Anaemia in chronic kidney disease

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Wilmington Healthcare

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Methodology

Extensive analysis was carried out on patients with a recorded diagnosis of anaemia appearing in Hospital Episode Statistics (HES) data. HES data is a cleaned and audited version of Secondary Uses Service (SUS). HES and SUS data start from the same source, the NHS trusts episode of care data; this is all consolidated in the SUS warehouse from Patient Administration Systems (PAS). Extracts from the SUS warehouse, the raw input data, form HES data. SUS data is only available to the NHS as it contains patient identifiable data and clinician sensitive data. This can be accessed daily by the trust. HES data is still available at patient record level but the identifiable fields have been pseudonymised.

HES contains around 1 billion records of patients who have been treated in hospital trusts in England. This includes inpatient, outpatient, A&E and critical care activity. The inpatient data splits out elective activity (planned care) and non-elective (non-planned care). All hospital activity is recorded but not always as accurately as it could be. Inpatient activity is recorded by ICD-10 code and OPCS-4 code and outpatient activity is recorded as either a first outpatient or follow-up appointment. It should be noted that outpatient procedures are also coded.

ICD-10 codes are used to classify diseases and other health problems in secondary care. Patients can have both a primary and secondary diagnosis (up to 20). Primary diagnosis is the main condition treated or investigated during the relevant episode of healthcare (reason for admission does not constitute primary diagnosis). Secondary diagnoses are defined as condition or complaints either coexisting with the primary diagnosis or arising during the episode of patient care. The provider will enter only the number of codes necessary to describe and manage the patient's condition.

The matched cohort analysis relates to patients with stage 3, 4 or 5 CKD who had hospital admissions in the fiscal years 2016/17, 2017/18 and 2018/19 for ICD-10/OPCS codes listed, including those for iron deficiency anaemia and normochromic normocytic anaemia. The information within this report refers to patients who have this code in either the primary or a secondary diagnosis position. Inpatient measures for each cohort were spells, patients, spells per patient, cost, cost per patient, cost per spell, bed days and mean length of stay (MLOS). Outpatient appointments for each cohort were also captured, as well as co-morbidities for each cohort. This uncovered recent trends and costs of anaemia in this population.

- N183, N184, N185 — CKD stages 3, 4 and 5
- D500 — Iron deficiency anaemia secondary to blood loss (chronic)
- D508 — Other iron deficiency anaemias
- D509 — Iron deficiency anaemia, unspecified
- D649 — Anaemia, unspecified
- X401, X402, X403, X404, X405, X406 — Dialysis

Patients were divided into those who had anaemia in their history (A+) and those who did not have anaemia in their history (A-). They were further divided into and those on dialysis (D+) and those not on dialysis (D-).

Analysis

- Inpatient measures at national level for all, elective, and non-elective admissions.
- Inpatient measures at regional level (GIRFT region) for all, elective and non-elective admissions.
- Ten most common outpatient appointment types by consultant specialty and operation description for each cohort (based on appointment count), split by those with elective and non-elective admissions.
- Ten most common co-morbidities for each cohort (based on spell count).
- Inpatient measures at national level for all, elective and non-elective admissions, with dialysis spells excluded for patients who've had dialysis.
- Inpatient measures at regional level (GIRFT region) for all, elective and non-elective admissions, with dialysis spells excluded for patients who've had dialysis.
- Mean and median ages of patients by group and GIRFT region.

Suppression

Values above 7 have been rounded to the nearest 5, due to this, totals may not sum across columns/rows.

For patients, appointments and spells, values between 1 and 7 inclusive have been suppressed and are represented by '*'.

Cost per patient, spells per patient and appointments per patient have been suppressed where patients suppressed.

Cost per spell and MLOS have been suppressed where spells suppressed.

Contents

Summary

Anaemia in chronic kidney disease (CKD)

- CKD is estimated to affect 15% of people aged ≥35 years in England.
- Anaemia is very common in this patient group, affecting over 50% of those with the poorest kidney function.
- CKD is underdiagnosed, as is the resultant anaemia, so services are not likely to be aware of the true scale of the affected patient population.

Hospital admissions

- CKD patients with anaemia put a large burden on hospital services, with more inpatient spells (for those not on dialysis), longer hospital stays and higher costs.
- Non-elective care likely offers the best avenue for reducing inpatient demand on hospitals. Compared to their counterparts without anaemia, on average CKD patients with anaemia have:
    - More unplanned spells of care (1.8 vs 1.4 spells for non-dialysis patients; 3.0 vs 2.2 spells for dialysis patients in 2018/19).
    - Longer stays (10.6 vs 8.3 days for non-dialysis patients; 10.3 vs 8.5 days for dialysis patients in 2018/19).
- Non-elective CKD inpatients are having significant numbers of outpatient engagement with services (including 12.3 nephrology appointments on average in 2018/19) which are all intervention opportunities to screen for anaemia.

Cost saving opportunities

- CKD inpatients with anaemia cost an estimated £166 million more than those who are not anaemic (2018/19).
- Interventions that proactively address anaemia may help to reduce this added burden on hospital care budgets.

Regional trends

- There is significant regional variation in the number of spells per patient, length of stay and cost per patient for CKD, especially for those receiving dialysis.
- This underlines the need for care to follow standardised integrated pathways to reduce the level of service and care variation that patients experience.

Opportunities for NHS stakeholders

Anaemia is a commonly diagnosed complication among patients suffering with CKD. NHS stakeholders are missing a number of opportunities to substantially improve outcomes for patients with anaemia and the unnecessary strain that this places on NHS resources.

Reduce costs

Anaemia is highly amenable to intervention with proactive screening, especially in at-risk groups such as those with CKD. Clinical commissioning groups (CCGs) could significantly reduce costs and create service efficiencies by detecting anaemia sooner.

Optimise patient care

Get patients into the best condition possible by routinely testing for anaemia. Services should ensure that NICE screening guidelines are followed for CKD patients in order to ensure that patients with anaemia receive treatment and minimise the chances of serious complications from their condition.

Take advantage of opportunities for screening

Take advantage of patient touchpoints to facilitate anaemia screening. CKD patients are having multiple outpatient contacts with services and these could be utilised to incorporate anaemia testing into these existing clinician contacts. Primary care has an important role in proactively identifying CKD patients at risk of developing anaemia. There are numerous opportunities to drive up screening and deliver anaemia treatment to the patients who could benefit from it.

Establish integrated pathways for smarter care

Ensure that all CKD patients get consistent access to best-practice care, including consistent access to anaemia testing. There is a high level of regional variation in both admissions and costs for CKD patients which could be addressed through standardised CKD care pathways. By integrating primary and secondary care and ensuring that professionals are educated about their role in the pathway, fewer patients with anaemia will be missed and people with CKD will receive optimised management across teams. Clinical leadership and coordination is required to drive local change and then to direct these care pathways in the longer term. Shared-care arrangements play an important role in reducing the burden on hospital clinics. The type of forward-thinking and collaborations developed by Integrated Care Systems (ICSs) have the potential to alter treatment pathways for patients.

Calls to action: practical steps

Identify CKD patients with anaemia

- **Commissioners** responsible for CKD service populations to focus on system improvement opportunities which includes identification of groups of people likely to have anaemia including people with CKD. This additionally meets targets for ambulatory care sensitive conditions (ACSC) and Enhanced Recovery After Surgery[1] (ERAS) targets.
- **Specialist nephrology services** to work with their primary care commissioners to highlight their potential unseen numbers of people with CKD anaemia.
- **Renal charities** and stakeholder groups to be supported to engage with local Healthwatch and Health and Wellbeing boards to highlight the issue of CKD anaemia locally and to develop a self-monitoring symptom management tool.

Develop explicit guidance for diagnosis of anaemia with CKD

- **Professional bodies, specialist professionals** to promote the need for education to ensure detection of CKD anaemia.

National awareness

- **Renal charities** to spearhead and coordinate a national programme which will improve quality of care and patient outcomes in CKD anaemia.
- **Sustainability and Transformation Partnerships (STPs) and Integrated Care Services (ICSs)** to ensure three monthly reviews of people with CKD are implemented as per NICE guidelines.

Use data to better understand patient need

- **Primary care** to undertake regular reviews of patients with CKD to compare with their counterparts in an effort to reduce variation.
- **Commissioners** to work with **local practices** to monitor variations in reporting.
- **Public Health England** to monitor trends in data.

1. Background

Chronic kidney disease (CKD) has an estimated prevalence in England of 15% in people aged ≥35 years, and an estimated annual cost to the NHS of 1.4 billion GBP[2]. Anaemia is a common complication of CKD that is strongly associated with poor outcomes resulting in increased hospitalisations and mortality. Left untreated anaemia is linked to left ventricular dysfunction and heart failure, as well as reduction in exercise capacity and quality of life in people with CKD.

Anaemia is defined as a state in which the quality or quantity of circulating red blood cells is below normal, with several causes in this patient population. As the kidney function deteriorates, together with medications and dietary restrictions, patients may develop iron deficiency, resulting in reduction of iron supply to the bone marrow (which is the body organ responsible for the production of different blood elements). CKD patients may not be able to utilise their body's own iron stores effectively and hence, many patients, particularly those receiving haemodialysis, may require additional iron treatment, usually provided by infusion.

A major cause of anaemia in CKD is a reduction in erythropoietin production due to kidney damage. Erythropoietin stimulates the bone marrow to produce red blood cells, and it is produced by the kidney in response to low tissue oxygen levels. With further weakening of kidney function, patients with CKD may need additional treatment with erythropoietin which is naturally produced by the kidneys and becomes relatively deficient in patients with CKD. Any patients will eventually require treatment with erythropoietin or similar products that are given by injection. Over the last few years, several iron and erythropoietin products have been licensed for treating anaemia in CKD patients.

Anaemia has a substantial impact on patients' health, sleep and functioning which can significantly reduce quality of life. Possible adverse effects of anaemia include reduced oxygen use, increased cardiac output, left ventricular hypertrophy, reduced cognition and concentration, reduced libido and reduced immune responsiveness.

International guidelines, such as those from the National Institute for Health and Care Excellence (NICE)[3] and Kidney Disease: Improving Global Outcomes (KDIGO)[4], recommend that people with CKD are identified early to address the health risks and slow the deterioration in kidney function. Many patients in primary care have CKD that is not formally recognised, and it is unclear whether this has any bearing on their prognosis[5].

Having CKD stage ≥3 is the leading risk factor for progression to end-stage renal disease (ESRD)[6] and a strong predictor of hospitalisation[7]. Globally, CKD mortality has increased by one-third over the last 10 years, accounting for 1.2 million deaths annually worldwide[8].

The use of iron therapies and erythropoiesis stimulating agents (ESAs) has allowed improvement in patients with CKD who have anaemia.

2. Commissioning for anaemia in CKD

Despite the large numbers of people in England affected by anaemia, current management and hence outcomes are suboptimal. The occurrence of anaemia is often related to one of a variety of other diagnoses, and hence anaemia management may reside with GPs or with a range of different secondary care specialties. It is often under-diagnosed and under-treated and there are many possible reasons for this, including insufficient surveillance of at-risk groups by healthcare professionals (HCPs), lack of understanding of the potentially severe consequences of not treating anaemia, lack of responsibility for anaemia by one specialty, inadequate referral and follow-up pathways, and insufficient use of appropriate therapies.

Commissioners should therefore be aware of the implications of failing to manage this treatable issue.

In this section we examine the details of the current problem that anaemia with CKD presents. The following section covers:

2.1 Financial impact of anaemia in CKD

The cost burden of suboptimal anaemia management in CKD is very often a hidden one. Significant numbers of patients are affected and the impact of this is felt at a system level. It is estimated 15% of people aged ≥35 years have CKD in England at an estimated annual cost to the NHS of £1.4 billion[2].

We carried out an extensive analysis on CKD patients with a recorded diagnosis of anaemia appearing in HES data. HES is a records-based system containing details of all admissions, outpatient appointments and A&E attendances at NHS hospitals in England.

The full analysis is detailed in section 3 below, but the data shows that emergency unplanned admissions for CKD patients with anaemia are rising and there are now over 70,000 such admission spells per year in England, with an associated cost of over £300 million. This makes anaemia intervention a useful target to achieve NHS cost savings.

HES data was examined for the period 2018/19 with patients divided into those who had anaemia in their history (A+) and those who did not have anaemia in their history (A-). It was also split into patients who have dialysis (D+) and those who don't (D-) – full methodology and data presented in section 3. The analysis highlights an additional spell cost per patient between an A+ and an A- patient is £2,815 for D- patients (71% increase), and £7,885 for D+ patients (99% increase) (see figure 1).

Figure 1

Cost variance analysis between CKD patients with anaemia (A+) and without anaemia (A-) 2018/19

	Number of patients		Average cost per patient			
Group	**A+**	**A-**	**A+**	**A-**	**Cost variance**	**Savings if all A+ patients were proactively treated**
D+	5,195	17,585	£15,845	£7,960	£7,885	£40,962,575
D-	44,445	220,460	£6,805	£3,990	£2,815	£125,112,675
Total						**£166,075,250**

If all A+ patients were to receive proactive treatment for their anaemia (figure 1) the national implications would amount to an NHS cost saving of over £166 million.

Patients receiving dialysis are likely to have more severe CKD and thus a multiplicity of health complications including anaemia. Although it is impossible to attribute patient costs to a single variable, such as anaemia, the figures do provide insight into the potential costs of anaemia in patients with CKD.

It is worth considering how these savings would apply at a local level so that services can understand the potential gains to be made in their area. Figure 2 shows a calculation of the same analysis applied to the population in England per 100,000 (based on a population estimate of 55,977,178 in 2018). This shows that the savings translate to £296,684 per 100,000 population, a useful figure for local services and CCGs to keep in mind.

