Anaemia:
Opportunities in surgical care

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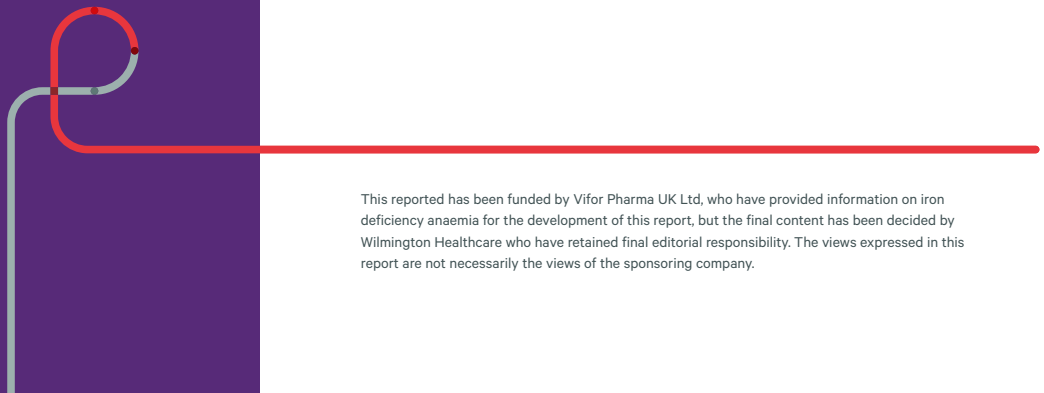

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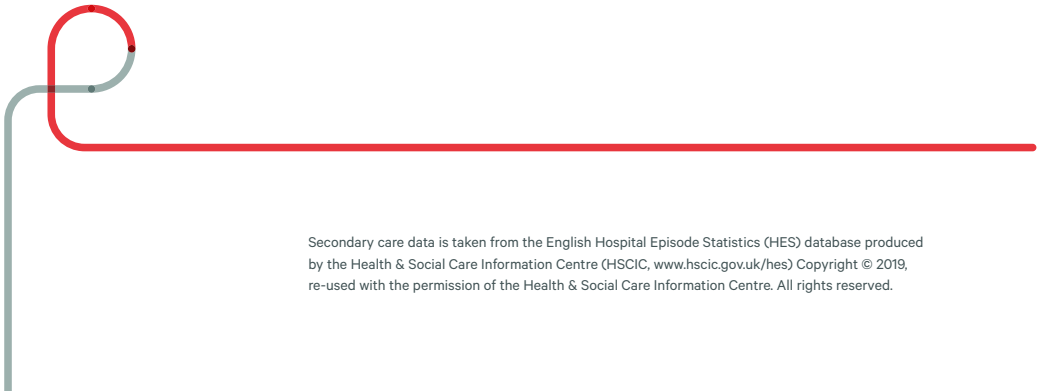

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Executive summary

This report aims to shed light on the rationale to treat Iron Deficiency Anaemia (IDA) and how to fund it while also urging NHS stakeholders to make anaemia a strategic focus. People with IDA are at higher risk of overall poor health and comorbidities, which can have a significant impact on NHS budgets. Early identification and treatment present a simple opportunity for both improving patient outcomes and generating efficiencies for the NHS.

"Strong evidence indicates that pre-operative anaemia is not simply an abnormal laboratory value; it is rather an important modifiable risk factor for peri-operative morbidity and mortality."

British Society for Haematology, 2015

The evolving NHS landscape

The commissioning landscape is changing through Sustainability and Transformation Partnerships (STPs) and Integrated Care Services (ICS) with a huge emphasis on place-based care (NHS England, 2019). Now is the time to prioritise treatment for individuals with IDA. Robust strategies are needed to help support commissioners to ensure more effective local service integration, provision of appropriate care pathways and quality measures so that improved patient outcomes are achieved.

In its Long-Term Plan (NHS England, 2019), the NHS committed to addressing the overwhelming burden of Ambulatory Care Sensitive Conditions (ACSCs), one of which is IDA. To achieve this goal, we need both a greater commissioning focus on identifying more individuals with IDA within primary care, screening them for and treating the condition as part of pre-operative care and ensure this is in line with the Getting It Right First Time NHS Improvement agenda which is currently developing a suite of best practice guidelines to uplift the quality of care.

Patient safety is at risk

IDA in patients who are about to undergo surgery is not yet fully recognised as an important health issue. These patients are at a higher risk of poorer outcomes, complications, and the need for blood transfusion, increased morbidity and longer hospital stays. (Richards, 2015)

Our call to action for commissioners, providers and healthcare professionals is to make strategic changes that will have a direct impact on quality improvement. Our 10-point plan lists steps that NHS stakeholders need to take to ensure that they are not missing opportunities to improve quality and outcomes for patients with anaemia and to reduce the burden on already strained budgets.

Proactive intervention is the priority

The importance of addressing IDA is advocated for by the Royal College of Anaesthetists (RCA) (RCoA, 2019), NHS Blood and Transplant (NHSBT, 2016), British Society of Haematology (British Society for Haematology, 2015) and NICE (NICE, 2019). Primary care plays an important role in this pathway by addressing anaemia, especially to help prevent individuals presenting with anaemia in the case of unplanned non-elective surgery when timelines may be tighter.

