.

The large differences across clinical specialties are likely to reflect numerous channels. Differences in the urgency of care across conditions lead to variation in the extent to which care continued during the pandemic. For example, there were much smaller falls in elective admissions for specialties such as oncology, including patients undergoing chemotherapy and cancer surgery, and nephrology, including patients undergoing dialysis. There were larger falls in specialties such as trauma & orthopaedics and ophthalmology. These specialties include common procedures such as hip and knee replacements and cataract surgery, which may be easier to defer. But there is a substantial reduction in volume of care even in specialties where we might expect a large fraction of care to be urgent, such as oncology (Richards et al., 2020). Other research has similarly found large reductions in the number of admissions for urgent conditions such as acute coronary syndromes (for example, Mafham et al. (2020)).

The case of cancer is particularly interesting. The number of elective admissions for medical and clinical oncology fell by 81,000 each, while the number of outpatient appointments increased by 104,000 (7.5%) for medical oncology and fell by 132,000 (6.1%) for clinical oncology. This suggests that some hospitals changed how they delivered cancer care, shifting some care to an outpatient setting. However, the extent to which these different types of care are perfect substitutes remains unclear.

There may also be differences in how easily hospitals are able to substitute resources, particularly staff time and equipment, from a particular clinical specialty towards treating COVID-19 patients. For example, specialties with greater need for ventilators or anaesthetists, including many surgical specialties, would be expected to experience greater disruption than other specialties. There may also be differences in whether hospitals are able to substitute between inpatient and outpatient care: for example, the drop in the number of paediatric admissions is much larger than the drop in paediatric outpatient appointments. For outpatient care, another important factor that varies across specialties is the ability to provide services remotely. Many of the specialties that experienced very large reductions in

outpatient care require physical examinations (for example, diagnostic imaging) or treatments (for example, physiotherapy).

One specialty where reductions in both elective and emergency activity are particularly large is paediatrics. Children are a group who have been relatively unaffected by the direct effects of the virus on health, with limited effects on mortality and morbidity (Ludvigsson, 2020). Some of the fall in hospital activity in this specialty likely reflects a genuine reduction in the need for hospital care. For example, since children were often at home rather than at school or doing other (often physical) activities, the spread of other respiratory diseases and the incidence of accidents may have been reduced (Pelletier et al., 2021). Reductions in hospital use may also reflect changes in the care-seeking behaviour of parents for children. Early in the pandemic, paediatricians were reported to be 'concerned that parental worries over visiting healthcare centres are leading to a drop in vaccination rates and the late presentation of serious illness in children' (Crawley et al., 2020). Such patterns raise concerns that reductions in care use may lead to worse health outcomes for children, both now and in the future.

5. Variation by patient characteristics

In order to understand the current and future impacts of the changes in activity outlined above, we also need to know *who* has been affected by these changes. In this section, we examine how the changes in each type of hospital activity varied across age, sex, ethnicity and the local area deprivation of patients. Importantly, for each patient characteristic that we study, there may be a number of reasons why groups have differed in their use of hospitals during the pandemic. Understanding why these differences occur is beyond the scope of this briefing note. However, documenting these differences is an important first step towards understanding which groups have been most affected by the pandemic and where resources should be targeted to address any emerging inequalities in use of hospital care.

Variation by age group

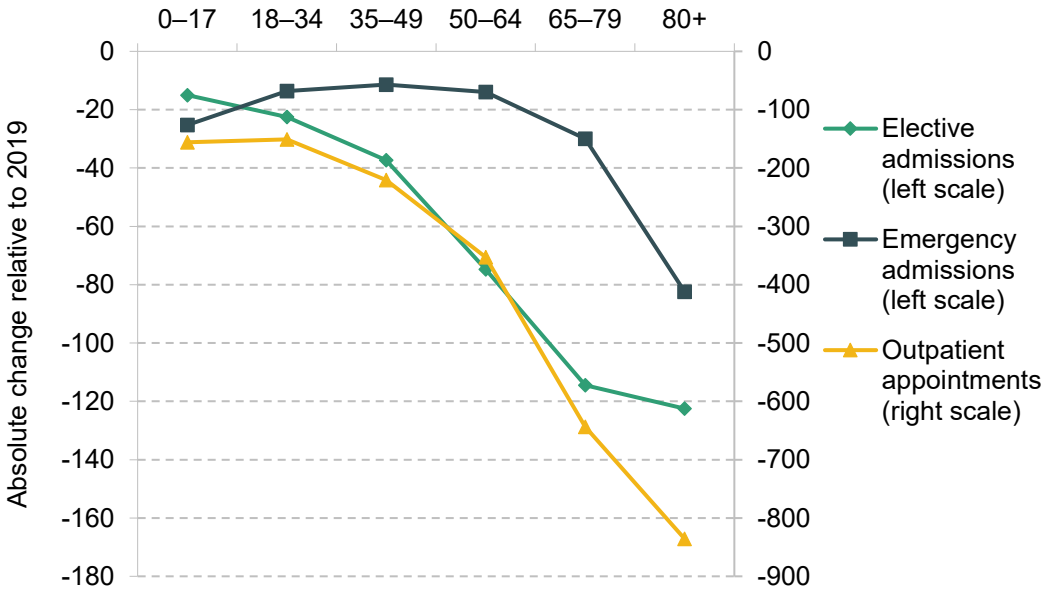
Figure A.2 in the appendix shows, for the period from March to December, the absolute changes in volumes of care for six age groups between 2019 and 2020. Across all age groups, there are substantial reductions in all types of care. For emergency admissions, the greatest reductions are among the under-18s and those over the age of 65. For elective and outpatient services, the changes reflect the much greater use of elective services by older age groups. By far the greatest reduction in elective admissions is among those aged 65–79 (861,000) and 50–64 (799,000), who are the most frequent users of elective care.