Figure 2

Cost variance analysis per 100,000 population between CKD patients with anaemia (A+) and without anaemia (A-) 2018/19

	Number of patients		Average cost per patient			
Group	**A+**	**A-**	**A+**	**A-**	**Cost variance**	**Savings if all A+ patients were proactively treated**
D+	9.3	31	£28	£14	£14	£73,177
D-	79	394	£12	£12	£5	£223,507
Total						**£296,684**

It is important to note that although the NICE guideline NG8 for anaemia management in CKD[3] specifies that testing to diagnose anaemia should be carried out every three months, not all patients are likely to be tested at the recommended frequency and so there is likely to be an unknown number of CKD patients yet to be diagnosed with anaemia.

> Epidemiology: What is the true incidence and prevalence of anaemia among CKD patients in England (diagnosed and undiagnosed)? How many A+ patients are being missed?

Anaemia is found in people with CKD in increasing proportions as glomerular filtration rate (GFR) declines. Inker et al (2011)[9] indicate the following prevalence rates by GFR category, which range between 4.0% and 51.5% (see figure 3). The prevalence of A+ in the analysis conducted for this report is 17%. However, it is quite possible that the A- cohort in this analysis also includes many undetected A+ patients therefore the true cost variance and opportunities for savings may be much higher. Our estimate is likely to be a conservative figure.

> The conclusions from the analysis indicate there is value in pre-emptively addressing anaemia in the CKD population in order to make a significant cost saving.

Figure 3

Prevalence of anaemia by GFR category[9] 2018/19

Complication	**GFR category (ml/min/1.73 m²)**				
	≥90	**60–89**	**45–59**	**30–44**	**<30**
Anaemia	4.0%	4.7%	12.3%	22.7%	51.5%

The data analysis in section 3 below shows cost trend data in further detail.

2.2 Current state of anaemia management in CKD

Several publications detail management of anaemia in CKD these include a specific NICE guideline.

NICE guidelines

NICE guideline NG8 for managing anaemia in chronic kidney disease[3] was published in 2015. It provides advice on the following areas

- How to screen CKD patients for anaemia;
- Which patients to investigate for other causes of anaemia;
- When and how to treat patients with different medications;
- How to ensure safe prescribing of treatment;
- How to diagnose and manage complications associated with anaemia and the drugs used for its treatment.

The guideline also outlines a number of implementation priorities relating to diagnosis, assessment, treatment and monitoring. All parts of the care pathway for adults, children and young people are covered in the guideline and the treatment algorithm is highlighted in figure 4.

> Lobbying NICE for an update of guideline NG8 is important, especially in light of the new medicines that are available once they have received a NICE technology assessment.

Recombinant human erythropoietin (EPO) is an erythropoietic stimulating agent (ESA) for treating anaemia in CKD and is an important treatment in managing the condition. The NICE guideline states that during ESA treatment patients should be offered iron therapy, normally intravenous. High-dose low-frequency IV iron is the recommended treatment when trying to achieve iron repletion.

For those not yet receiving ESA, iron therapy should also be offered before discussing ESA therapy. For people who are not receiving haemodialysis, the guideline recommends a trial of oral iron before offering intravenous iron therapy. If patients are intolerant of oral iron or target haemoglobin (Hb) levels are not reached within 3 months intravenous iron therapy should be offered. People receiving haemodialysis should be offered intravenous iron therapy.

Some CKD patients with anaemia who are offered an ESA are 'ESA resistant' in that their condition consistently fails to respond to the ESA treatment. These patients often receive large doses of ESA, sometimes with a blood transfusion but this has limited benefits and is at a significant cost to the NHS. Many CKD patients with anaemia receiving an ESA are admitted with an intercurrent illnesses, like pneumonia, which may temporarily render them acutely hyporesponsive to ESA. There is uncertainty about the management of these groups of patients.

Over the past decade attention has shifted to the role and management of iron deficiency in CKD anaemia. In CKD patients there is often a complex inflammatory state that makes it difficult to diagnose iron deficiency when using standard markers, such as serum iron, serum total iron binding capacity or ferritin. In recent years evidence has been published on newer markers of iron deficiency and intravenous iron preparations, and so the guideline makes several recommendations around diagnosis and management of iron deficiency in CKD.

Figure 4

NICE algorithm[3]

Diagnosis

Is anaemia due to CKD?

- Consider other causes if eGFR ≥60 ml/min/1.73m^2

Consider treating anaemia when:

- Hb falls to ≤ 110 g/litre (or ≤105 g/litre if younger than 2 years) or
- symptoms attributable to anaemia develop

Determine iron status and potential responsiveness to iron therapy when:

- %HRC >6%
- CHr or Ret-He less than 29 pg

If above tests are not available or person has thalassaemia or thalassaemia trait, diagnose potential responsiveness to iron therapy when:

- TSAT <20% and serum ferritin <100 micrograms /litre

Serum ferritin is now recommended to check iron stores for iron overload at 1-3 month intervals

Correction

Optimise iron status:

- before or when starting ESAs
- before deciding whether to use ESAs in dialysis and non-dialysis patients

Iron correction should maintain*:

- %HRC <6% (unless serum ferritin >800 micrograms/litre)

CHr or Ret-He >29 pg (unless serum ferritin >800 micrograms/litre)

If above tests are not available or person has thalassaemia or thalassaemia trait, maintain TSAT>20% and serum ferritin >100 micrograms/litre

Review iron dose:

- when serum ferritin reaches 500 micrograms/ litre (should not rise above 800 micrograms/litre)

Initiate ESAs:

- for patients likely to benefit in quality of life and physical function
- initiate ESA trial when there is uncertainty over whether presence of comorbidities or prognosis negate benefit

Age alone should not be a determinant for treating anaemia of CKD

Adjust ESA dose and frequency:

- to maintain stable Hb between 100 and 120 g/litre (or 95 and 115 g/litre in children under 2 years)
- to keep rate of Hb increase between 10 and 20 g/litre/month
- if Hb above 115 g/litre or below 105 g/litre

Maintenance

Maintain iron levels in both haemodialysis and non-haemodialysis patients:**

- %HRC <6% (unless serum ferritin >800 micrograms/litre)
- CHr or Ret-He > 29 pg (unless serum ferritin >800 micrograms/litre)
- TSAT >20% and serum ferritin >100 micrograms/litre (unless serum ferritin >800 micrograms/litre) (in practice likely to require i.v. iron)
- Testing should be undertaken at least every three months (1-3 months for haemodialysis patients)

Monitor:

- Serum ferritin to check iron stores for iron overload at 1-3 month intervals. Review iron dose when serum ferritin reaches 500 micrograms/litre (should not rise above 800 micrograms/litre)
- Hb every 2-4 weeks (induction phase) or 1-3 months (maintenance phase) during ESA therapy
- Hb more actively after adjusting ESA dose
- in clinical setting agreed with patient

Adjust ESA dose and frequency:

- if Hb >115 g/litre or <105 g/litre
- established rate of change in Hb, e.g. >10 g/litre/month

Investigate cause of any unexpected change in Hb level

Review ESA use:

- If ESA trial, review ESA effectiveness
- Discuss continued use with all patients after an agreed interval

Check for ESA resistance and if detected:

- Consider referral to a haematology service if underlying haematological disorder is suspected
- Evaluate and discuss risks and benefits with person and carers (where appropriate)
- Take into account symptoms, quality of life, underlying conditions and the chance of a future successful kidney transplant, in addition to Hb levels, when considering the need for red cell transfusion
- Review the rate of red cell transfusion and consider trial of ESA cessation; if the rate of red cell transfusion increases, consider restarting ESA therapy.

Iron doses

***Correction:** usually 500-1000 mg iron for adults or equivalent doses for children. All patients on haemodialysis should be offered i.v. iron. Peritoneal dialysis and non-dialysis patients who do not respond to oral iron should be offered i.v. iron. When using i.v. iron, consider high-dose low-frequency iron preparations to be the treatment of choice. For children and those having in-centre haemodialysis, low-dose high-frequency iron preparations may be more appropriate. Refer to the Summary of Product Characteristics for the prescription of individual iron preparations.

****Maintenance:** dosing regimen will depend on modaluty, for example haemodialysis patients will require the equivalent 50-60 mg i.v. iron per week (or an equivalent dose in children of 1 mg/kg/week). Peritoneal dialysis and non-dialysis patients who do not respond to oral iron should be offered i.v. iron. When using i.v. iron, consider high-dose low-frequency iron preparations to be the treatment of choice. For children and those having in-centre haemodialysis, low-dose high-frequency iron preparations may be more appropriate.

Clinical practice guidelines

An international clinical practice guideline for anaemia in CKD was published in 2012 by Kidney Disease Improving Global Outcomes (KDIGO)[10] and in 2017 the Renal Association published its Clinical Practice Guideline of Anaemia of CKD[11] which outlines best practice based on the available evidence.

The guideline recommends anaemia screening via haemoglobin levels at least annually in patients with CKD G3 and at least twice a year in patients with CKD G4-5 not on dialysis.

Where treatment with ESAs is concerned, the guideline recommends that this should be offered to patients with anaemia of CKD who are likely to benefit in terms of quality of life and physical function and to avoid blood transfusion; especially in patients considered suitable for transplantation. Choice of specific ESA treatment is recommended as based on local availability of ESAs.

Anaemia manifesto

The report "A manifesto for improving iron deficiency anaemia care in England 2016"[12] is forthright about the room for improvement for people with anaemia whose management and outcomes in England are suboptimal. While anaemia often relates to a variety of other diagnoses its management largely sits with GPs or with a range of different specialties, there are broad principles of best practice.

The manifesto highlights that anaemia can have a substantial impact on patients' health, sleep and functioning and, as a result, may significantly reduce quality of life (QOL). The treatment of anaemia has been shown to improve patients' QOL in randomised controlled trials across several conditions (e.g. inflammatory bowel disease, congestive heart failure and heavy menstrual bleeding). Treatment also improves symptomatic measures, such as exercise capacity. Despite this, anaemia is under-diagnosed and under-treated in England. There are many possible reasons for this, including insufficient surveillance of at-risk groups by HCPs, lack of understanding of the potentially severe consequences of not treating anaemia, lack of responsibility for anaemia by one specialty, inadequate referral and follow-up pathways, and insufficient use of appropriate therapies.

The authors highlight that available guidelines are often not followed resulting in a lack of treatment but perhaps, and more importantly, patients with anaemia are not always diagnosed in the first place. Anaemia can easily be missed, particularly in primary care, and clinical surveillance among HCPs in England is failing to adequately detect the problem. There is evidence to show that the introduction and implementation of clear anaemia guidelines could increase the number of patients screened and improve the detection of underlying causes. Anaemia management in CKD does however have a specific set of NICE guidelines, although from a logistical perspective, care pathways often differ widely from area to area, and even from practice to practice, depending on the experience and knowledge of GPs and service delivery in secondary care. This service heterogeneity, allied to a lack of awareness among HCPs, can result in a failure to take responsibility for long-term care in anaemia.

The manifesto emphasises the essential importance of recognising and diagnosing anaemia, giving patients appropriate treatment and following up on those patients in the long term.

> Reduce variation: Clinical leadership and coordination is required to drive local change and then to direct these care pathways in the longer term.

2.3 Healthcare professional education

Levels of knowledge about anaemia vary significantly amongst HCPs, particularly in primary care (where HCPs have to manage a particularly broad range of conditions). As a result, clinical surveillance may fail to detect anaemia, and some people may remain undiagnosed. Furthermore, many patients with anaemia are under-treated. The extent to which this is true of the CKD patient population specifically is unclear.

Failures to detect and treat anaemia may reflect uncertainty and lack of knowledge among HCPs about a wide variety of factors, including:

- The need for anaemia surveillance in at-risk groups and in those with signs and symptoms of anaemia (e.g. fatigue)
- The potentially severe physical and psychological consequences of inaction on anaemia
- Diagnostic thresholds for defining anaemia and iron deficiency
- Appropriate investigations required to identify underlying causes
- Who should take responsibility for anaemia patients and referral pathways into specialist care
- Appropriate treatment
- Long-term monitoring and follow-up.

Improved knowledge among HCPs is also essential if they are to support patients to understand anaemia and its management. Many patients currently lack sufficient understanding to perform adequate self-care or to drive the medical management of their condition.

> Education is required for all HCPs who manage patients with or at risk of anaemia, due to conditions like CKD. (Responsibility of medical and nursing schools; Health Education England; local education providers (with expertise provided by medical specialty societies); patient associations.)

Physicians and nurses in primary and secondary care who manage patients at risk of anaemia need training to recognise those patients at risk for anaemia; referral criteria and pathways; diagnosis and key investigations; treatment and follow-up guidelines. Patients need to be empowered to ask their HCPs the right questions about anaemia and understand their condition.

2.4 Models of good practice and integrated care pathway frameworks

Case study: Shared care pathway, Imperial College London

Imperial College Healthcare NHS Trust developed a shared-care pathway for CKD in 2017/18[13]. A significant number of patients had non-progressive CKD who did not require specialist input and could therefore be for managed in primary care. Primary care monitoring of their disease including potential complications such as anaemia, was supported by specialist input with virtual clinics and an e-advice service.

Redesign of the CKD pathway in north-west London was aimed at:

- Reducing growth and stabilising end-stage renal disease (ESRD)
- Reducing unnecessary clinic attendance
- Increasing discharges from secondary care
- Improving patient care and experience
- Supporting self-management and community care

Figure 5

Constituents of shared-care pathway[13]

To achieve this the service would need to identify and focus on at-risk patients, ensure that NICE guidance was followed, improve care efficiency and improve the planning for ESRD management for those patients who do deteriorate.