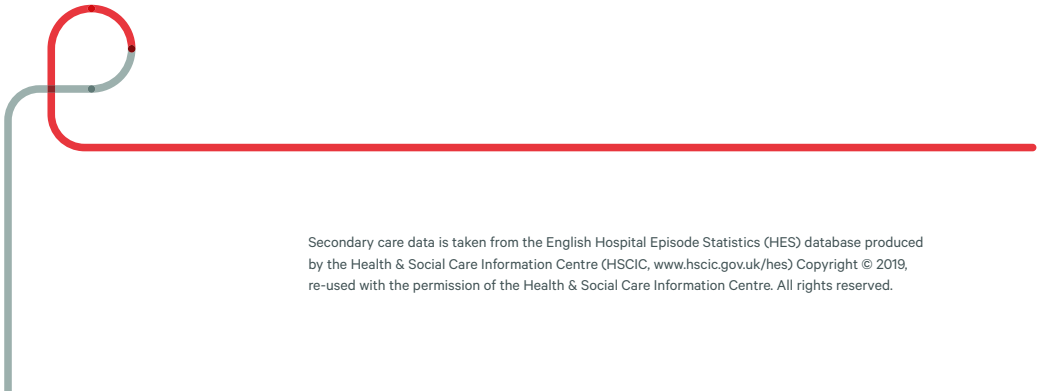
A practical way ahead

With competing demands on commissioners, why should the focus be on anaemia? Clinically and economically it makes sense to introduce and/or formalise simple pre-emptive care measures into existing care processes before patients with anaemia reach the point of needing blood transfusion. Blood is clearly a limited resource and ideally transfusion should be reserved for emergencies.

The data analysis of elective surgeries in this report shows that on average, admission spells for people with IDA cost £6,722 which is 38% more expensive than patients who are not recorded as having a history of IDA. Based on the variation in costs of these spells, a conservative estimate is that £26.5 million of savings are available to be made nationally each year if IDA were treated before a patient's hospital spell. However, if IDA is as prevalent as some sources suggest, nationally savings are more likely to be in the region of £250 million.

This report shows an analysis of HRG tariff information, the refund mechanism between commissioners and providers for care, which may be considered a more robust measure, demonstrates that £13.4 million of savings could be made for IDA patients as a direct result of the reduced complexity tariff for patients whose IDA is proactively treatment before their spell. This is a modest estimate and using more realistic IDA prevalence statistics the cost saving rises to £135.4 million annually – a material sum for commissioners to consider.

Taking action on IDA presents a major financial opportunity for clinical commissioning groups (CCGs). Simple steps begin with gearing pre-operative assessment pathways towards earlier anaemia diagnosis and intervention. As the gold standard, services should have a robust pre-operative assessment pathway in place that includes full anaemia assessment and management. Early diagnosis will improve patient outcomes and drastically reduces the NHS bill.



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1. Missed opportunities for NHS Stakeholders

Around 10 million people undergo surgery in the NHS each year (Royal College of Anaesthetists, 2019). NHS stakeholders are missing a number of opportunities to substantially improve the burden of pre-operative care 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.
Earlier detection will introduce significant savings and efficiencies into the NHS.

Pre-optimise patients for surgery

Get patients into the best condition possible ahead of their surgery by routinely testing for anaemia, to maximise the chances of success and minimise the risk of complications.

Integrate peri-operative care

Anaemia frequently slips through the gaps between surgical decision making and operative care itself. Establish joined-up peri-operative teams that oversee the whole journey a surgical patient takes.

Take advantage of pre-assessment clinics

Most patients already undergo pre-assessment before surgery. Anaemia assessment and pre-optimisation can easily be incorporated into these existing clinician contacts.

Maximise the benefits of timeframes for screening

Even for surgeries with the shortest waiting times, there is opportunity to diagnose and treat chronic conditions like anaemia. Ensure pre-assessment clinics are scheduled as early as possible.

Address healthcare inequality

Ensure that all patients undergoing surgery gets consistent access to anaemia screening. Primary care has an important role in proactively identifying patients at risk of becoming anaemic during surgery.

Establish a clear care pathway

Ensure that health care professionals have a clear roadmap to follow so that everybody understands the process for fulfilling screening and delivering treatment. driven up the percentage of patients receiving monitoring but contracts need to be for the whole pathway for certain patients e.g. with schizophrenia, not just for when they are inpatients within the community mental health team.

2. Commissioning for pre-operative anaemia management

From a commissioning perspective, it is important to tackle the rising burden that untreated anaemia places on NHS services. Analysis undertaken in 2019 by the authors identified over 300,000 people undergoing elective surgery in 2017/18 with an estimate that over 125,000 patients of these could benefit from improved outcomes. At a conservative estimate this would save the NHS £200m a year.

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

2.1 The current financial impact of anaemia

The cost burden of anaemia is a largely hidden one. At a national level we estimate that untreated anaemia among the elective surgical population is costing at least £200m a year. This makes anaemia intervention a good candidate for achieving straightforward cost savings.

Extensive analysis was carried out on patients with a recorded diagnosis of anaemia appearing in the HES data. HES is a records-based system containing details of all admissions, outpatient appointments and A&E attendances at NHS hospitals in England. HES data is designed to enable non-clinical secondary use. Recording of inpatient activity includes recording ICD-10 diagnosis codes to classify the causes of morbidity and mortality. There can be up to 20 diagnoses on a patient's admission record: the primary diagnosis is the main reason the patient was admitted to hospital e.g. heart failure and the secondary diagnoses are additional conditions (comorbidities) which the person has e.g. iron deficiency anaemia.

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Additional costs associated with IDA patients

1. Cost variance analysis between patients with IDA (IDA+) and without IDA (IDA-)

Based on 12 months of Hospital Episode Statistics (HES) data for England and Wales for the period 2017/18, this analysis highlights that the additional cost associated with per spell between an IDA+ and an IDA- patient is £1,838, which is 37.6% more expensive (see Table 1).

Follow-up spells for IDA+ patients are even more costly at £2,796 cost variance on average, and 43.9% more expensive than those for IDA- patients. It is also important to note that the rate of readmissions among IDA+ patients is much higher (8% compared to 4% of patients in the initial spell) which is indicative of the wider ongoing health complications of IDA and the additional costs to services.