Noticeably, the absolute change in activity for patients aged 80 and above remains large, despite this age group accounting for a relatively small share of the national population (5.0% in 2019). Figure 5.1 shows the reduction in volumes of care per 1,000 people in each age band. For elective inpatient admissions, each older age band has lost more per-capita care than all younger groups. For emergency admissions, there is a U-shaped pattern, with those aged 0–17 having a larger reduction in per-capita admissions than adults younger than 65. For outpatient appointments, those aged 0–17 lose slightly more than those aged 18–34 (155.8

compared with 150.9), and then all subsequent age bands lose more than younger groups.

Figure 5.2 repeats this analysis for the percentage change in volumes of care for each age group. The largest fall in elective admissions is among children (0–17 years), with a 37.0% reduction in admissions. The smallest percentage reduction in elective admissions is among patients aged 65–79 (32.5%). These differences are even starker when looking at emergency admissions: emergency admissions among the under-18s decreased by 38.5% (44.9% for 0–5 and 27.7% for 6–17), compared with a fall of 21.4% among 18- to 34-year-olds (the next most affected group). In the case of outpatient appointments, the largest percentage changes are among those aged 80 and above (26.5%) and those aged between 65 and 79 (25.1%).

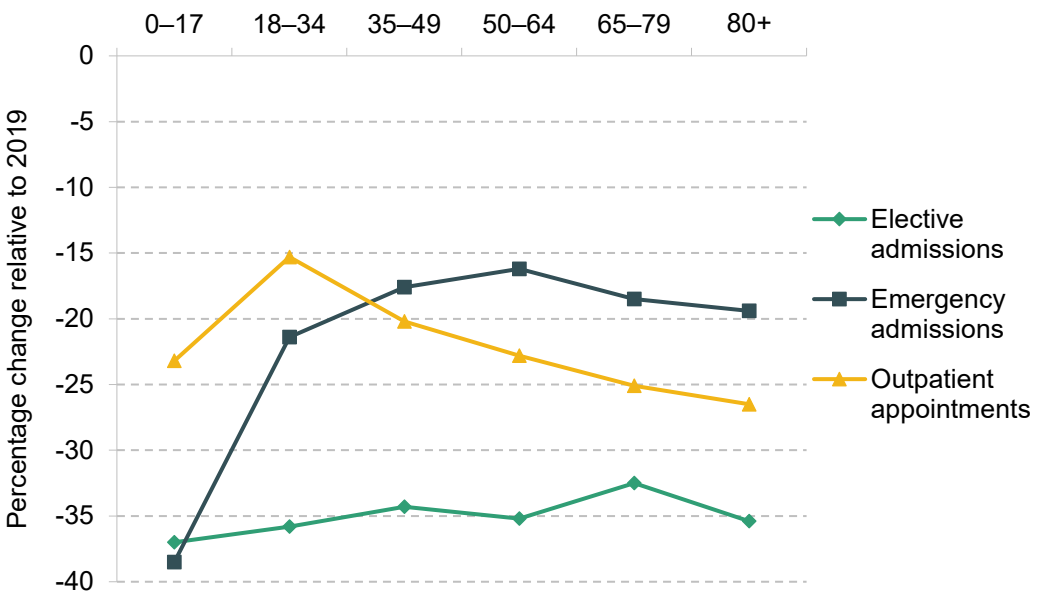
Figure 5.1. Absolute change in volumes of care per 1,000 population, March–December 2019 to March–December 2020, by age



Note: See note to Table 2.1. Age is defined as the age at admission. Patients with unknown age are omitted.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics and Office for National Statistics (2020).