They developed a CKD shared-care programme and pathway redesign with virtual clinics for CKD patients, alongside an e-advice service and consultant outreach into primary care.

- Referral criteria: supported by NICE guidance, electronic referral forms and e-advice.
- Transfer from secondary care to follow-up: patients unlikely to require specialised renal intervention.
- Discharge information: sent to GP and patient.
- Maintenance in primary care: lifestyle, vein preservation, blood pressure, medication management, eGFR monitoring. Includes monitoring for anaemia; if suspected nephrology advice should be sought.
- Quality standards: blood pressure target achieved, eGFR measured within 12 months, change in eGFR managed.
- Local guidelines: education sessions in community, educational literature, patient education.

As a result, over 700 patients have been transferred from the renal outpatient clinic into shared care. Freeing up capacity in the nephrology services has increased the capacity available for patients with later stage kidney disease or renal failure as well as supporting patients to continue their care out of hospital.

Case study: Manchester Anaemia Guide[14]

This local care document covers all patients with suspected anaemia in the Manchester area and provides guidance on appropriate diagnostic tests and management strategies. It includes specific, detailed recommendations for the investigation and treatment of anaemia. For example, the document notes that all patients with anaemia should commence iron therapy.

Furthermore, to aid GPs, criteria for referral to specialist care are given:

- Patients with no gastrointestinal (GI) symptoms and no obvious cause for their anaemia (such as heavy menstruation) should be referred to an appropriate specialty;
- Patients with GI symptoms should undergo a careful history / examination, and coeliac screening, with urgent cancer referral for those meeting criteria.

This guide (and others like it) provides a potential model for local anaemia care pathways across England. However, more localised documents can go even further than the Manchester guide in setting out precise management and referral pathways.

Case study: 'Enhancing Quality and Enhanced Recovery' programme in Kent, Surrey and Sussex[15]

Within this programme, clinical staff in the South East of England have agreed a number of key processes and outcome measures to ensure patients receive the best possible care in selected conditions (e.g. hip and knee replacement surgery, heart attack, heart failure and pneumonia). Ideal pathways have been created. The success of NHS Trusts against individual quality measures can be tracked at https://www.ahsnnetwork.com/case-study/enhanced-recovery-programme-erp.

Although the current remit is Kent, Surrey and Sussex, there is an opportunity to benchmark performance against the North West region and internationally with the United States, where similar programmes have been established.

These metrics (and others like them) provide potential models for a national-level dashboard to measure performance in anaemia care.

Case study: Cost analysis based on HES data[16]

The 'Ferronomics' analysis used HES data for England for the year 2012/13 to identify some important cost issues relating to the management of anaemia. Key findings were that: the annual cost of managing anaemia was £55.5 million; and each of the ~15,000 emergency admissions per year cost an estimated £1,013 more than an elective admission (£1,627 vs £614, respectively), including HCP time, drug and procedure costs, and excess bed day fees. Hence, reducing emergency admissions through improved diagnosis and management would substantially reduce costs. This analysis also estimated that £8.4 million (15.2%) could be saved if the CCGs performing below mean levels could elevate their performance to the mean – equivalent to around £80,000 for each of the ~100 CCGs performing at below-mean levels.

Analysis of HES data from 2014/15 showed an increase in the cost of anaemia management (£65.6 million) and an even wider difference between the cost of non-elective versus elective admissions (£1,165). As such, the £8.4 million figure stated above is likely to have increased.

Given the substantial impact of anaemia on functioning and QOL[17, 18, 19, 20], further analysis is essential to better understand the potential cost effectiveness of improving anaemia care in England (compared with other potential investments).

2.5 Voluntary sector and professional bodies

There are a number of voluntary sector organisations and professional bodies working within the nephrology arena.

Kidney Care UK[21] is the leading patient support charity providing practical, emotional and financial support to patients and families affected by kidney disease. They have a range of information on many aspects of kidney health and research and offer downloadable or hard copy information for kidney-related issues including anaemia. Publications include: anaemia in chronic kidney disease; medicines for anaemia and mineral bone health and an anaemia and ESA fact sheet[22].

The National Kidney Federation[23] is unique in that, although there are a large number of kidney charities, the NKF is the national kidney charity actually run by kidney patients for kidney patients. Most renal units have a Kidney Patient Association (KPA) specifically attached and in January 1979 these independent charities realised that they needed a national organisation to fight their cause as renal provision was very variable. Currently there are 51 KPAs and they come together as the controlling Council of the National Kidney Federation. The KPAs are both the ears and the eyes of the NKF and its controlling force with patients are the officers of the NKF, the executive committee of the NKF and the workforce of the NKF. Apart from six members of staff, all other personnel are either kidney patients or carers of kidney patients. Unlike other kidney charities, the NKF has only two roles, campaigning for improvements to renal provision and treatment and national patient support services. NKF has a range of resources including a helpline and patient information.

The Renal Association[24] is the leading professional body for the UK renal community and supports professionals in the delivery of kidney care and research. Membership is multidisciplinary and involves all team members working or training in clinical renal care, renal research or related fields, and those treating and caring for people with kidney disease. In support of education and training they run an annual UK Kidney Week, an Advanced Nephrology Course and regional Kidney Quality Improvement meetings.

The Renal Association was the first professional society dedicated to kidney care, the first to produce service specifications and the first to produce guidelines. Through such initiatives as the Kidney Quality Improvement Partnership, Patient View, expanding the scope of the UK Renal Registry and the UK Renal Research Consortium, and in partnership with its patient, professional and corporate partners, their aim is to transform the way kidney care and research is delivered in the UK.

The website includes useful resources for professionals and patients and also the UK e-CKD Guide which includes a section on anaemia[25].

The British Renal Society[26] began as The British Renal Symposium in 1989 to promote formal dialogue between the many specialist groups supporting professionals involved in the care of patients with kidney disease. Their multi-professional members support the development of renal care, by exerting influence at a number of levels including the advancement of the evidence base, the commissioning process, and the formulation of policy. Since becoming the British Renal Society in 2001, the Society has grown substantially.

The BRS does not have individual members but is made up of Affiliates. The BRS Council is led by the BRS Officers (President, Immediate Past President, Vice Presidents for Research, Education, Clinical Practice and Clinical Development, Treasurer and Communications Secretary) and comprised of representatives from each Affiliate as well as the Special Interest Groups. The BRS Council meets quarterly and the Officers have fortnightly telephone conferences to facilitate ongoing activities.

Core aims are the promotion of and effective patient- centred multi-professional care to improve quality of life for people with kidney failure and their families and carers, advancement of education in renal disease and replacement therapy in the UK and the funding and support of multi-professional research into kidney disease and its management.

2.6 NHS Long Term Plan implications

In its Long Term Plan[27] (2019) a central policy point is the NHS's commitment to addressing the overwhelming burden of ACSCs, one of which is anaemia, which are common predictors of admission. ACSCs are preventable problems and therefore proactive intervention could reduce emergency admissions to hospital. Anaemia should therefore be proactively raised with service providers as a call to action to achieve this goal, with greater commissioning focus on identifying more individuals with anaemia.

Another point within Long Term Plan emphasises the need for patients to better understand their condition and enable self-care. Putting tools in place to assist with this would be a valuable step, such as symptom tracker developed by a patient charity that patients could use to identify issues that need to be discussed with an HCP.

3. Data analysis

Prioritising anaemia in people with CKD has the potential to significantly improve outcomes for many patients. The cost of testing for and treating anaemia proactively is minimal compared to the costs of downstream complications. From a patient perspective, proactive identification and treatment of anaemia is far preferable to the potential consequences of untreated anaemia.

To address anaemia with CKD, it is essential that commissioners fully understand the impact that the condition places on inpatient care spells and local budgets. We have analysed a large dataset to assess the impact of anaemia on these patients.

The matched cohort analysis relates to patients with stage 3, 4 or 5 CKD who had hospital admissions in the fiscal years 2016/17, 2017/18 and 2018/19 for ICD-10/OPCS codes listed. The information within this report refers to patients who have this code in either the primary or a secondary diagnoses position. Inpatient measures for each cohort were spells, patients, spells per patient, cost, cost per patient, cost per spell, bed days and mean length of stay (MLOS). Outpatient appointments for each cohort were also captured, as well as co-morbidities for each cohort. This uncovered recent trends and costs of anaemia in this population.

- N183, N184, N185 — CKD stages 3, 4 and 5
- D500 — Iron deficiency anaemia secondary to blood loss (chronic)
- D508 — Other iron deficiency anaemias
- D509 — Iron deficiency anaemia, unspecified
- D649 — Anaemia, unspecified
- X401, X402, X403, X404, X405, X406 — Dialysis

Patients were divided into those who had anaemia in their history (A+) and those who did not have anaemia in their history (A-). They were further divided into and those on dialysis (D+) and those not on dialysis (D-).

Of the 287,685 patients recorded in the year 2018/19, 82.7% were A- (238,045) and 16.3% were A+ patients (49,640).

3.1 Hospital admissions

- 49,640 CKD patients with anaemia were admitted to hospital in 2018/19 with a total of 219,075 spells.
- Patients with anaemia comprise about 1 in 6 of all CKD patients admitted in 2018/19.
- A+ patients place a larger demand on services in terms of spells per patient (for those not on dialysis), MLOS and cost per patient.

Figure 6

Inpatient admissions 2018/19

Group	Spells	Patients	Spells per patient	MLOS	Cost per patient
A+ D+	122,370	5,195	23.6	1.5	£15,845
A+ D-	96,705	44,445	2.2	7.0	£6,805
A- D+	553,885	17,585	31.5	0.5	£7,690
A- D-	347,795	220,460	1.6	4.9	£3,990

Spells per patient

In the non-dialysis group, A+ patients place a large spell burden on hospitals. A+ patients who are not receiving dialysis have 0.6 spells per patient more on average than A- patients (2.2 spells vs 1.6 spells)*.

MLOS

CKD patients with anaemia stay in hospital for longer on average (higher MLOS) and therefore place a larger demand on secondary care than A- patients.

In a consistent trend across the three-year period, the MLOS is noticeably higher among A+ patients (dialysis group: A+ 1.5 days vs A- 0.5 days in 2018/19) than that for A- patients (no dialysis group: A+ 7 days, A- 4.9 days in 2018/19).

Cost per patient

A+ patients with CKD cost significantly more than their A- counterparts. Among D- patients, there is an additional cost of £2,815; and among D+ patients the extra cost rises to £7,885. This represents a significant extra cost to services which could potentially be mitigated with more proactive anaemia management.

*The spell count per patient is much higher for A- patients receiving dialysis (31.5 spells) compared to those who are A+ (23.6). We can speculate that this could be related to the type of treatment that dialysis patients receive: those who are A- are more likely to be eligible for kidney transplant, and therefore have more spells than A+ patients who are ineligible for transplant. In the non-dialysis group, A+ patients may be more likely to have other health issues as a result of their anaemia and this may account for the increase in spells per patient.

3.2 Non-elective admissions

- 37,310 CKD patients with anaemia were admitted to hospital non-electively in 2018/19 with a total of 71,570 spells.
- Patients with anaemia comprise 1 in 4 of all CKD patients admitted non-electively in 2018/19.
- A+ patients place a larger demand on services in terms in terms of spells per patient, MLOS and cost per patient.

Figure 7

Non-elective admissions 2018/19

Group	Spells	Patients	Spells per patient	MLOS	Cost per patient
A+ D+	14,130	4,720	3.0	10.3	£12,855
A+ D-	57,440	32,590	1.8	10.6	£7,440
A- D+	26,450	12,155	2.2	8.5	£8,020
A- D-	183,240	134,895	1.4	8.3	£4,625

Patient numbers

The three-year analysis period shows a steady increase in the number of patients admitted non-electively. With emergency care already under strain, it would be prudent to reduce the demand that CKD places on services by seeking to address anaemia proactively.

Spells per patient

A+ patients have more non-elective hospital spells per patient than A- patients, both those receiving dialysis and those not on dialysis. On average A+ patients have an extra 0.8 spells in the dialysis group (3.0 spells vs 2.2 spells), and an extra 0.4 spells in the non-dialysis group (1.8 spells vs 1.4 spells).

MLOS

A+ patients stay in hospital for longer on average than their A- counterparts, in both the dialysis group (10.3 days vs 8.5 days) and non-dialysis group (10.6 days vs 8.3 days).

Cost per patient

Non-elective admissions for A+ patients are more costly than those for A-, when comparing both those receiving dialysis and those not. This data suggests that an intervention to ameliorate anaemia may well help to reduce the burden on unplanned care budgets across all CKD patient groups, although especially those receiving dialysis where A+ costs over £5,000 more on average per patient. Deeper analysis may help gain insight into whether there is an increasing cost trend during the three-year analysis period, and why A+ patients are consistently more costly.

Outpatient appointments

Our analysis also identified the ten most common outpatient appointment types by consultant specialty. Non-elective CKD inpatients are having significant numbers of outpatient engagement with services (including 12.3 nephrology appointments on average in 2018/19) and these represent opportunities for intervention to screen for anaemia status.

3.3 Regional data

Full regional data by GIRFT (Getting It Right First Time[28]) region is shown in the appendix at the end of this report. Overall patterns over time follow a similar trend across regions and reflect the national trends.

Most striking in the regional data is the significant variation in spells per patient, MLOS and cost per patient among the patient groups receiving dialysis. This may reflect the variation in service provision for dialysis and underlines the need for care to follow standardised integrated pathways to reduce the level of service and care variation that patients experience.

Spell numbers

In both the A+ and A- groups receiving dialysis there is a noticeable drop in spell numbers in the East of England region for which spells reduce by over half between 2017/18 and 2018/19.