Table 1
Costs for IDA+ and IDA- patient admission spells (HES data, 2017/18)

	IDA+ patients	IDA- patients	Average spell cost IDA+	Average spell cost IDA-	Spell cost variance	Spell savings if all IDA+ patients are pre-treated
Admission spells	12,450	295,180	£6,722	£4,884	£1,838	£22,877,457
Re-admission spells	1,290	14,920	£9,171	£6,375	£2,796	£3,606,494
Total						**£26,483,951**

If all IDA+ patients were to receive pre-treatment with iron, Table 1 shows that the national implications would amount to a cost saving of approximately £26.5 million. These calculations are based on the 4% IDA prevalence rate within this dataset.

However, this is likely to be a substantial underestimate. In their annual report 2017/18, the Perioperative Quality Improvement Programme (PQIP) (PQIP, 2019) states that 41% of patients were anaemic at the time of surgery (from a sample size >500).

Not only does this suggest that a large number of patients with IDA are not captured in secondary care coding, it also suggests that the true financial impact of untreated IDA could be far higher. Projecting from the costs in Table 1, a prevalence rate of 41% would increase the potential savings to over £250 million nationally.

However, it could be impossible to pin patient cost variances on a single variable, such as IDA, and so the figures in Table 1 serve only as a guide. Inevitably other perioperative factors are involved in the treatments, costs and outcomes for patients with IDA. Therefore, it is worthwhile to also look at IDA from a coding complexity perspective to assess the condition's direct impact on what commissioners pay.

2. Analysis of HRG cost variances between IDA+ and IDA- patients

For the 12,450 patients who had been coded as IDA+, all the HRG codes that had been recorded against these patient spells were reviewed. This analysis showed that out of these 12,450 codes, 9,800 were eligible for tariff cost reduction where the complexity is reduced due to the removal of the IDA factor, i.e. commissioners are charged less if IDA is treated before the spell.

Table 2
HRG coding savings associated with reduced complexity of IDA+ patients who receive treatment before spell.

	IDA+ patients eligible for HRG cost reduction	Spell savings if all IDA+ patients are pre-treated
Admission spells	9,800	£10,523,084
Re-admission spells	1,015	£2,838,848
Total		**£13,361,930**

This analysis is based on coding that is directly related to the costs that commissioners pay and so could be viewed as a more robust measure that directly correlates with IDA alone.

Again, extrapolating these figures as above using the 41% IDA prevalence estimate, the national cost savings rise from £13.4 million to £135.4 million annually – a material sum for NHS commissioners to consider.

3. Unit cost analysis

The most common treatment for IDA among the surgical population is a packed red cell transfusion (Clevenger, 2015). This expensive option because it entails the costs of processing, testing, storing and distributing, as well as those of administering red blood cell units. HES analysis performed on the average cost of all SA13 spells this is the HRG denoting Single Plasma Exchange, Leucophoresis or Red Cell Exchange in 2017/2018 was £495. Furthermore, patients receiving transfusion during major surgical intervention have poorer outcomes (Klein, 2016). Earlier intervention with more cost-effective treatments that carry lower overall risk are far more preferable. Efficacy is also a consideration; oral iron may not be effective in cases of inflammatory bowel disease, chronic kidney disease, intolerance, or when haemoglobin improvement is required in a short time span.

Using the difference in spell costs outlined in Table 1 for IDA+ patients, which is around £1,800 for the first spell and £2,800 for a readmission (with the caveat on this estimate mentioned above), how do these elevated costs compare with the unit cost of treating a typical IDA+ patient with iron therapy?

- IV Iron average costs over 4-6 weeks (pre surgery) will cost in the region of £150 -£450 per IV infusion (BNF, n.d.)
- Oral Iron average costs >6 weeks (pre surgery) will cost in the region of £5

Based on these figures, treating IDA+ patients with both types of iron therapy appears to be economically advantageous, compared to bearing the increased hospital spell costs for patients whose IDA is left untreated. Other patient variables play their part, but all things being equal, IV iron treatment is a more cost-effective option for commissioners. Investing in proactive anaemia treatment before patients develop complications, and certainly before undergoing surgery, makes good sense for everyone.

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Hospital admission analysis

Our analysis indicates that patients who have already been identified as anaemic prior to their elective surgery but not on treatment, cost on average £1,800 more than patients who are not recorded as anaemic. These costs arise from complications during their elective admission spell.

IDA+ consistently has a higher number of:

- Bed days
- Critical care days
- Comorbidity
- Readmission rate within 30 days
- Readmission length of stay

Overall the average cost per spell for an IDA- patient in the authors analysis was £4,884, whereas IDA+ patients cost £6,722 per spell which represents a 38% cost increase.

Proactive care delivers savings

Interestingly, the data analysis also found that during the six weeks leading up to the admission spell, 68.7% of IDA+ patients had an outpatient appointment. Despite this, less than 15% of these patients were coded for having been given IV iron treatment or a blood transfusion in the period during or six months prior to their admission. These findings indicate that there is a significant level of unexploited opportunity to intervene earlier.

Proactively addressing anaemia ahead of surgery could create an average saving of £1,838 per elective spell according to the costing estimate above. This saving is created by the overall reduction in resource consumption when complications caused by anaemia are eliminated.

A significant aspect of the cost saving is derived from reduced need for blood transfusions. In 2014/15 (NHSBT) issued 1.7 million units of red blood cells to hospitals in England and North Wales (NICE, 2015). These services are delivered in secondary and tertiary care and paid for by CCGs as part of the national tariff.

NICE estimates that implementation of their guideline on blood transfusion (NG24) would reduce the number of blood units required and has the potential to save between £146 and £689 per patient (NICE, 2015).