Figure 5.2. Percentage change in volumes of care, March–December 2019 to March–December 2020, by age



Note: See note to Figure 5.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Taken together, this suggests that, in absolute and per-capita terms, the reductions in hospital activity in 2020 have most affected older people. This is in line with expectations given that they have the greatest underlying need for care. However, the sharp change in the use of emergency care by children is noticeable. As noted in Section 4 when discussing the reduction in paediatric admissions, this could reflect reductions in the need for care, but also raises concerns over worse outcomes for children who did not receive appropriate care at the time as a result of the pandemic.

Variation by sex

We next study variation in the changes in hospital activity across patients of different sexes (as recorded in their hospital records). Figure 5.3 shows the absolute changes per 1,000 population between 2019 and 2020 in admissions and appointments that took place between March and December for male and female patients. Across all three forms of hospital care, females had larger reductions per capita than males. The largest difference is for outpatient appointments, where

females had a reduction of 333.3 per 1,000 compared with 266.8 per 1,000 for males. However, this will partly reflect prior patterns of use, since in 2019 females had 4.0% more elective admissions, 7.1% more emergency admissions and 33.8% more outpatient appointments than males per capita.

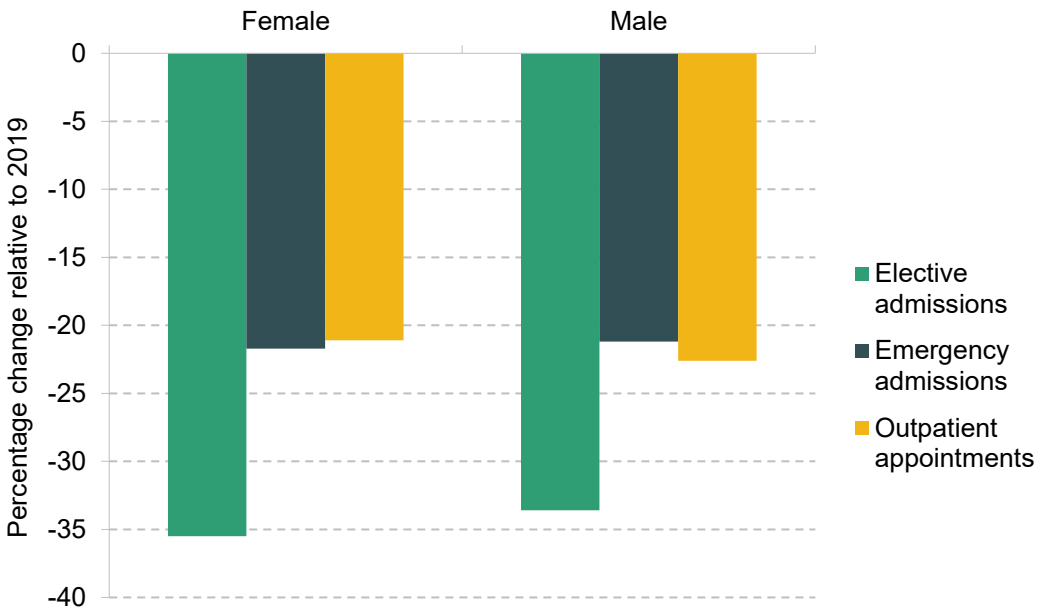
Figure 5.3. Absolute change in volumes of care per 1,000 population, March–December 2019 to March–December 2020, by sex

Note: See note to Table 2.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics and Office for National Statistics (2020).

To adjust for the fact that females are more frequent users of hospital care, we examine variation in the percentage changes in Figure 5.4. This shows that females experienced a greater percentage reduction in elective care (35.5% compared with 33.6%) and emergency care (21.7% compared with 21.2%). However, males experienced a larger percentage reduction in outpatient appointments (22.6% compared with 21.1%).

Figure 5.4. Percentage change in volumes of care, March–December 2019 to March–December 2020, by sex



Note: See note to Table 2.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Variation by ethnicity

We next study variation in the changes in hospital activity across patients of different ethnicities, as recorded at the time of admission. These records include six broad groups, which in themselves will each comprise a diverse group of patients. These groups are Asian, black, mixed, other, white and unknown ethnicity. Unfortunately, reliable population data by ethnicity group are not available for 2020, but Table 5.1 shows the percentage of patients from each of the ethnicity groups for inpatient admissions and outpatient appointments in 2019 to give a sense of the relative size of these population groups.

Table A.1 in the appendix shows the changes between 2019 and 2020 in the number of elective and emergency inpatient admissions, and outpatient appointments, that took place from March to December for patients of different ethnicities. These changes largely reflect the underlying population composition of England, with the largest absolute changes in each care type for white patients.