Spells per patient

Spells per patient are highly similar across regions for patients not receiving dialysis, for both the A+ and A- groups. For patients receiving dialysis however, there is a much greater spread in the number of spells per patient across regions – by a factor of 10 or even almost 20 in some cases – with the highest figures in the North West.

For patients with anaemia who are receiving dialysis there is a consistent increase in spells per patient between 2017/18 and 2018/19 with the marked exception of the East of England, which saw a decrease from 30.9 to 11.0 spells..

MLOS

Figures here are fairly similarly clustered, with the exception of the North East & Yorkshire region, which compared to other regions has dramatically higher MLOS for patients receiving dialysis (in both A+ and A- groups): 5.5 days in 2018/19 compared with under 1 day for all other regions in the A- group of patients receiving dialysis.

Cost per patient

It is noticeable in this set of data that costs per patient are highly similar across regions for patients not receiving dialysis, for both the A+ and A- groups. For patients receiving dialysis however, there is a much greater spread in the cost per patient across regions – over double in some cases. In 2018/19 the London region consistently has the highest cost per patient across all groups.

4. Conclusions

- Anaemia remains an under-diagnosed condition within the CKD population, and furthermore many patients with CKD are undiagnosed, so the true prevalence of anaemia in this patient group is uncertain.
- Without knowing the true prevalence of CKD patients with anaemia the scope of efficiencies and cost savings that could be made are unclear and likely to be larger than anticipated.
- The NICE Guidelines for screening and management of anaemia in CKD need to be reinforced to ensure that patients are properly and promptly identified and can receive appropriate intervention.
- Proactive intervention enhances quality of life and reduces complications for patients.
- Our data analysis gives an insight into the potential to ease admissions burden on services, both in terms of number of spells per patient and length of stay, and reduce costs, while improving patient care. The comparison in our analysis is likely to be giving a conservative estimate of the cost reduction that addressing anaemia with CKD would deliver.
- It is essential that services measure their performance in anaemia surveillance, diagnosis, treatment and follow-up to track outcomes of service improvement activities.

Glossary

ACSC	Ambulatory care sensitive conditions
CCG	Clinical commissioning group
CKD	Chronic kidney disease
EPO	Erythropoietin
ERAS	Enhanced Recovery After Surgery
ESA	Erythropoietic stimulating agent
ESRD	End-stage renal disease
GFR	Glomerular filtration rate
GIRFT	Getting It Right First Time
HCP	Healthcare professional
HES	Hospital Episode Statistics
ICS	Integrated Care Systems
ICD-10	International Statistical Classification of Diseases and Related Health Problems: 10th Revision
KPA	Kidney Patient Association
MLOS	Mean length of stay
NICE	National Institute for Health and Care Excellence
OPCS	OPCS Classification of Interventions and Procedures version 4
PAS	Patient Administration Systems
SUS	Secondary Uses Service
Spell	A hospital provider spell is the total continuous stay of a patient using a hospital bed on premises controlled by a health care provider during which medical care is the responsibility of one or more consultants, or the patient is receiving care under one or more episodes of care.

Appendices

1. **Demographics**
2. **All admissions**
3. **Elective admissions**
4. **Non-elective admissions**
5. **Regional data**

1. Demographics

Region	Mean age	Median age
East of England	71.8	75
London	66.7	69
Midlands	70.4	74
North East & Yorkshire	74.2	78
North West	65.4	68
South East	71.2	74
South West	70.3	74

Figure 8

Mean and median ages of patients by GIRFT region 2018/19

2. All admissions

Group	Spells	Patients	Spells per patient	MLOS	Cost per patient
A+ D+	122,370	5,195	23.6	1.5	£15,845
A+ D-	96,705	44,445	2.2	7.0	£6,805
A- D+	553,885	17,585	31.5	0.5	£7,690
A- D-	347,795	220,460	1.6	4.9	£3,990

Figure 9

Inpatient admissions 2018/19

Figure 10

Three-year trend in patient numbers by group (national, all admissions)

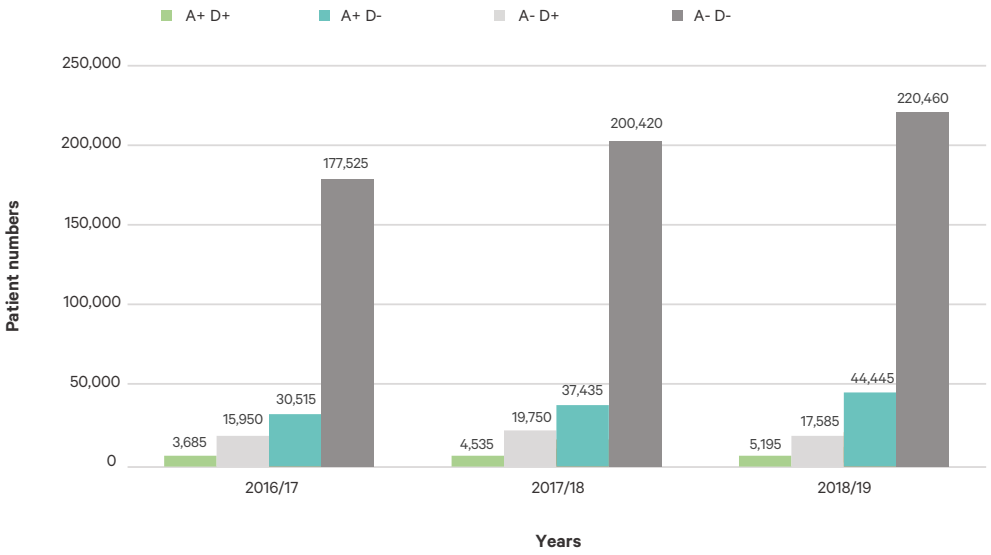


Figure 11

Three-year trend in MLOS by group, including percentage change from previous fiscal year (national, all admissions)

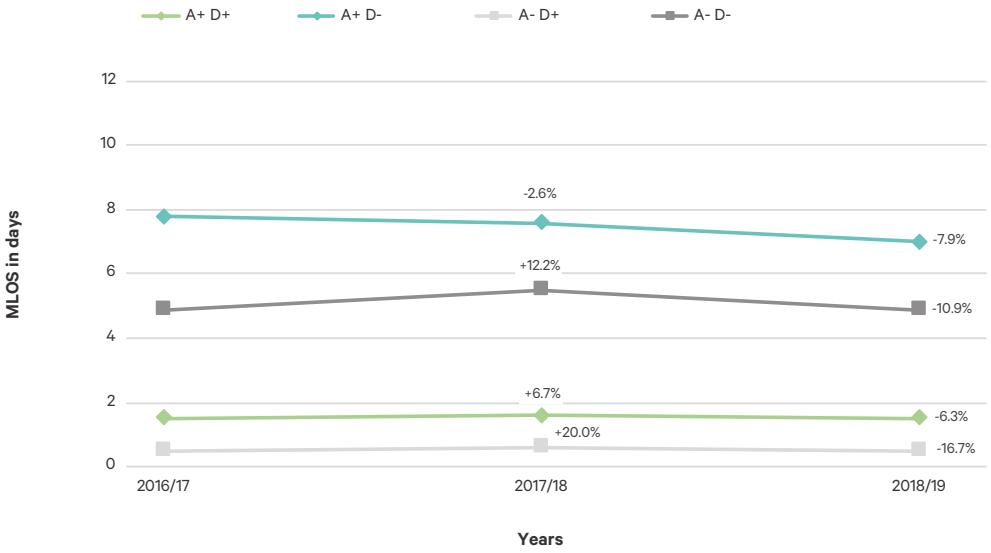
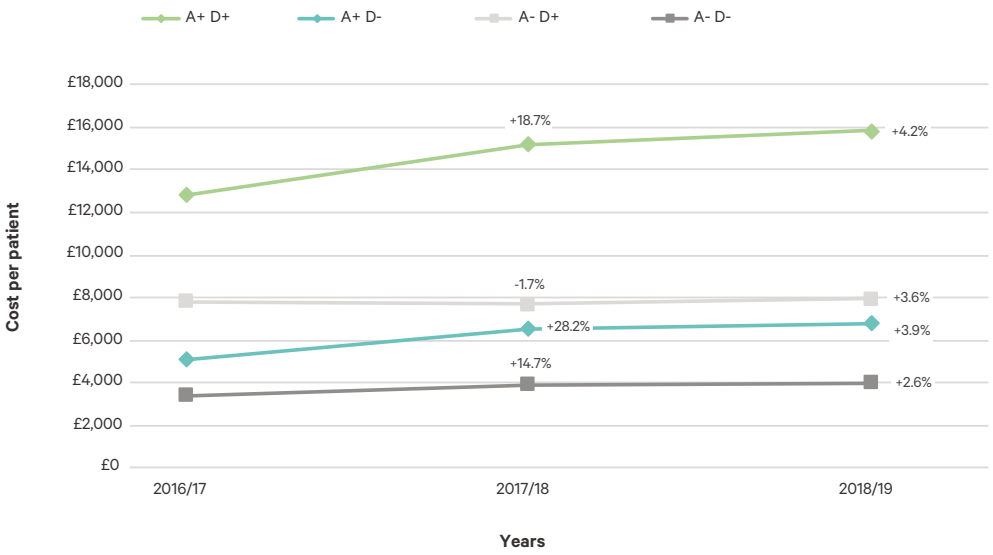


Figure 12

Three-year trend in cost per patient by group, including percentage change from previous fiscal year (national, all admissions)



3. Elective admissions

Group	Spells	Patients	Spells per patient
A+ D+	108,245	3,915	27.7
A+ D-	39,265	20,780	1.9
A- D+	527,435	13,265	39.8
A- D-	164,555	106,945	1.5

Figure 13

Elective admissions 2018/19

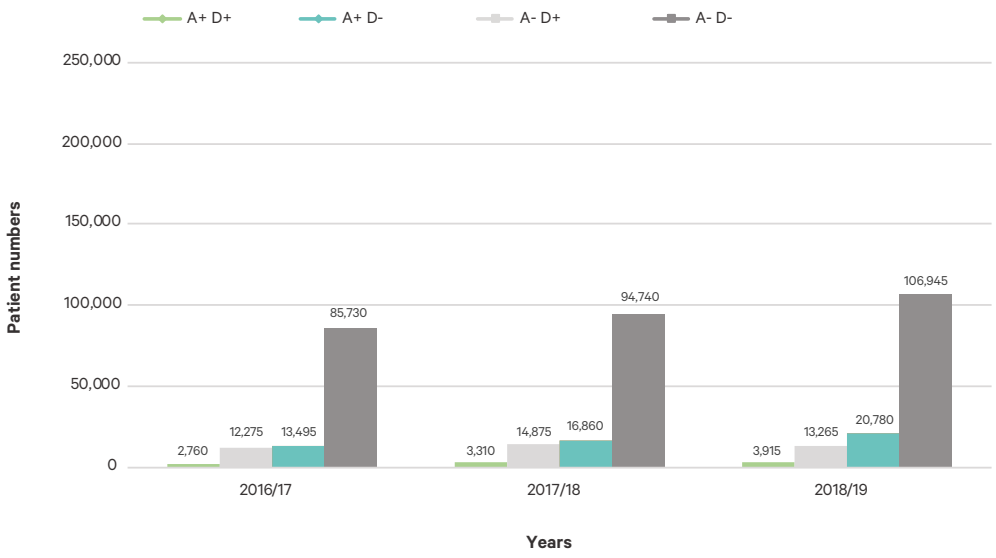


Figure 14

Three-year trend in patient numbers by group (national, elective admissions)

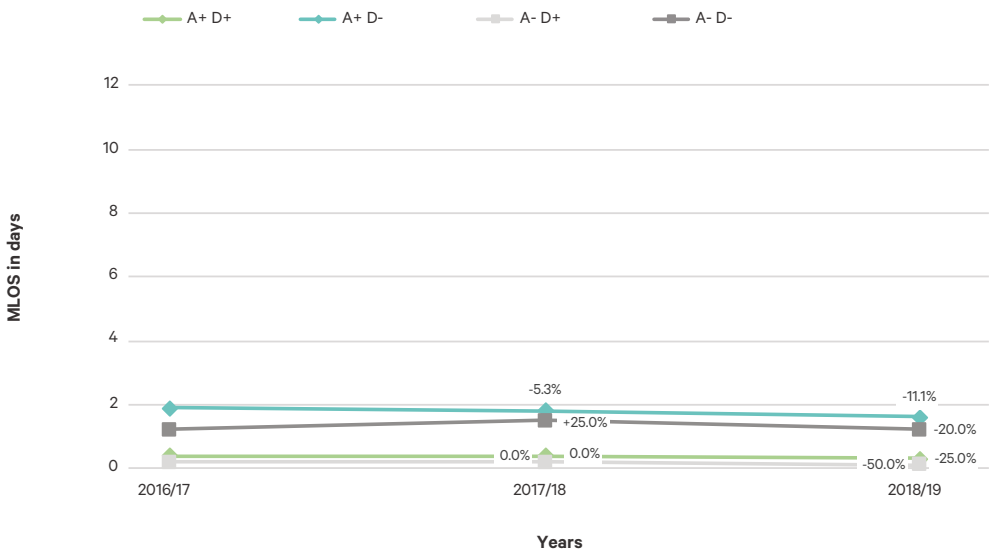


Figure 15

Three-year trend in MLOS by group, including percentage change from previous fiscal year (national, elective admissions)

Figure 16

Outpatient appointments - consultant specialty for patients with elective admissions 2018/19