2.2 The current state of anaemia management

In spite of evidence for the increased risks associated with anaemia as early as 1970 (Lunn, 1970), it is frequently presumed that pre-operative anaemia does not entail an increase in a patient's risk. As a result, the condition is often overlooked in the pre-operative context (Munoz, 2015) This is reflected in the NHSBT's National Comparative Audit of Blood Transfusion which identified that although pre-operative anaemia management is improving gradually, only 50% of patients were being managed appropriately in 2016 (up from 46% in 2015) (NHSBT, 2016) . Despite the slow progress, most hospitals took part in the audit and so this provides a useful benchmark for measuring the pace of ongoing improvement.

In recent decades a body of evidence has accumulated that makes the case for pre-operative anaemia intervention. A recent meta-analysis including over 900,000 patients who underwent major surgical procedures (including a large number of orthopaedic operations) confirmed that pre-operative anaemia, even if mild, is an independent risk factor for poorer post-operative outcomes (Fowler, 2015).

Various clinical guidelines exist with recommendations for pre-operative anaemia. However, the transition from guideline recommendations to daily clinical practice and designated care pathways is currently far from realised. The paucity of clear anaemia management pathways is exacerbated by reduced timeframes between pre-assessment clinics and surgery. There is also a perception among staff that comprehensive screening for anaemia in all patients is too challenging to achieve.

Data from recent NHSBT and surgical audits show that time from booking till date of operation is on average at least two weeks, even in cancer surgery (NHSBT, 2016). Analysis in Section 5 suggests that for patients having elective surgery time frames are closer to 12 weeks. The purpose of pre-assessment is to focus on identifying patients where better optimisation needs to occur and, for the majority of patients, there is adequate time pre-operatively to address anaemia.

In a survey of 115 local leads for peri-operative medicine (Bougeard, 2017), a significant level of variation in practice was found and is another reminder of the current room for improvement. The local leads rated their top priorities in peri-operative care as: shared decision-making, peri-operative team development, frailty screening and its management, postoperative morbidity prediction, and primary care collaboration.

These findings very much tie in with general opinion that a more holistic approach to blood management is needed which utilises a collaborative approach between all peri-operative health professionals. Munoz and colleagues argue that a multi-modal and multidisciplinary approach to patient blood management should be adopted, to both reduce unnecessary reliance on blood transfusion and its attendant costs and risks. This approach has an emphasis on continuity of care and quality improvement for the patient (Munoz, 2017).

The authors highlight that stimulation of erythropoiesis to optimise pre-operative haemoglobin levels or correct post-operative anaemia constitutes one of the fundamental pillars of a patient blood management programme. Whenever feasible, pre-operative anaemia should be corrected before an elective major surgical procedure. This may entail re-scheduling surgery, if possible, to allow for adequate timeframes for patients to fully benefit from undergoing surgery with optimised haemoglobin. (Munoz, 2017)

Certain groups of people are at elevated risk of being anaemic and should be specifically targeted for intervention if surgery is likely. This includes pre-menopausal women, people who are frail, elderly or with poor nutrition, and those with other long-term health conditions. Currently without clear primary care and peri-operative anaemia care pathways consistently in place around the country, these groups of people are at particular risk of suffering adversely (and avoidably) as a result of untreated anaemia.

2.3 Models of good practice

Integrated care system: Buckinghamshire ICS

The Buckinghamshire ICS sits within the Berkshire West, Oxfordshire, and Buckinghamshire Sustainability and Transformation Partnership (STP), with which it shares priorities. The ICS group set out to embed perioperative medicine best practice in major surgery pathways (RCoA, 2019). The priority for them was to prevent surgical site infections using the protocol below, drawing on an established ERAS+ pathway developed in Greater Manchester that incorporates coordinated pre- and post-operative interventions.

Presentation:
Once patients are identified as needing major surgery theyare reviewed by the hospital perioperative surgery team. They are made aware of ERAS+ including training for surgery, smoking cessation advice, Surgery school and anaemia management.

Surgery school:
60-90 minute session covering training for major surgery (chest training, physical activity, nutritional preparation, smoking cessation), what to expect after surgery including pain management and recovery in hospital and at home by preoperative and special nurses and surgeons.

Surgery:
Advice about what their surgery involves, how long they are expected to remain in hospital after surgery and what to expect on each day of their live in hospital recovery.

Recovery:
This recovery package will initially focus on adapting to returning home and what to expect. There will then be a strong focus on returning to normal activities.

Discharge:
Record patient outcomes after surgery and determine satisfaction with the pathway.

Part of the pathway involved giving patients information about how to prepare for and recover from surgery (RCoA, 2018). As a result of implementing this pathway, the ICS achieved a halving of post-operative chest infections, reduced average length of stay by three days, and made savings of £500,000 a year.

Pre-operative anaemia project: North West of England

North West region of England is driving forward to implement pre-operative anaemia management into everyday practice, so that no scheduled patient with treatable anaemia comes to surgery without an attempt to correct the anaemia. A wealth of pathway and template resources are available to use (RCoA, 2019).

Reduced blood transfusions: Oxford University Hospitals

NICE's national costing statement for blood transfusion describes how Oxford University Hospitals implemented an electronic transfusion system to optimise blood management and reduce unnecessary transfusions (NICE, 2015). As a result, they achieved a combination of cash-releasing savings and productivity savings: gross savings of £920,000, £420,000 of which were cash-releasing. Expenditure on blood decreased by 10% because access to blood is much quicker, meaning less blood is ordered and then wasted. Productivity savings are through reduced nursing/laboratory time.

After taking account of the service contract and system manager the net realisable savings are £28,000, or £4,561 per 100,000 population. There are also productivity savings of £500,000. Also noted are the potential savings from avoiding very costly treatment associated with ABO incompatible blood transfusions (the most serious type of wrong blood transfusion event). There have been no ABO incompatible red cell transfusions at Oxford University Hospitals in the four years during implementation of electronic transfusion system and the four years after full implementation. Approximately 230,000 red cell units were transfused in this period; the benchmark based on national data from the Serious Hazards of Transfusion (SHOT) scheme for the same period is 1 in 183,000 red cell units.