Table 5.1. Percentage of 2019 inpatient admissions and outpatient appointments, by ethnicity group

Ethnicity	Inpatient admissions	Outpatient appointments
White	75.9%	70.7%
Asian	5.7%	6.3%
Black	3.0%	3.0%
Mixed	1.0%	1.3%
Other	1.8%	2.0%
Unknown	12.6%	16.7%

Note: See note to Table 2.1. Ethnicity is recorded using 2001 census codes which we aggregate into four broad ethnic groups and two other groups. 'Asian' is Indian, Pakistani, Bangladeshi, Chinese and any other Asian background. 'Black' is Caribbean (black or black British), African (black or black British) and any other black background. 'Mixed' is white and black Caribbean (mixed), white and black African (mixed), white and Asian (mixed) and any other mixed background. 'White' is British (white), Irish (white) and any other white background. 'Other' is any other ethnic group. 'Unknown' is not stated or not known.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Comparing percentage changes from their 2019 levels across ethnicity groups reveals large differences in changes in different types of activity across some groups. Table 5.2 shows percentage changes in elective and emergency admissions, and outpatient appointments, for March–December 2020 relative to their levels in the same period in 2019. For elective admissions, the percentage change in activity is greatest among white (36.5%) and Asian (35.6%) patients and is much smaller for black patients (24.4%). This difference is in part explained by the fact that black patients are more likely to be users of clinical specialties that experienced relatively small reductions. In particular, in 2019, black patients made up 11.6% of nephrology elective admissions, which saw one of the smallest reductions in volumes, compared with 3.2% for all elective admissions.

Table 5.2 also shows the changes in emergency admissions by ethnicity. There are large differences in the percentage change in emergency admissions across ethnicities. The largest falls are among Asian patients with a reduction of 32.0%.

Black (27.5%) and mixed (27.9%) ethnicity patients also saw greater reductions in emergency admissions than white (21.2%) and other (20.9%) ethnicity patients.

Finally, the table shows the changes in outpatient appointments. The percentage reductions in the number of appointments among Asian (23.3%) and white (23.1%) patients were similar, and slightly greater than the reduction among black patients (19.6%). Reductions in outpatient appointments were smaller among patients with other (14.0%), mixed (14.8%) and unknown (17.7%) ethnicities. Across all care types, Asian patients had some of the largest falls in hospital use. Taken together, these figures suggest that there were marked differences in the changes in hospital use during the pandemic across different ethnicity groups.

Table 5.2. Percentage changes in volumes of care, March–December 2019 to March–December 2020, by ethnicity group

Ethnicity	Elective admissions	Emergency admissions	Outpatient appointments
White	–36.5%	–21.2%	–23.1%
Asian	–35.6%	–32.0%	–23.3%
Black	–24.4%	–27.5%	–19.6%
Mixed	–31.3%	–27.9%	–14.8%
Other	–27.1%	–20.9%	–14.0%
Unknown	–26.5%	–14.0%	–17.7%

Note: See note to Table 5.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

The larger reductions in emergency admissions for ethnic minorities result from several channels. Black and minority ethnic groups are likely to have a higher risk of infection due to factors such as occupation and household size (Public Health England, 2020). They are also more likely to become seriously ill from COVID-19, meaning they may be both more reluctant to seek care and more affected by supply-side changes to care provision. Individuals from these groups are also more likely to

live in more deprived local areas (Ministry of Housing, Communities and Local Government, 2020), creating additional barriers to accessing care.

Attitudes to seeking care during the pandemic may also vary across groups. Polling in England in November 2020 found that people from white ethnic backgrounds were significantly more likely than people from other ethnicities to report that, if needed, they would feel comfortable using their local hospital services in the next month (The Health Foundation, 2021).

The differences in care use across ethnicity groups highlighted above paint a complicated picture, and vary across the different types of care. Nevertheless, some of these ethnic disparities in care use risk exacerbating both health inequalities that existed before the pandemic and ethnic disparities in the impact of COVID-19. Black and South Asian individuals are at greatest risk of infection from COVID-19 and, conditional on infection, more likely to need ICU care and more likely to die (Public Health England, 2020; Sze et al., 2020; Williamson et al., 2020). They are also less likely to have been vaccinated against COVID-19 (The OpenSAFELY Collaborative, 2021). Large reductions in the use of hospital care, on top of a larger impact of COVID-19, are alarming and will need to be addressed.