Group	Consultant specialty	Appointments	Patients	Appointments per patient
A+ D+	Nephrology	45,885	3,530	13.0
A+ D+	Ophthalmology	6,800	1,475	4.6
A+ D+	Cardiology	4,895	1,695	2.9
A+ D+	Diabetic Medicine	4,715	855	5.5
A+ D+	Transplantation Surgery	3,990	760	5.3
A+ D+	Dietetics	3,975	965	4.1
A+ D+	Diagnostic Imaging	2,820	1,095	2.6
A+ D+	Vascular Surgery	2,565	1,020	2.5
A+ D+	Clinical Haematology	2,530	485	5.2
A+ D+	Anticoagulant Service	2,505	190	13.3
A+ D-	Nephrology	53,425	7,565	7.1
A+ D-	Ophthalmology	27,420	6,670	4.1
A+ D-	Cardiology	21,640	6,845	3.2
A+ D-	Trauma and Orthopaedics	15,065	4,025	3.7
A+ D-	Clinical Haematology	14,495	2,915	5.0
A+ D-	Urology	12,360	3,805	3.2
A+ D-	Gastroenterology	10,280	4,835	2.1
A+ D-	Diabetic Medicine	10,165	2,020	5.0
A+ D-	General Surgery	9,145	4,110	2.2
A+ D-	Diagnostic Imaging	8,925	4,250	2.1
A- D+	Nephrology	125,435	10,620	11.8
A- D+	Ophthalmology	16,715	3,690	4.5
A- D+	Dietetics	12,040	3,215	3.7
A- D+	Cardiology	11,400	4,285	2.7
A- D+	Transplantation Surgery	11,100	2,100	5.3
A- D+	Diabetic Medicine	10,825	2,035	5.3
A- D+	Anticoagulant Service	9,150	535	17.1
A- D+	Diagnostic Imaging	7,860	3,010	2.6
A- D+	Clinical Haematology	6,645	1,025	6.5
A- D+	Podiatry	6,465	740	8.7
A- D-	Nephrology	208,590	25,870	8.1
A- D-	Ophthalmology	139,375	34,980	4.0
A- D-	Trauma and Orthopaedics	99,815	25,270	4.0
A- D-	Cardiology	82,650	27,430	3.0
A- D-	Urology	67,905	19,875	3.4
A- D-	Clinical Haematology	50,100	8,190	6.1
A- D-	Physiotherapy	45,160	10,525	4.3
A- D-	Clinical Oncology	40,625	5,895	6.9
A- D-	Diagnostic Imaging	40,420	19,335	2.1
A- D-	General Surgery	40,030	18,325	2.2

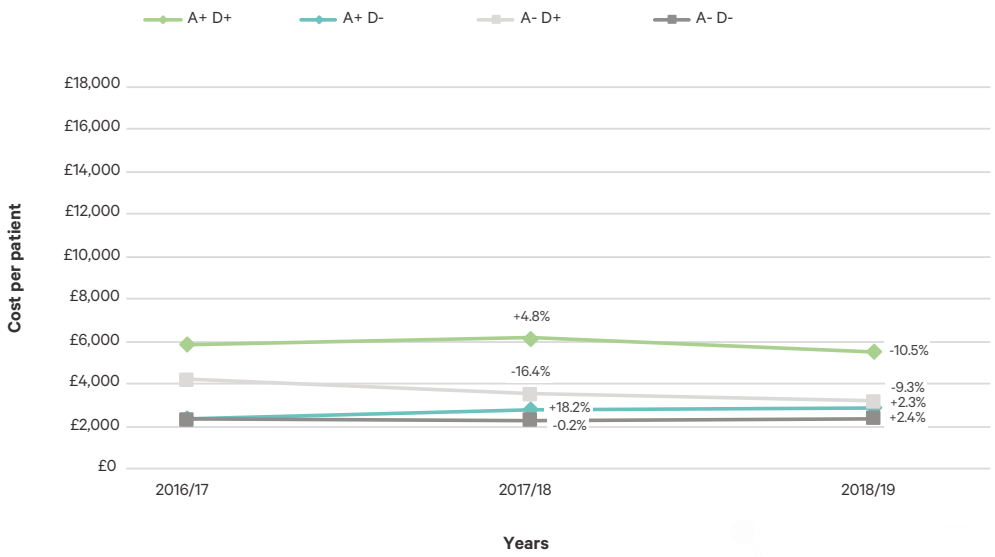
Figure 17

Outpatient appointments - operation description for patients with elective admissions 2018/19

Group	Operation description	Appointments	Patients	Appointments per patient
A+ D+	Assessment By Multiprofessional Team Nec	3,750	1,250	3.0
A+ D+	Assessment By Uniprofessional Team Nec	2,295	445	5.2
A+ D+	Post-transplantation of Kidney Examination - Recipient	2,105	190	11.1
A+ D+	Radiology of One Body Area (or < 20 Minutes)	1,960	935	2.1
A+ D+	Tomography Evaluation of Retina	1,620	750	2.2
A+ D+	Assessment By Multidisciplinary Team Nec	1,495	600	2.5
A+ D+	Attention to Dressing of Skin Nec	895	260	3.4
A+ D+	Transthoracic Echocardiography	845	665	1.3
A+ D+	Diagnostic Blood Tests, Other Specified	835	210	4.0
A+ D+	Diagnostic Blood Tests, Unspecified	740	220	3.4
A+ D-	Assessment By Uniprofessional Team Nec	13,880	2,800	5.0
A+ D-	Assessment By Multiprofessional Team Nec	8,780	3,360	2.6
A+ D-	Tomography Evaluation of Retina	6,670	2,980	2.2
A+ D-	Radiology of One Body Area (or < 20 Minutes)	6,590	3,735	1.8
A+ D-	Assessment By Multidisciplinary Team Nec	3,015	1,300	2.3
A+ D-	Blood Withdrawal, Unspecified	2,975	1,155	2.6
A+ D-	Transthoracic Echocardiography	2,740	2,330	1.2
A+ D-	Post-transplantation of Kidney Examination - Recipient	2,660	275	9.7
A+ D-	Diagnostic Blood Tests, Unspecified	2,515	890	2.8
A+ D-	Bilateral Operation	2,265	1,155	2.0
A- D+	Assessment By Multiprofessional Team Nec	10,095	3,505	2.9
A- D+	Post-transplantation of Kidney Examination - Recipient	8,340	625	13.4
A- D+	Assessment By Uniprofessional Team Nec	6,270	1,130	5.6
A- D+	Radiology of One Body Area (or < 20 Minutes)	5,425	2,560	2.1
A- D+	Tomography Evaluation of Retina	3,910	1,860	2.1
A- D+	Assessment By Multidisciplinary Team Nec	3,645	1,515	2.4
A- D+	Attention to Dressing of Skin Nec	2,785	750	3.7
A- D+	Diagnostic Blood Tests, Other Specified	2,515	630	4.0
A- D+	Transthoracic Echocardiography	1,955	1,635	1.2
A- D+	Test Strip Urinalysis	1,925	465	4.2
A- D-	Assessment By Uniprofessional Team Nec	64,190	14,615	4.4
A- D-	Assessment By Multiprofessional Team Nec	35,850	14,675	2.4
A- D-	Radiology of One Body Area (or < 20 Minutes)	32,270	18,675	1.7
A- D-	Tomography Evaluation of Retina	28,480	13,465	2.1
A- D-	Post-transplantation of Kidney Examination - Recipient	17,890	1,850	9.7
A- D-	Assessment By Multidisciplinary Team Nec	11,600	5,175	2.2
A- D-	Delivery of A Fraction of External Beam Radiotherapy Nec	11,595	880	13.2
A- D-	Transthoracic Echocardiography	10,550	9,090	1.2
A- D-	Bilateral Operation	10,450	5,690	1.8
A- D-	Diagnostic Electrocardiography, Unspecified	9,430	7,560	1.2

Figure 18

Three-year trend in cost per patient by group, including percentage change from previous fiscal year (national, elective admissions)



4. Non-elective admissions

Figure 19

Non-elective admissions 2018/19

Group	Spells	Patients	Spells per patient	MLOS	Cost per patient
A+ D+	14,130	4,720	3.0	10.3	£12,855
A+ D-	57,440	32,590	1.8	10.6	£7,440
A- D+	26,450	12,155	2.2	8.5	£8,020
A- D-	183,240	134,895	1.4	8.3	£4,625

Figure 20

Three-year trend in patient numbers by group (national, non-elective admissions)

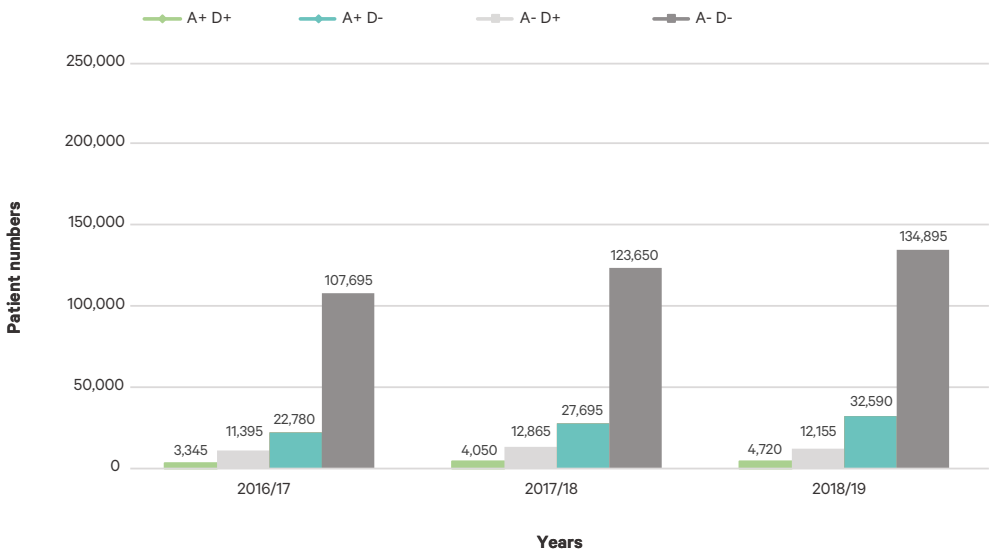


Figure 21

Three-year trend in MLOS by group, including percentage change from previous fiscal year (national, non-elective admissions)

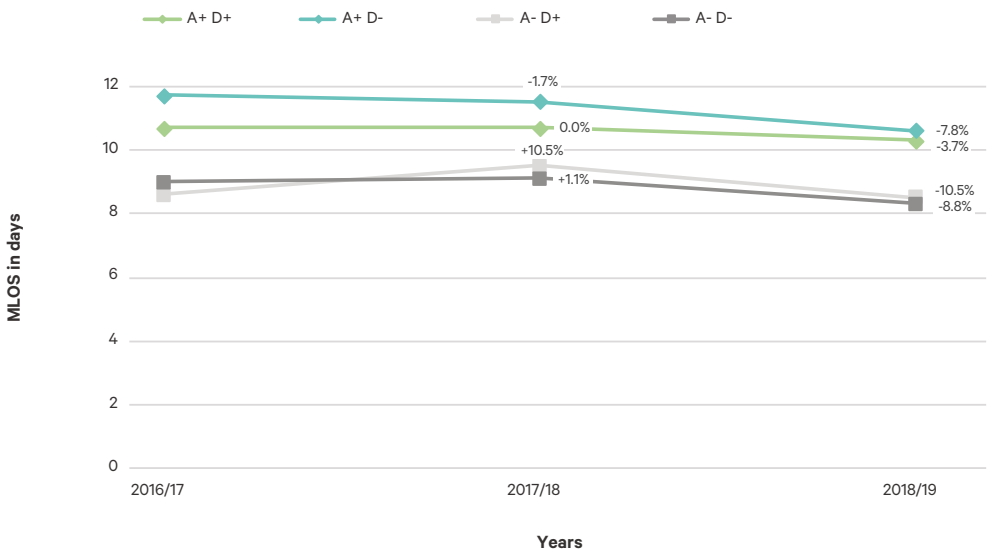


Figure 22

Outpatient appointments - consultant specialty for patients with non-elective admissions 2018/19

Group	Consultant specialty	Appointments	Patients	Appointments per patient
A+ D+	Nephrology	51,235	4,160	12.3
A+ D+	Ophthalmology	7,800	1,735	4.5
A+ D+	Diabetic Medicine	5,850	1,055	5.5
A+ D+	Cardiology	5,615	1,960	2.9
A+ D+	Transplantation Surgery	4,200	780	5.4
A+ D+	Dietetics	4,010	1,030	3.9
A+ D+	Diagnostic Imaging	3,140	1,255	2.5
A+ D+	Anticoagulant Service	3,065	220	13.8
A+ D+	Vascular Surgery	2,810	1,115	2.5
A+ D+	Clinical Haematology	2,765	540	5.1
A+ D-	Nephrology	56,975	9,390	6.1
A+ D-	Ophthalmology	34,445	8,995	3.8
A+ D-	Cardiology	32,170	10,765	3.0
A+ D-	Intermediate Care	22,180	745	29.7
A+ D-	Clinical Haematology	16,875	3,770	4.5
A+ D-	Diabetic Medicine	15,740	3,215	4.9
A+ D-	Urology	14,785	4,890	3.0
A+ D-	Trauma and Orthopaedics	14,040	4,485	3.1
A+ D-	General Medicine	13,095	4,420	3.0
A+ D-	Anticoagulant Service	11,990	1,200	10.0
A- D+	Nephrology	119,350	10,230	11.7
A- D+	Ophthalmology	16,685	3,865	4.3
A- D+	Diabetic Medicine	12,335	2,280	5.4
A- D+	Cardiology	11,885	4,400	2.7
A- D+	Transplantation Surgery	10,945	1,830	6.0
A- D+	Dietetics	9,750	2,680	3.6
A- D+	Anticoagulant Service	8,770	535	16.5
A- D+	Diagnostic Imaging	7,580	2,940	2.6
A- D+	Clinical Haematology	6,920	1,040	6.6
A- D+	Podiatry	6,440	745	8.6
A- D-	Nephrology	177,905	27,110	6.6
A- D-	Ophthalmology	122,160	33,065	3.7
A- D-	Cardiology	111,925	38,855	2.9
A- D-	Intermediate Care	74,170	2,760	26.9
A- D-	Trauma and Orthopaedics	52,625	17,725	3.0
A- D-	Urology	52,410	18,085	2.9
A- D-	Clinical Haematology	51,760	9,455	5.5
A- D-	Diabetic Medicine	46,040	9,785	4.7
A- D-	General Medicine	42,170	14,115	3.0
A- D-	Respiratory Medicine	41,480	14,905	2.8