Enhancing patient responsibility

Public health messages about individual responsibility for health and wellbeing is another important factor in managing anaemia. The major responsibility for this is in primary care, where preventative measures for reducing and managing chronic diseases, especially ASCSs, plays the biggest role of all. Primary care that effectively encourages self-care support and consistent management of long-term conditions, as well as encouraging and supporting lifestyle change, has the scope to make a large impact on the overall burden of anaemia on all services. However, to achieve this commissioning must enable continuity of GP care, effective local primary care arrangements, and easy access to urgent advice especially for people with long-term conditions. It is essential that primary care practitioners make people aware of the importance of their iron status on their broader health and to encourage patients who are undergoing surgery to check that their haemoglobin levels have been tested in advance.

2.4 An integrated care pathway framework for anaemia

Analysis of the patient cohort highlights the impact that iron deficiency anaemia has on the costs and health outcomes of patients undergoing elective surgery. Services would benefit from addressing, identifying and treating individuals at an earlier stage before the onset of comorbidities.

In its 2012 report, the King's Fund highlighted that high levels of admissions for ACSCs, such as anaemia, often indicate suboptimal co-ordination between the different elements of the healthcare system, in particular between primary and secondary care (King's Fund, 2012). This is the reason why an integrated framework for anaemia care across services is vital.

A peri-operative anaemia pathway is aimed at optimising a patient's haemoglobin levels, especially those at risk of losing more than 500ml of blood during surgery. This has application for both elective and non-elective surgery. Even for patients having surgery at very short notice, such as within the cancer two-week wait timeframe (NHS England, 2018) or for rapid unplanned surgery, the benefits of ameliorating IDA are substantial.

What groundwork is needed for developing an anaemia pathway?

Before developing an integrated care pathway, it is important to be equipped with:

- Your local data – to understand the nature and scale of what a pathway needs to manage. This should include: incidence of anaemia, average peri-operative haemoglobin level drop, patient blood management details, transfusion rates, length of stay, critical care admissions. How many patients will the pathway likely need to handle?
- The right people – consult with anaesthetists, haematologists, gastroenterologists, nephrologists, surgeons, transfusion nurses, pharmacists, GP, commissioners, laboratory assistants. Speaking to the multidisciplinary group of professionals will help to identify where the bottlenecks are in the system and how the service can be streamlined.
- Your local anaemia expenditure – where do these lie? Which types of iron treatment are being used? What services are currently delivering treatment? What are the costs associated with delivering treatment?
- Highlight areas that can deliver the biggest impact – such as strategies that focus on patient groups with a particularly high risk of needing non-elective or rapid elective or surgery, or patients at particular risk of recurrent IDA might benefit from a small prophylactic dose for instance.
- Gather enough information to create a business case – along with the points above, what other information could help to create the most persuasive case that changes to the service would deliver a cost saving? Draw on tried and tested examples of good practice to support your proposal. Highlight the quality indicators required and the remuneration available.

Map your integrated care pathway

Create an agreed roadmap for anaemia management for all health professionals across primary, secondary, and tertiary care, as well as commissioners to agree on. The authors of the report have suggested a roadmap in Figures 3 and 4 below as possible examples.