Variation by local area deprivation

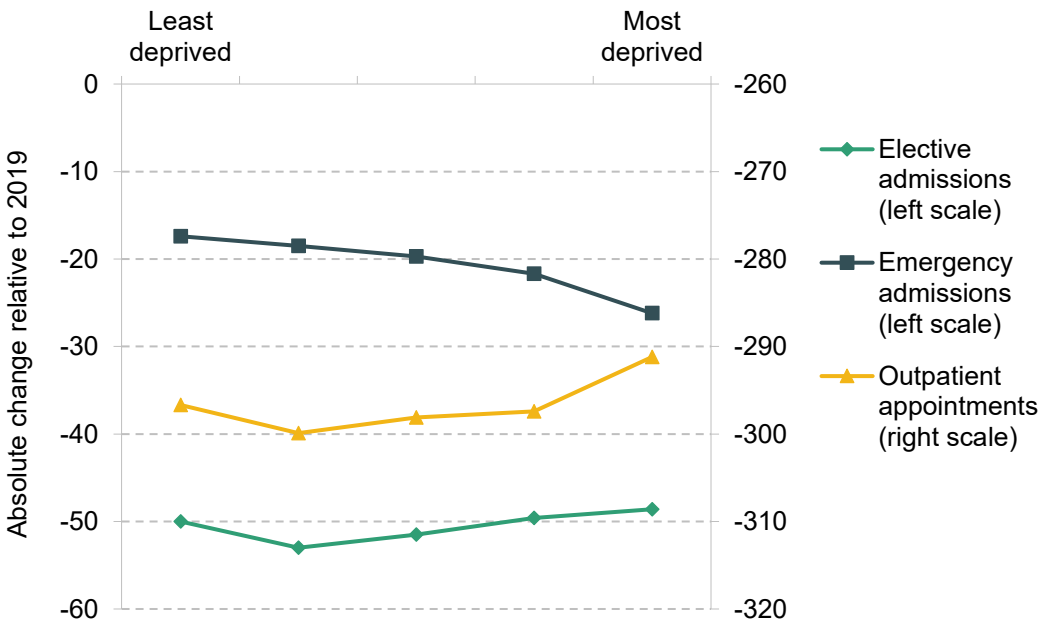
To examine variation in changes in hospital activity across areas with different levels of local deprivation, we rank the small area in which the patient lives – known as Middle Super Output Area (MSOA) – on the basis of its average 2010 Index of Multiple Deprivation (IMD) score, for all elective and emergency admissions in 2019.[8] We then divide these areas into five groups, with the first quintile including the 20% least deprived MSOAs and the fifth quintile containing the 20% most deprived MSOAs. Since the population of each quintile differs slightly, we examine absolute changes per 1,000 population.

Figure 5.5 shows the absolute changes per 1,000 population between 2019 and 2020 in the volumes of care that took place between March and December across the five deprivation groups. For elective care, the change is slightly smaller among patients living in the most deprived fifth of areas (–48.6 per 1,000) than among patients

[8] MSOAs are small areas designed to improve the reporting of small area statistics in England and Wales. There are 6,791 MSOAs in England, with a mean population of around 8,000 people.

living in the least deprived fifth (–50.0 per 1,000). However, the most affected groups are the second least deprived fifth, with –53.0 per 1,000, and the middle fifth, with –51.5 per 1,000. This reflects the higher use of NHS elective care among those living in the second and third least deprived areas. For example, between March and December 2019, there were 153.3 elective admissions per 1,000 population among patients living in the second least deprived fifth of areas, 10.7% higher than the number admitted from the most deprived fifth (138.5) and 4.8% higher than the least deprived fifth (146.3). When looking at percentage changes for elective admissions, as shown in Figure 5.6, there is very little variation across the areas, with a reduction of 34.2% in elective admissions among patients living in the least deprived fifth of areas compared with a 35.1% reduction among patients living in the most deprived areas.

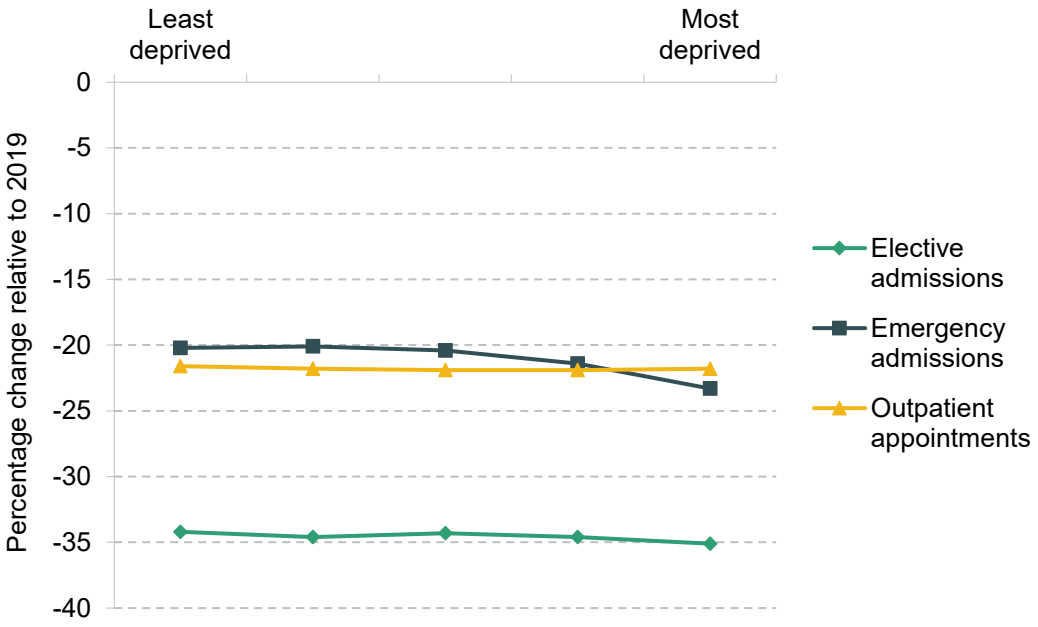
Figure 5.5. Absolute change in volumes of care per 1,000 population, March–December 2019 to March–December 2020, by local area deprivation