Figure 23

Outpatient appointments - operation description for patients with non-elective admissions 2018/19

Group	Operation description	Appointments	Patients	Appointments per patient
A+ D+	Assessment By Multiprofessional Team Nec	4,170	1,415	2.9
A+ D+	Assessment By Uniprofessional Team Nec	2,585	495	5.2
A+ D+	Post-transplantation of Kidney Examination - Recipient	2,470	220	11.2
A+ D+	Radiology of One Body Area (or < 20 Minutes)	2,225	1,080	2.1
A+ D+	Tomography Evaluation of Retina	1,820	850	2.1
A+ D+	Assessment By Multidisciplinary Team Nec	1,575	635	2.5
A+ D+	Attention to Dressing of Skin Nec	1,090	310	3.5
A+ D+	Diagnostic Blood Tests, Other Specified	970	225	4.3
A+ D+	Transthoracic Echocardiography	950	750	1.3
A+ D+	Diagnostic Blood Tests, Unspecified	830	215	3.9
A+ D-	Assessment By Uniprofessional Team Nec	13,075	2,755	4.7
A+ D-	Assessment By Multiprofessional Team Nec	9,400	3,685	2.6
A+ D-	Tomography Evaluation of Retina	7,800	3,760	2.1
A+ D-	Radiology of One Body Area (or < 20 Minutes)	7,210	4,225	1.7
A+ D-	Transthoracic Echocardiography	3,580	3,070	1.2
A+ D-	Assessment By Multidisciplinary Team Nec	3,180	1,345	2.4
A+ D-	Diagnostic Blood Tests, Unspecified	2,890	950	3.0
A+ D-	Bilateral Operation	2,660	1,410	1.9
A+ D-	Post-transplantation of Kidney Examination - Recipient	2,545	260	9.8
A+ D-	Blood Withdrawal, Unspecified	2,470	1,015	2.4
A- D+	Assessment By Multiprofessional Team Nec	10,045	3,450	2.9
A- D+	Post-transplantation of Kidney Examination - Recipient	8,820	645	13.7
A- D+	Assessment By Uniprofessional Team Nec	7,220	1,165	6.2
A- D+	Radiology of One Body Area (or < 20 Minutes)	5,540	2,590	2.1
A- D+	Tomography Evaluation of Retina	3,875	1,905	2.0
A- D+	Assessment By Multidisciplinary Team Nec	3,625	1,450	2.5
A- D+	Attention to Dressing of Skin Nec	3,180	825	3.8
A- D+	Diagnostic Blood Tests, Other Specified	2,935	605	4.9
A- D+	Transthoracic Echocardiography	2,050	1,685	1.2
A- D+	Blood Withdrawal, Unspecified	1,925	515	3.7
A- D-	Assessment By Uniprofessional Team Nec	50,315	10,970	4.6
A- D-	Assessment By Multiprofessional Team Nec	30,205	12,525	2.4
A- D-	Radiology of One Body Area (or < 20 Minutes)	26,785	15,760	1.7
A- D-	Tomography Evaluation of Retina	26,600	12,980	2.0
A- D-	Post-transplantation of Kidney Examination - Recipient	16,220	1,595	10.2
A- D-	Transthoracic Echocardiography	12,140	10,670	1.1
A- D-	Assessment By Multidisciplinary Team Nec	10,700	4,620	2.3
A- D-	Bilateral Operation	9,040	5,140	1.8
A- D-	Blood Withdrawal, Unspecified	8,320	2,955	2.8
A- D-	Injection Into Vitreous Body Nec	8,110	2,175	3.7

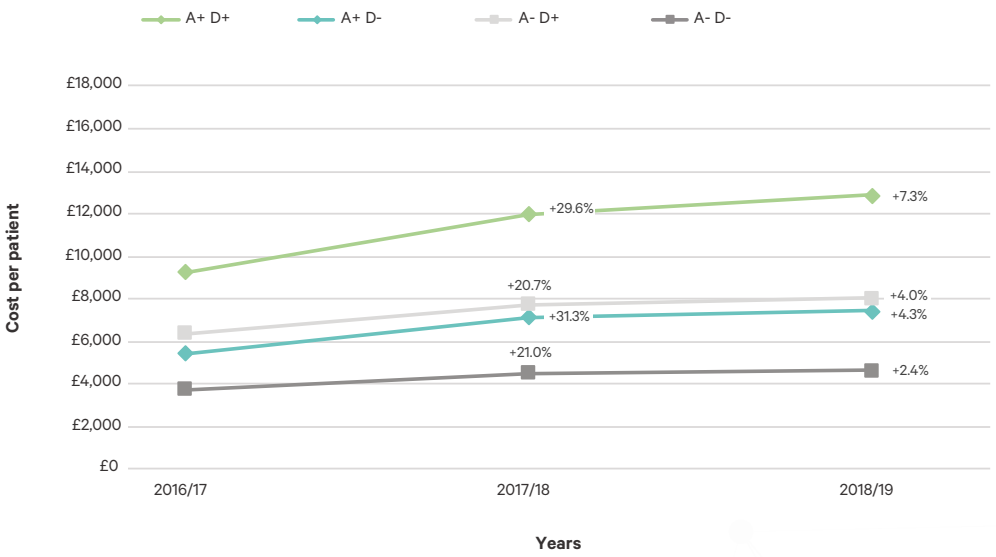


Figure 24

Three-year trend in cost per patient by group, including percentage change from previous fiscal year (national, non-elective admissions)

5. Regional data

5.1 Spell numbers by GIRFT region

Figure 25

Three-year trend in spell numbers by GIRFT region: A+ D+ patients, all admissions

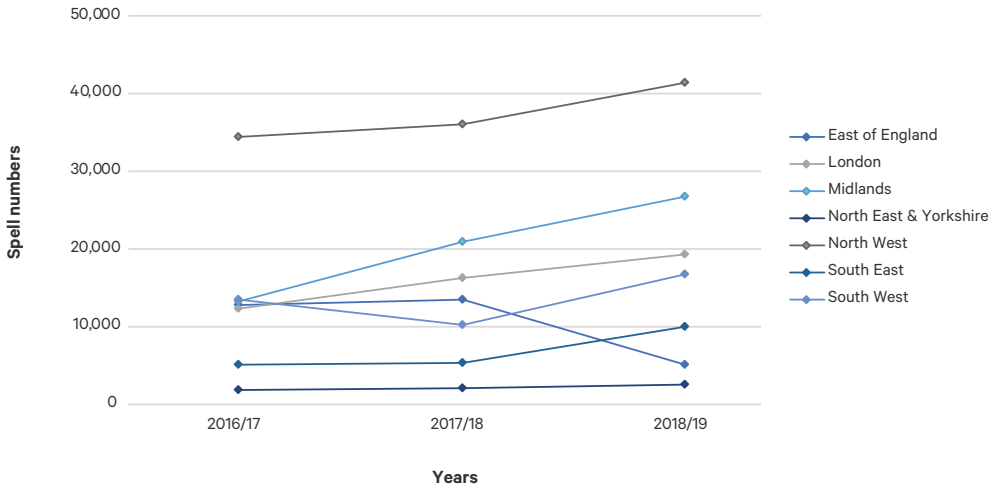


Figure 26

Three-year trend in spell numbers by GIRFT region: A+ D- patients, all admissions

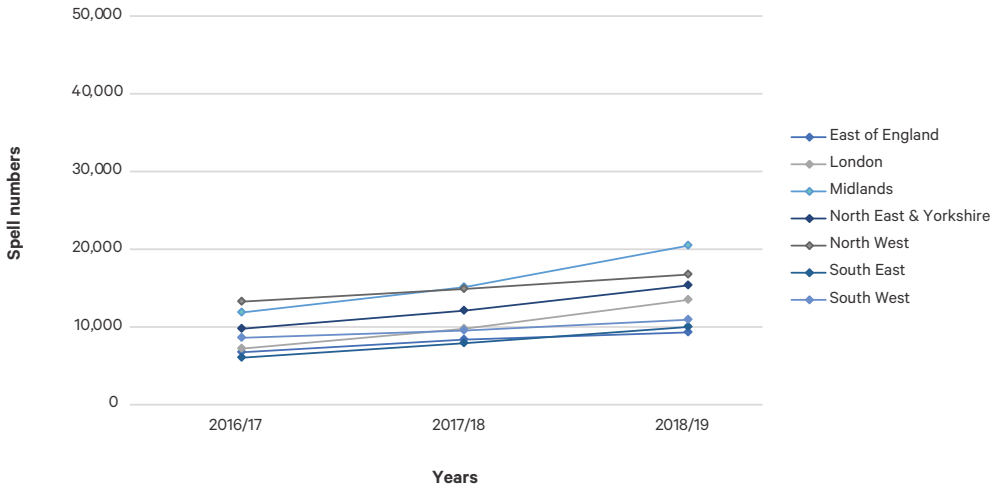


Figure 27

Three-year trend in spell numbers by GIRFT region: A- D+ patients, all admissions

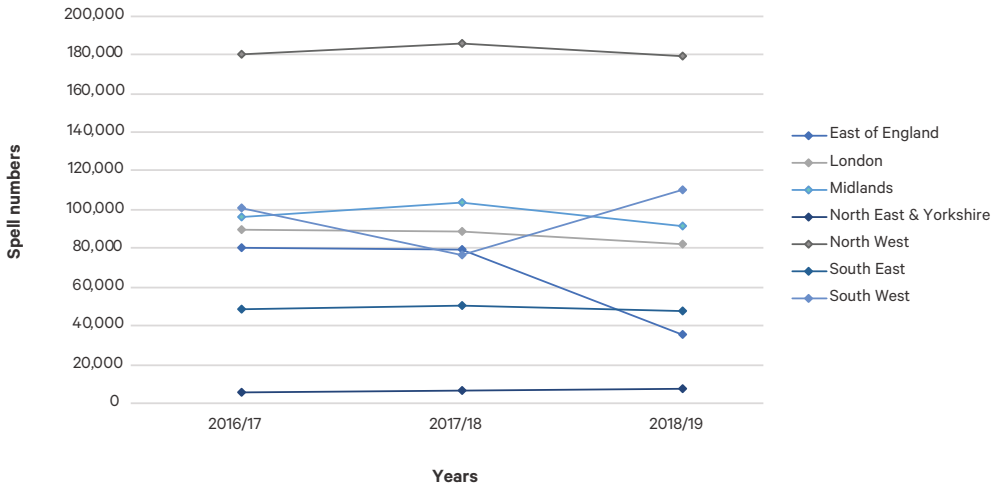
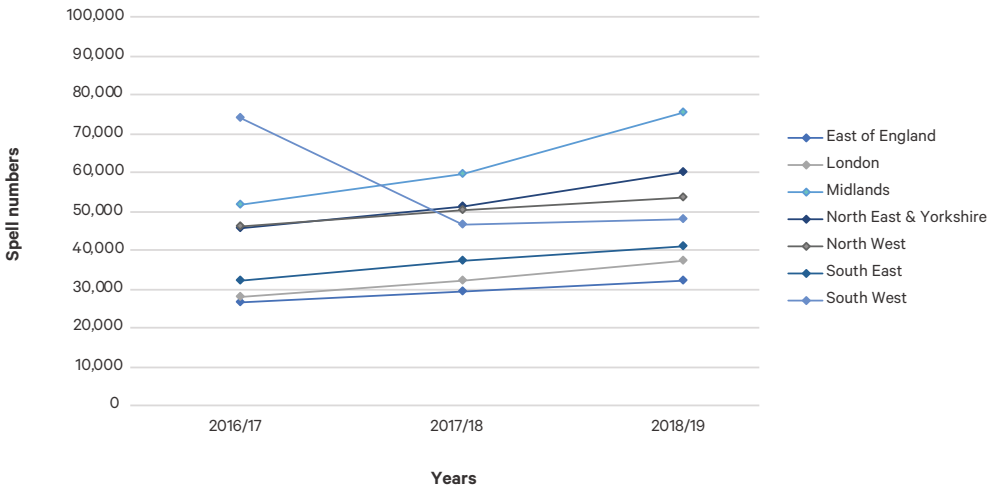


Figure 28

Three-year trend in spell numbers by GIRFT region: A- D- patients, all admissions



5.2 Spells per patient by GIRFT region

Figure 29

Three-year trend in spells per patient by GIRFT region: A+ D+ patients, all admissions