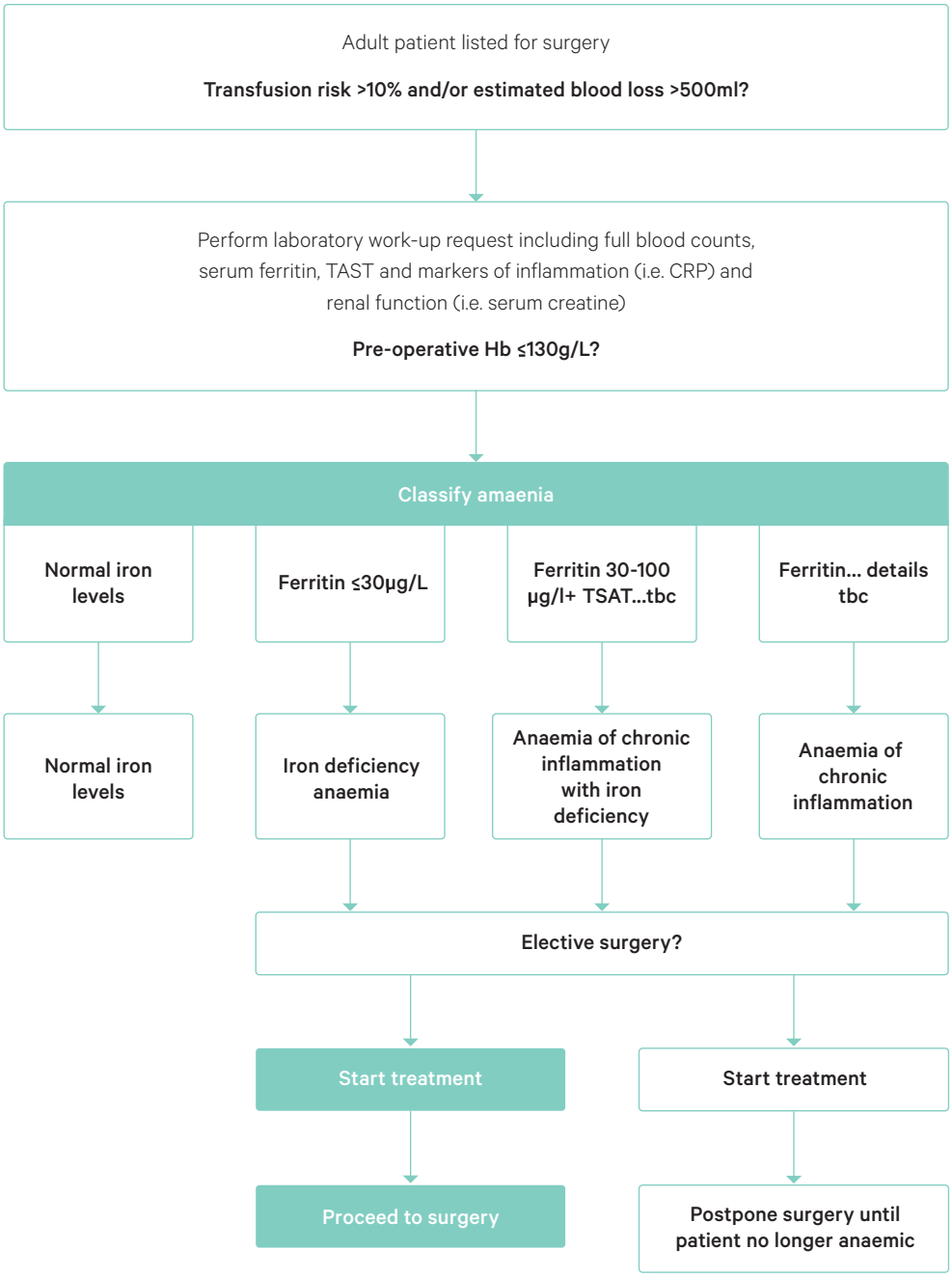

Fig 3
Diagnosis and management of peri-operative anaemia in surgical patients

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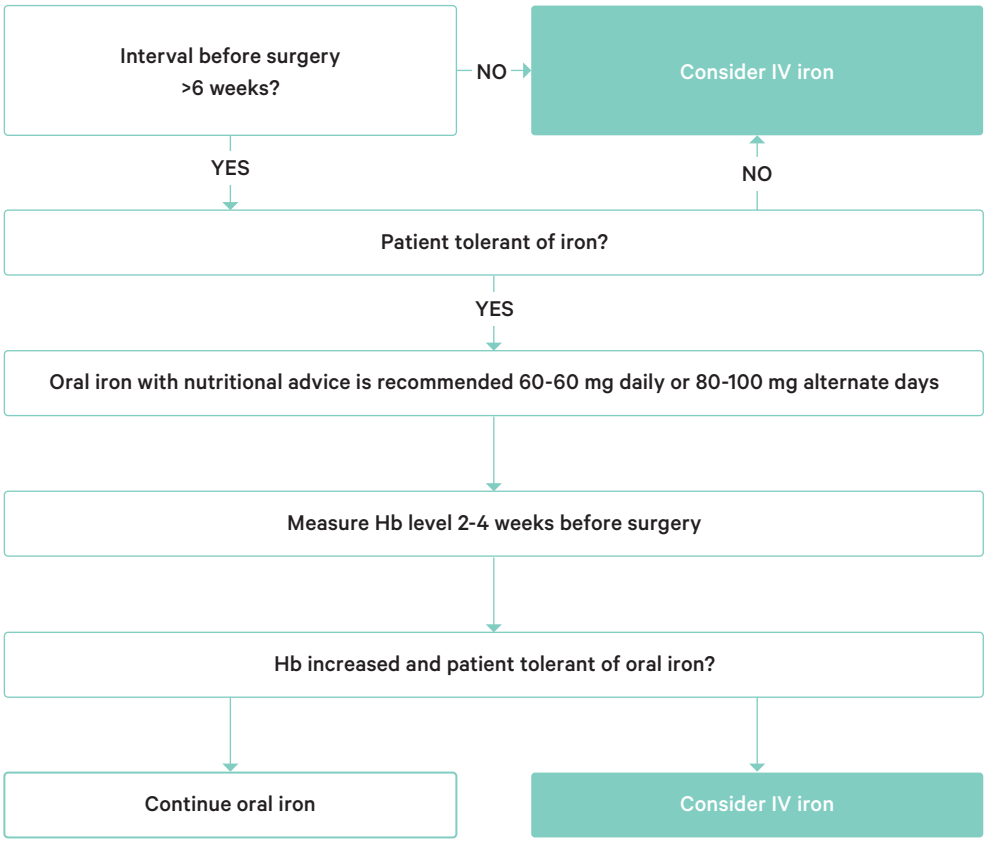

Fig 4
Management of patients with IDA

When building a pathway, the authors recommend the following are considered:

- Review diagnostic and treatment protocols for IDA, both within the community and in hospital, in order to decrease the cancellation rate for elective admissions and re-admissions following surgery.
- Re-examine ways in which primary and specialist care can be better aligned, particularly in the follow-up of patients discharged after elective admissions.
- Ensure that quality standards in IDA are met (e.g. those proposed by the British Society of Gastroenterology (Goddard A, 2011).
- Offer appropriate diagnostic work-ups for all patients with suspected IDA, including screening for other co-morbidities. This is to ensure that the pre-operative protocols include the screening of patients for potential IDA.
- Provide all IDA patients with appropriate iron replacement therapy, bearing in mind comorbid conditions and the safety, efficacy and cost of available treatment options.
- Ensure that all patients who do not respond to treatment are considered for further investigation.

3. Data analysis: Elective surgery and IDA

Prioritising anaemia in the perioperative care pathway has the potential to significantly streamline the surgical experience for many patients. The cost of treating IDA prior to surgery is minimal compared to the costs of post-operative complications. From a patient perspective, proactive identification and treatment of IDA is far preferable to risking the consequences of untreated IDA.

To address IDA, it is essential that commissioners fully understand the impact that the condition places on elective surgery spells and local budgets. We have analysed data from a cohort of patients undergoing elective surgery in 2017/18 to assess the impact of anaemia on the post-operative outcomes for these patients.