Note: See note to Table 2.1. Local area deprivation is defined at the MSOA level, using the mean IMD04 score for all inpatient admissions in 2019. Patients without a valid English MSOA are omitted.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics and Office for National Statistics (2020).

Figure 5.6. Percentage change in volumes of care, March–December 2019 to March–December 2020, by local area deprivation



Note: See note to Figure 5.5.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

In the case of emergency admissions, there is a more obvious deprivation gradient, with the most deprived group experiencing both the largest absolute and percentage reductions in activity. Emergency admissions were much greater for patients living in the most deprived areas pre-pandemic: there were 112.6 admissions per 1,000 population between March and December 2019 among patients living in the fifth most deprived areas, 30.8% more than the 86.1 per 1,000 among patients living in the least deprived fifth of areas. The same relative reduction in activity among these groups would therefore result in larger absolute reductions in activity among the most deprived groups. However, there is also a gradient in the percentage change in emergency admissions, with a larger percentage decrease in the most deprived fifth of areas (23.3%) than in the least deprived areas (20.2%). As a result, the absolute changes per 1,000 in emergency admissions, shown in Figure 5.5, across the deprivation gradient are even greater, with the fall in admissions among the most deprived group (26.2 per 1,000) 50.6% larger than that among the least deprived (17.4 per 1,000).

Use of outpatient care is slightly higher among those living in less deprived areas, with 1,076.2 appointments per 1,000 population in the least deprived fifth of areas and 1,079.0 per 1,000 in the second least deprived, compared with 1,046.7 per 1,000 for the most deprived fifth, between March and December 2019. As a result, the absolute fall in the most deprived areas (291.2 per 1,000) was 1.9% lower than the fall in the least deprived areas (296.7 per 1,000) over this period. The most affected group was the second least deprived areas, with a reduction of 299.9 per 1,000. However, in percentage terms, there is very little variation in the change in outpatient volumes across deprivation groups.

These results suggest that more deprived areas experienced the greatest absolute falls in hospital activity. This is mostly in line with variation in the use of these services prior to the pandemic, with the exception of emergency care where the fall even in percentage terms was greatest among the most deprived areas. These patterns will be driven by a number of different factors. Areas with different levels of deprivation will also have different demographies and levels of underlying health. Patient behaviour in response to the pandemic will also vary, as will the ability of the hospitals serving different communities to react to the pandemic.

Regardless of their source, these socio-economic gradients compound the unequal impacts of COVID-19 and pre-existing health inequalities. Early evidence during the pandemic suggests that the mortality rates from COVID-19 in the most deprived areas are more than double the rates in the least deprived areas (Public Health England, 2020). There is also evidence that people in more deprived areas, and those with lower household incomes, are substantially more likely to be hospitalised with COVID-19 (Patel et al., 2020), although neither of these studies control for co-morbidities. And even before the pandemic, more deprived local areas in England had lower life expectancies at birth and higher mortality rates from preventable causes (Marmot et al., 2020). Larger relative falls in the use of care among the most deprived therefore threaten to further exacerbate these health inequalities.

6. Conclusion

The COVID-19 pandemic has led to widespread disruption to the use of non-COVID hospital care in England. Our analysis, using detailed patient-level administrative data on all publicly funded hospital care in England, shows that between March and December 2020, there were 2.9 million fewer elective inpatient admissions, 1.2 million fewer emergency inpatient admissions, and 17.1 million fewer outpatient appointments than in the same period in 2019.