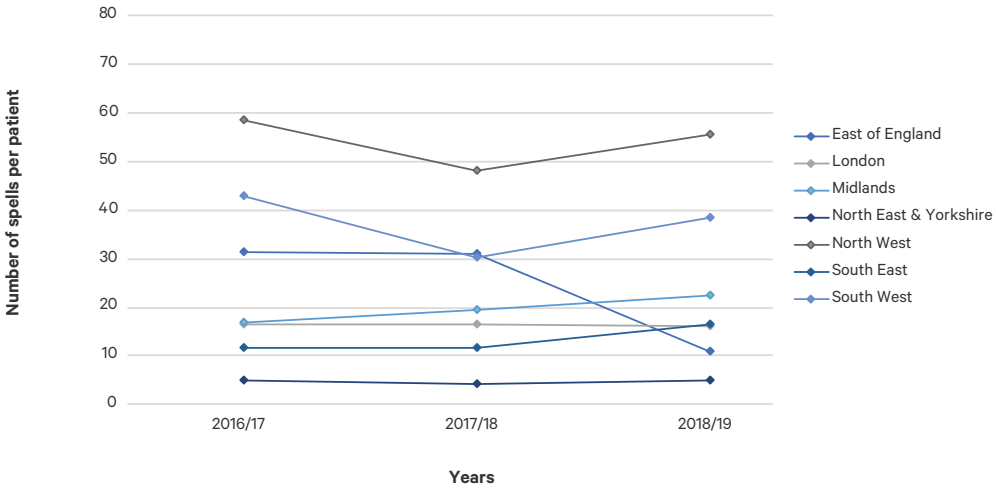


Figure 30

Three-year trend in spells per patient by GIRFT region: A+ D- patients, all admissions

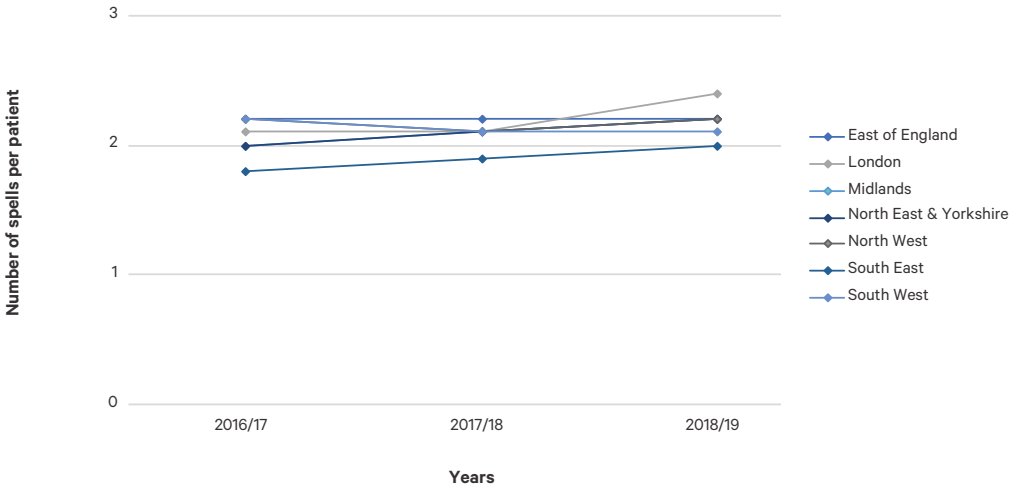


Figure 31

Three-year trend in spells per patient by GIRFT region: A- D+ patients, all admissions

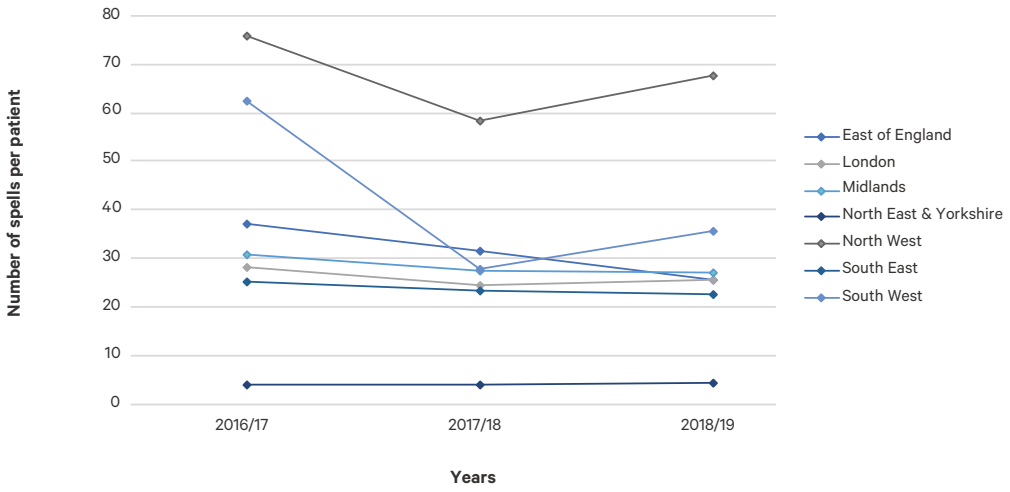
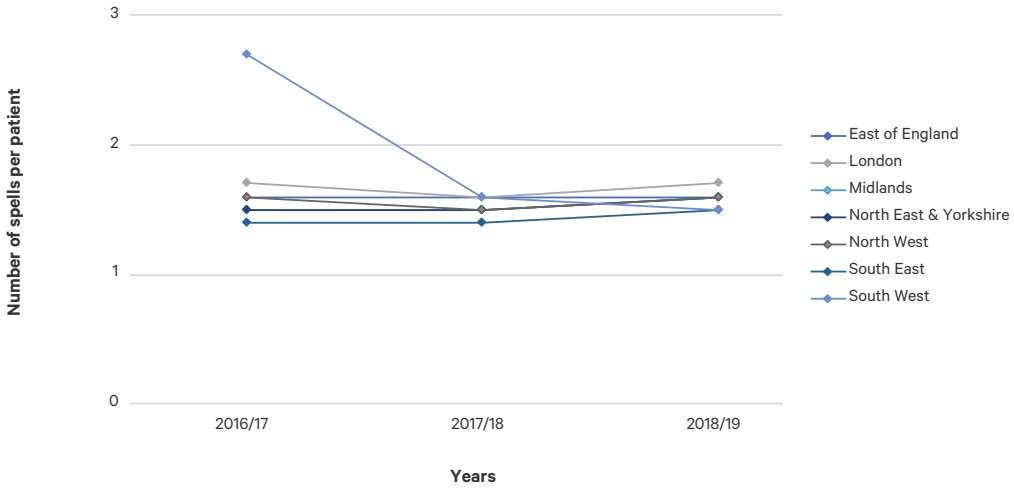


Figure 32

Three-year trend in spells per patient by GIRFT region: A- D- patients, all admissions



5.3 MLOS by GIRFT region

Figure 33

Three-year trend in MLOS by GIRFT region: A+ D+ patients, all admissions

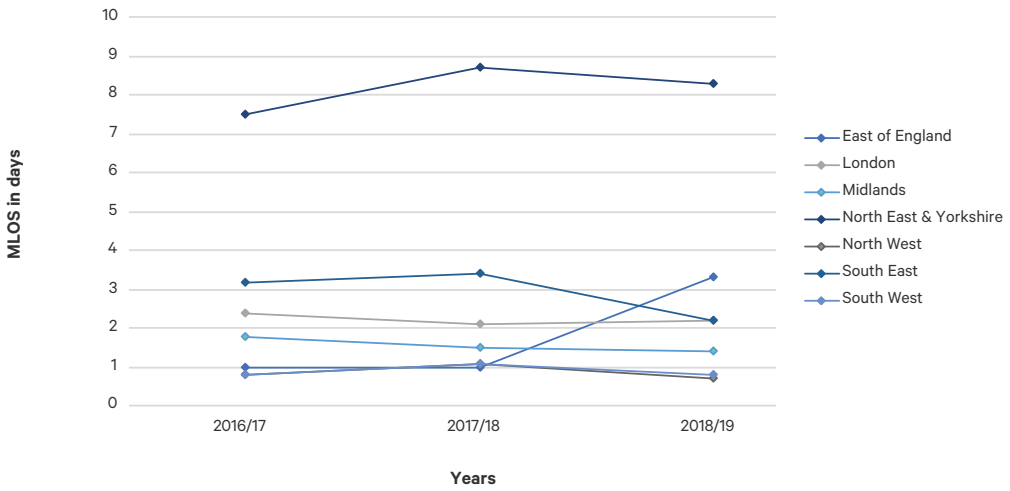


Figure 34

Three-year trend in MLOS by GIRFT region: A+ D- patients, all admissions

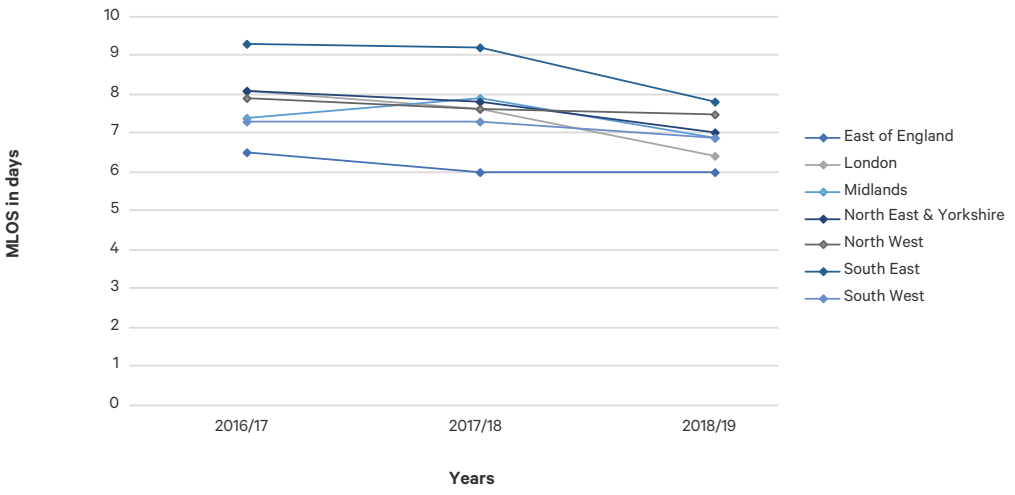


Figure 35

Three-year trend in MLOS by GIRFT region: A- D+, all admissions

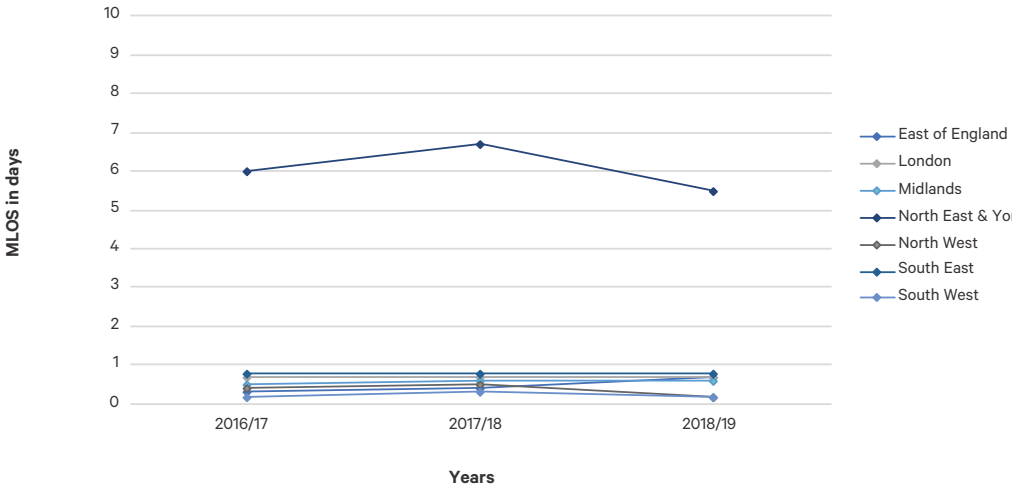
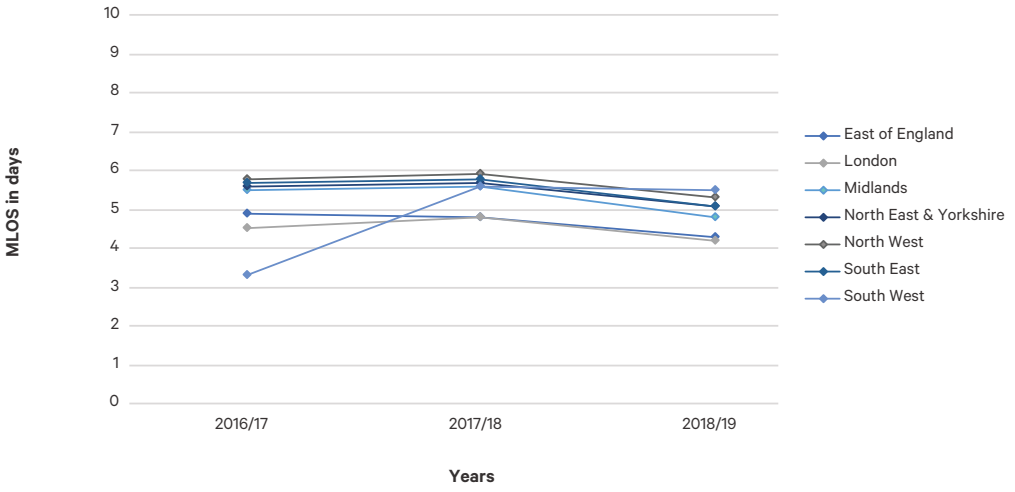


Figure 36

Three-year trend in MLOS by GIRFT region: A- D-, all admissions



5.4 Percentage change in MLOS over time by GIRFT region

Figure 37

Percentage change in MLOS over time by GIRFT region: A+ D+ patients, all admissions