3.1 Patient cohort

Our analysis relates to patients who had an elective admission in 2017/18 for a number of surgical HRGs. This uncovers recent trends and costs of anaemia in this population. HRG stands for Healthcare Resource Group and is how providers are refunded for their Payment by Results (PbR) activity.

3.2 Patient cohort characteristics

The patient cohort consisted of 307,625 individual adult patients who had an elective (inpatient and day case) spell between 1 April 2017 and ending by 31 March 2018 coded with any HRG from eight commonly occurring surgical HRG groups. The areas examined were similar to the National Comparative Audit (NHSBT, 2016).

The HRGs were separated into eight groups in five surgical specialties: orthopaedic, cardiothoracic, gynaecology, vascular and urology. Patients with these HRGs were examined for the three-month period prior to their HRG spell to see if they had a previous diagnosis of IDA in their inpatient history.

Patients were then split into those who had IDA in their history (IDA+) and those who did not have IDA in their history (IDA-) and also split into age brackets for further analysis.

Of the 307,625 patients, 96% were IDA- (295,180) and 4% were IDA+ patients (12,450) (see figure 5). The majority of patients in both groups were female (55.5% and 69.4% respectively; see figure 6). The Perioperative Quality Improvement Programme (PQIP) (PQIP, 2019) states that 41% of patients were anaemic at the time of surgery (from a sample size >500).

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3.3 Elective admissions

317,035 HRG spells of elective admission to hospital were recorded amongst the patient cohort for the HRG codes under examination. Of the 12,450 IDA+ patients with IDA, these most commonly appeared in the HRGs for orthopaedics: knee (28%), orthopaedics: hip (25%), and gynaecology (20%). Figure 8 shows the full HRG distribution of the cohort.

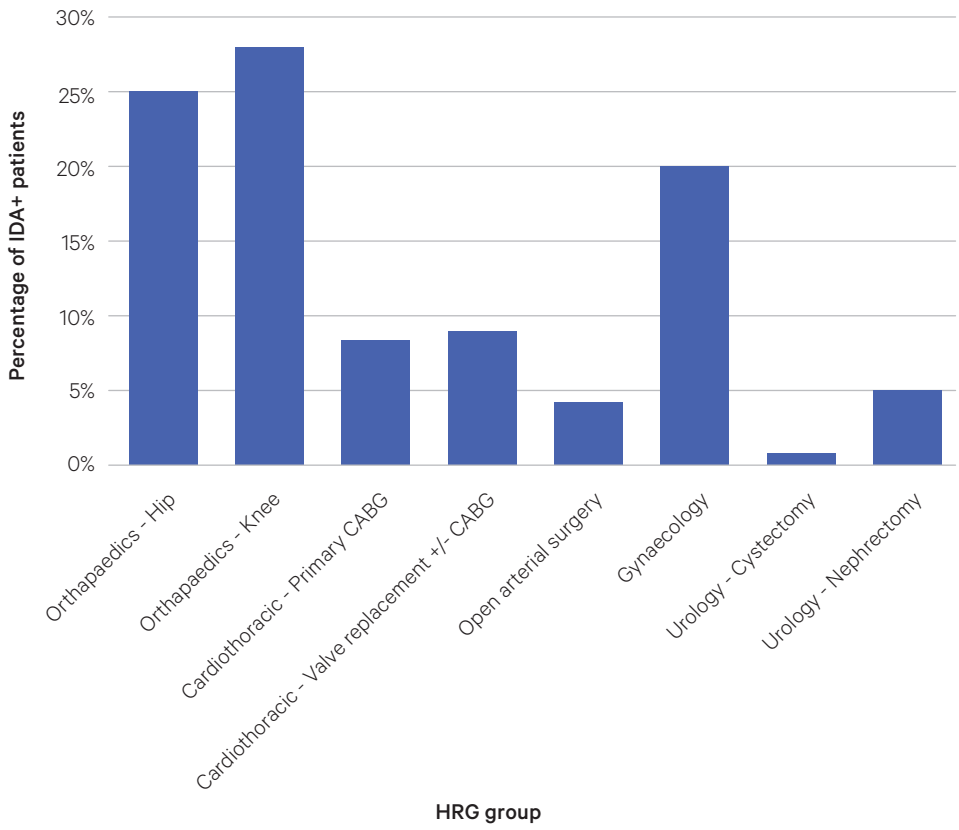
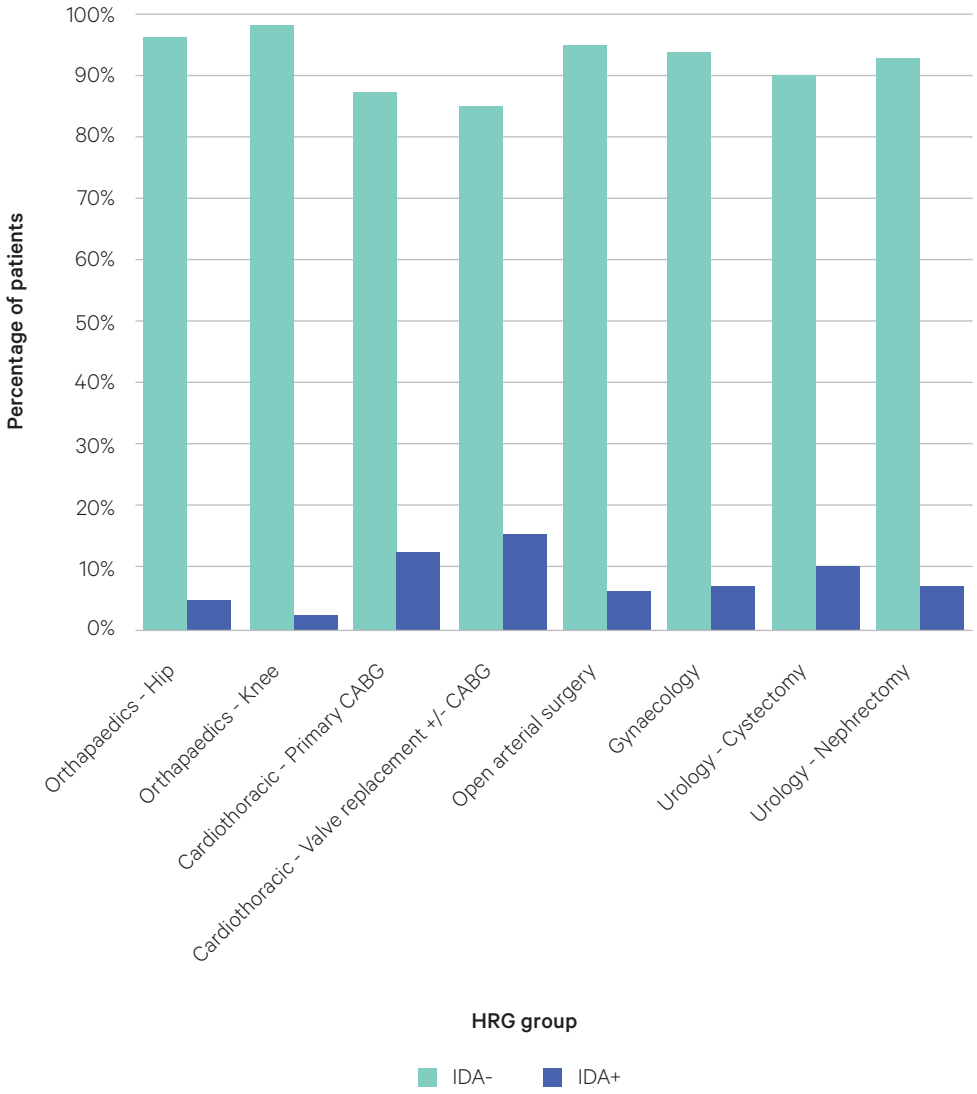