There is geographic variation in the size of the falls. The North and the Midlands have had some of the largest percentage reductions in hospital care, while the South and the East of England have had some of the smallest reductions. London is somewhat of an outlier, with the largest reduction in emergency admissions but relatively small falls in elective admissions and outpatient appointments. This variation likely results from a range of factors, including the amount of spare capacity that hospitals had in the area prior to the crisis, and the size and composition of the population living in the area.

Clinical specialties have had very different falls in activity. Large specialties where patients typically have time-sensitive conditions – such as nephrology patients requiring regular dialysis and cancer patients being treated by medical and clinical oncologists – still experienced reductions in elective activity, though ones that were smaller than the average. The largest fall in emergency admissions was for paediatrics, with a fall of two-fifths. While one driver of this could be less need for these services during the lockdown, it raises the worrying concern that reductions in care use may lead to worse health outcomes for children, both now and in the future. Within outpatient appointments, the number of physiotherapy appointments almost halved from 2019.

There is variation in the falls in hospital care across different population groups. In absolute terms, those most affected are those who are most likely to use hospital services. Those living in more deprived areas, who are on average in worse health and have greater use of hospital care, have seen the biggest falls, exacerbated in the case of emergency care by a larger-than-average percentage reduction in admissions

for the most deprived fifth of patients. Similarly, older people have experienced the greatest reductions in activity, with the largest per-capita reductions among the very oldest.

There are also marked differences by ethnicity. The fall in the use of elective care was considerably smaller for black patients than for white or Asian patients (for whom the reductions were similar), while the fall in emergency care use was largest for Asian patients and much smaller for white patients. While Asian patients have some of the largest falls across all care types, there is no clear pattern for the other major ethnicity groups we consider. Although it is not clear why these differences occur, it adds to the growing evidence that the pandemic has had varied impacts on different ethnicities in various dimensions.

This variation in the falls in hospital care across different regions, specialties and patients raises a number of important policy questions. We briefly discuss two of these questions below.

First, while we document variation across these dimensions, we do not attempt to disentangle the various mechanisms that can explain them. Future research should focus on understanding these drivers. In particular, separating out the role of supply and demand factors is important. Differences in access to hospitals with varied levels of capacity prior to the pandemic, or which made different choices about prioritising COVID and non-COVID care, may explain variation in the amount of care that different patients received. On the other hand, changes in demand for care may be explained by differences in the underlying health and attitudes towards care of different patient groups. Changes in access to primary care (not studied here) and other parts of the health service may have also had impacts on the demand for hospital care. Understanding the relative importance of these factors is important in designing policy to increase hospital use again after the pandemic.

Second, what do these reductions in care mean for the health of the population? For emergency care, some falls in activity may not negatively affect patients if their health issues could have been resolved without a hospital stay (or if health has actually improved as a result of changes in lifestyle brought about by the fall in economic activity that accompanied the pandemic (Banks, Karjalainen and Propper, 2020)). However, there are concerns that many people have not received necessary care because of the pandemic. If this leads to deteriorations in health, it may result in worse patient outcomes and/or higher costs for the health service if these people

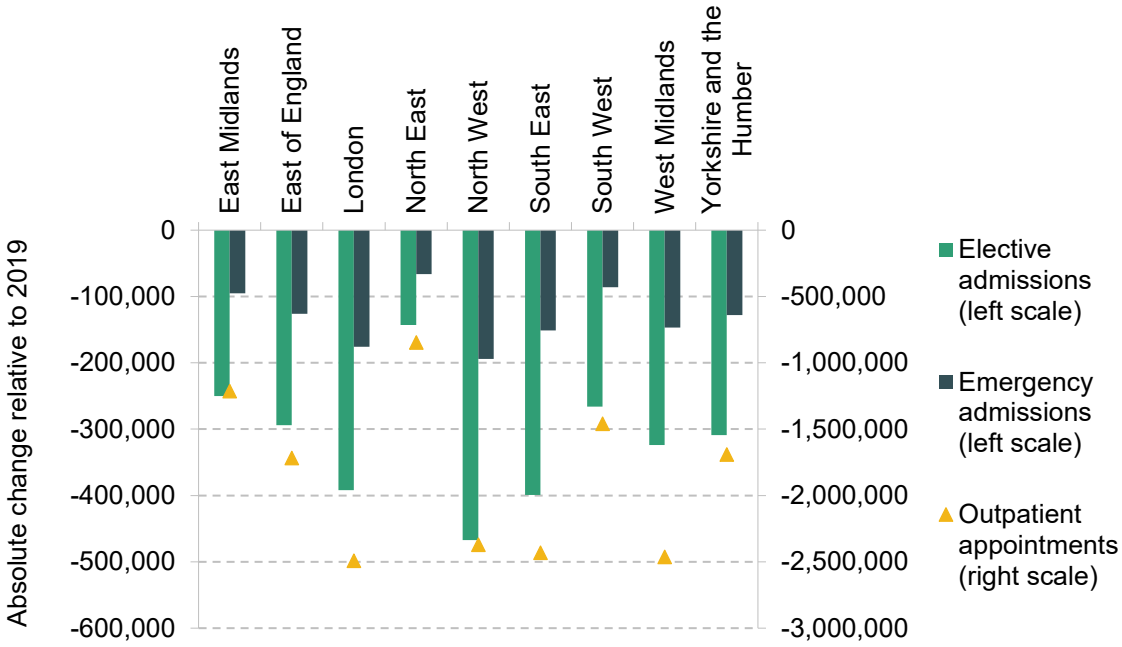
require more intensive treatment in future; in more extreme cases, it may have already led to patient deaths.