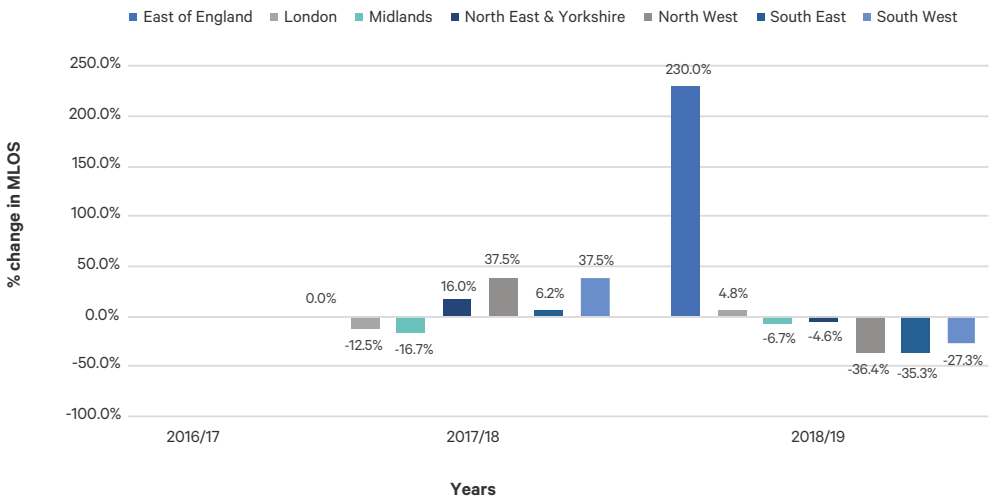


Figure 38

Percentage change in MLOS over time by GIRFT region: A+ D- patients, all admissions

Figure 39

Percentage change in MLOS over time by GIRFT region: A- D+ patients, all admissions

Figure 40

Percentage change in MLOS over time by GIRFT region: A- D- patients, all admissions

5.5 Cost per patient by GIRFT region

Figure 41

Three-year trend in cost per patient by GIRFT region: A+ D+ patients, all admissions

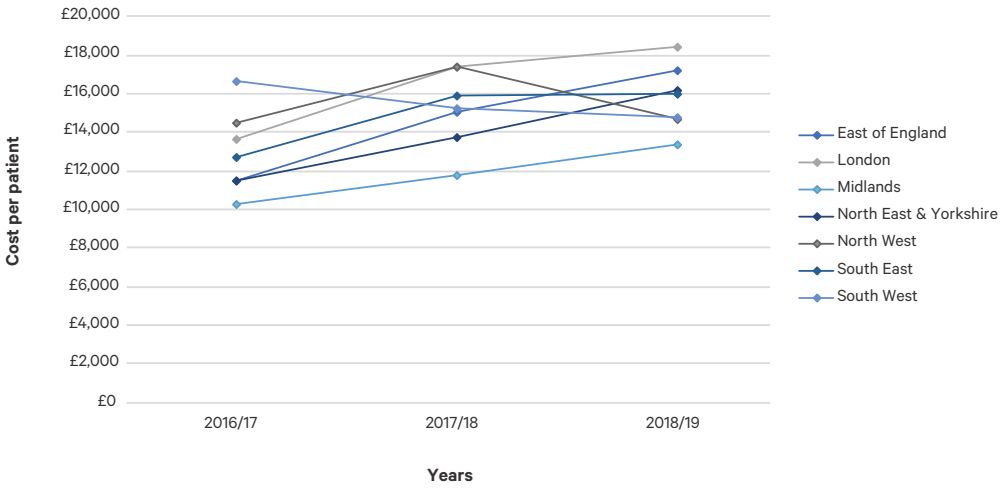


Figure 42

Three-year trend in cost per patient by GIRFT region: A+ D- patients, all admissions

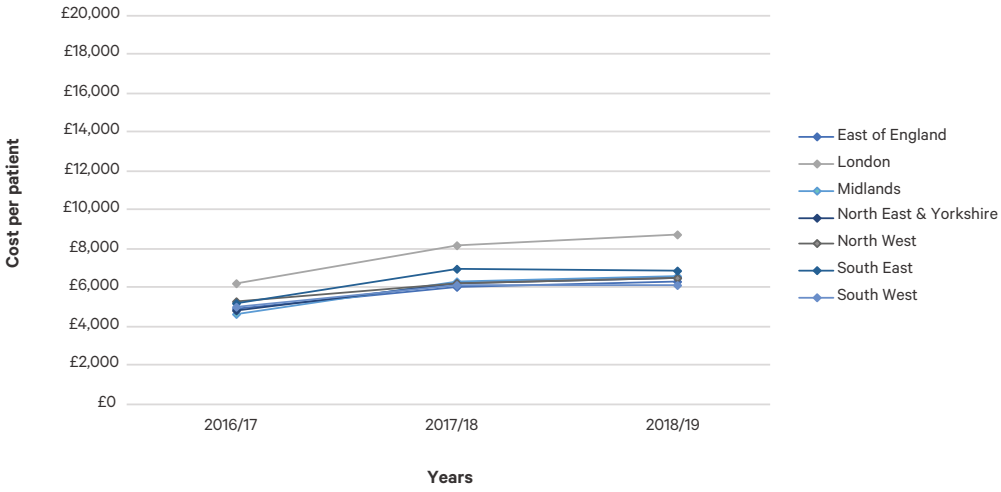


Figure 43

Three-year trend in cost per patient by GIRFT region: A- D+ patients, all admissions

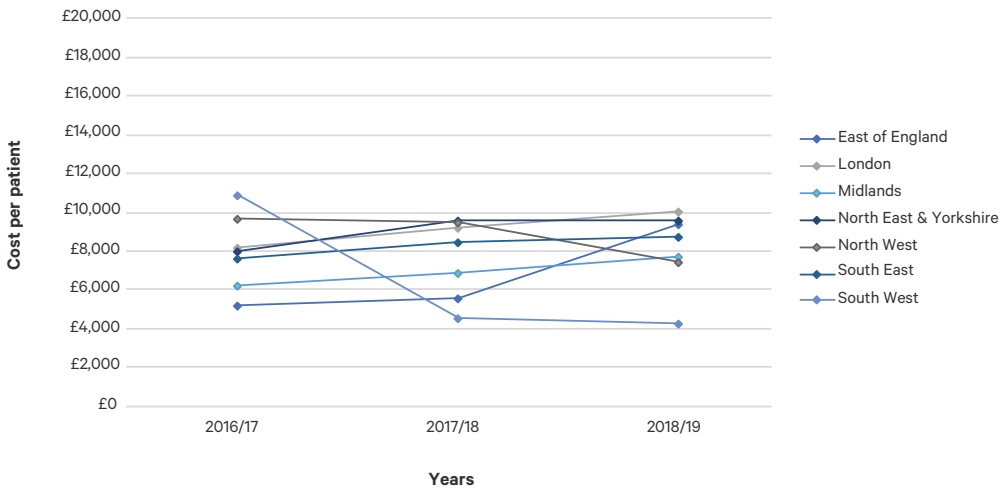
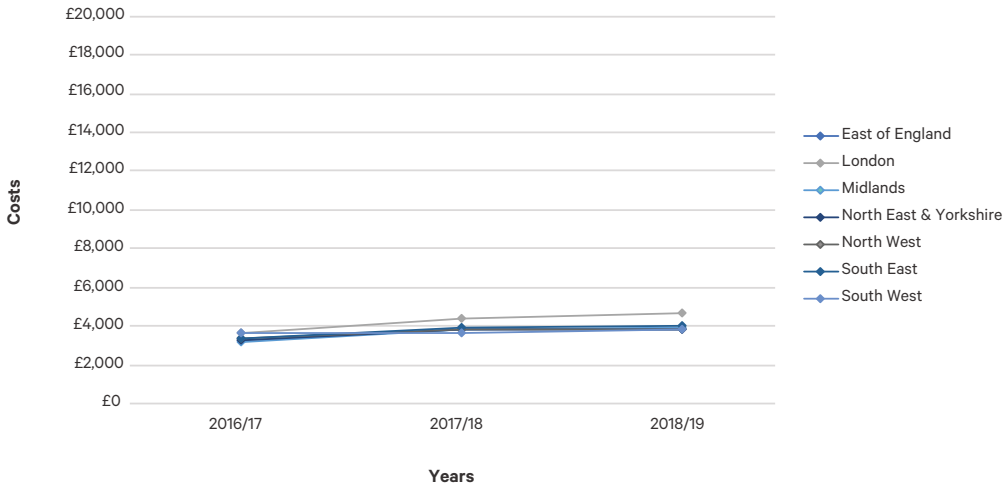


Figure 44

Three-year trend in cost per patient by GIRFT region: A- D- patients, all admissions



5.6 Percentage change in cost per patient over time by GIRFT region

Figure 45

Percentage change in cost per patient over time by GIRFT region: A+ D+ patients, all admissions

Figure 46

Percentage change in cost per patient over time by GIRFT region: A+ D- patients, all admissions

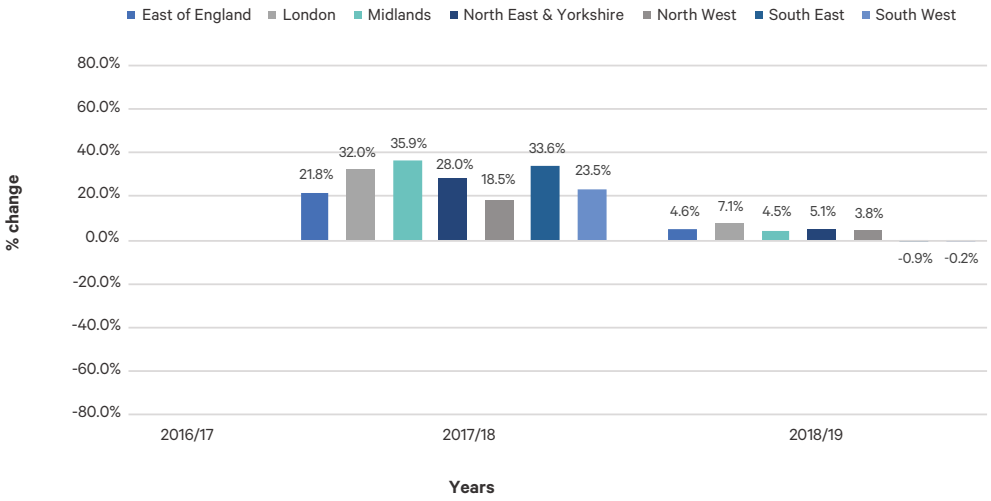


Figure 47

Percentage change in cost per patient over time by GIRFT region: A- D+ patients, all admissions

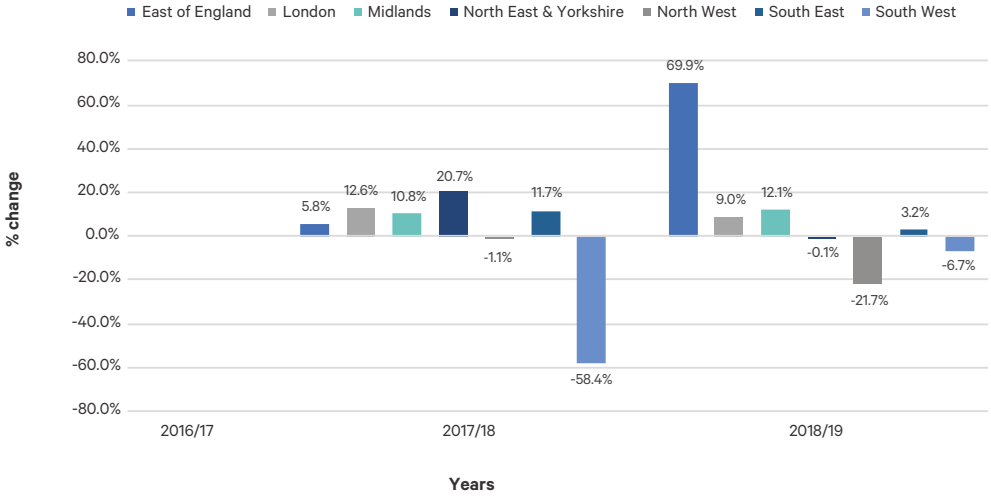
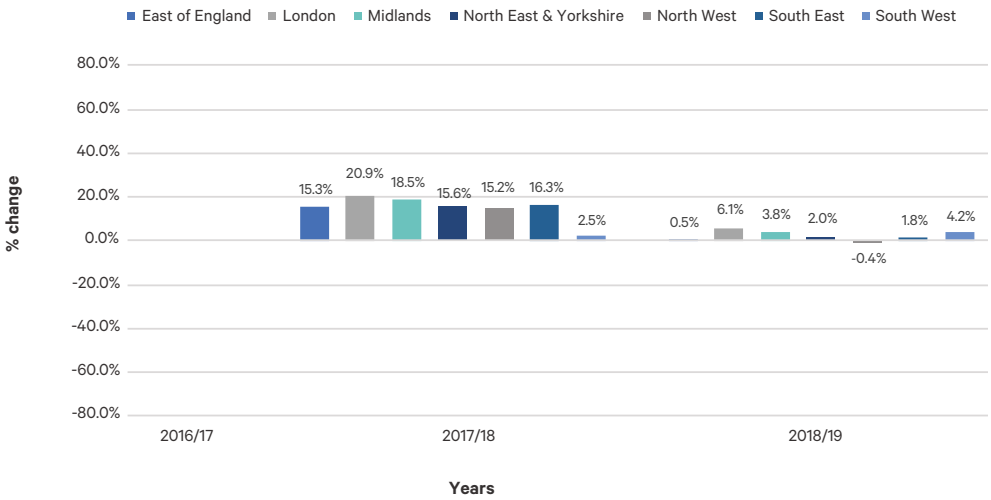


Figure 48

Percentage change in cost per patient over time by GIRFT region: A- D- patients, all admissions



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