Much of the missing care – and in particular the elective admissions and outpatient appointments – will need to be carried out in future, putting pressure on hospitals that have already experienced a year of unprecedented pressure on resources. The pandemic has added to waiting lists that were already growing, and some patients now face very long waits for NHS treatment. In many cases, this may lead to considerable impacts on quality of life and long-run health outcomes. This may also lead to increased health inequalities by socio-economic status, given that wealthier patients are more able to afford to pay for private treatment in order to avoid these waits. In addition, increased waiting lists will put pressure on hospitals which have to treat more patients in a shorter space of time, and could potentially deliver worse outcomes for patients if capacity constraints in hospitals mean lower-quality care for patients (Hoe, 2021).

Determining how health outcomes have been affected by reduced use of hospital care, and who has been particularly affected by these impacts, is therefore central to understanding how to allocate NHS resources to mitigate the unintended consequences of the pandemic.

Appendix

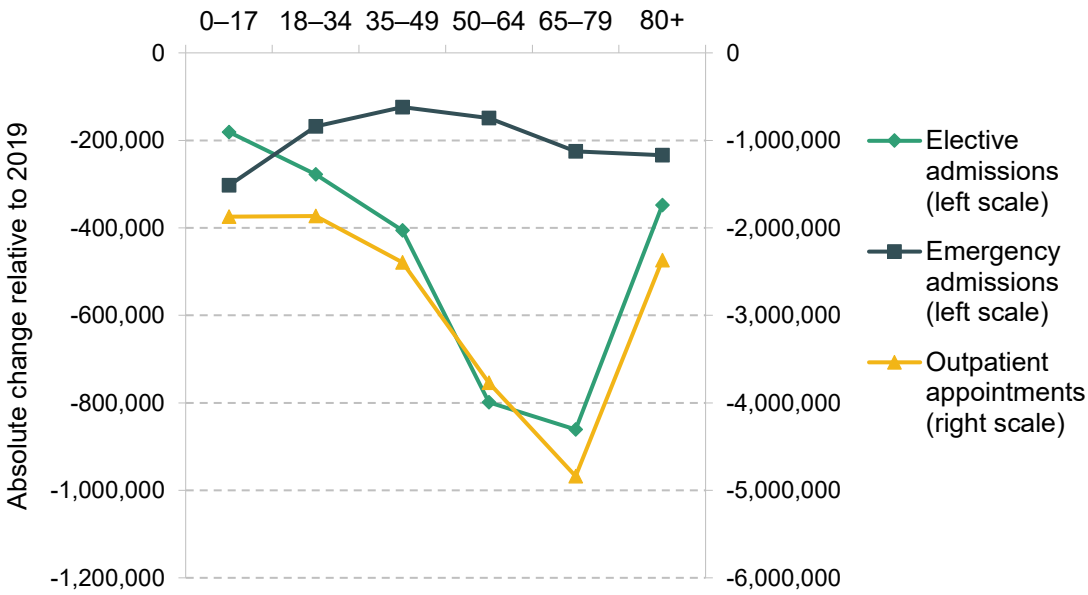
Figure A.1. Absolute change in volumes of care, March–December 2019 to March–December 2020, by region



Note: See note to Figure 3.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Figure A.2. Absolute change in volumes of care, March–December 2019 to March–December 2020, by age



Note: See note to Figure 5.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

Table A.1. Absolute change in volumes of care, March–December 2019 to March–December 2020, by ethnicity group

Ethnicity	Elective admissions	Emergency admissions	Outpatient appointments
White	–2,258,000	–933,000	–12,757,000
Asian	–159,000	–112,000	–1,148,000
Black	–65,000	–43,000	–468,000
Mixed	–23,000	–19,000	–152,000
Other	–37,000	–23,000	–216,000
Unknown	–332,000	–73,000	–2,317,000

Note: See note to Table 5.1.

Source: Authors' calculations using NHS Digital's Hospital Episode Statistics.

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