Fig 5
Percentage of IDA+ patients by HRG group

However, for each individual HRG cohort, the HRG with the highest proportion of IDA+ patients was cardiothoracic valve replacement +/- CABG (15%), followed by cardiothoracic primary CABG (12%), and urology – cystectomy (10%; see figure 5).

Fig 6
Percentage of IDA+ and IDA- patients by HRG cohort



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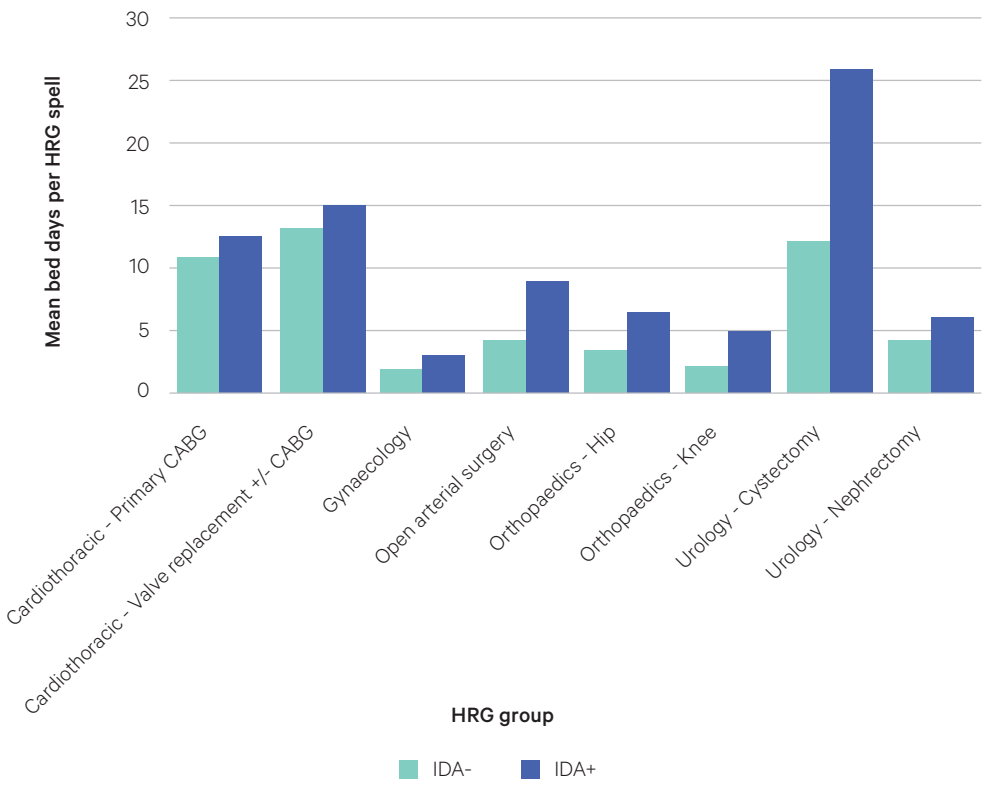
3.4 Trends among IDA+ patients

Although IDA+ patients are in the minority, this group has a higher average number of bed days per spell for every HRG cohort compared to IDA- patients (see figure 7). The overall mean bed days per spell for IDA+ patients undergoing elective surgery in the 2017/18 cohort was 5.83 days compared to 2.77 days for IDA- patients. For some HRG codes the Length of Stay for IDA+ patients is more than double that of the IDA- patient group. Most notably, for patients undergoing urology cystectomy surgery, IDA+ patients spent 26.4 bed days per spell on average, compared to 12 days among IDA+ patients. This data has implications for patients as they are more likely to have longer stays in hospital if they have IDA; it also has implications for hospitals on their throughput of patients within the hospital.

Fig 7
Mean bed days per HRG spell

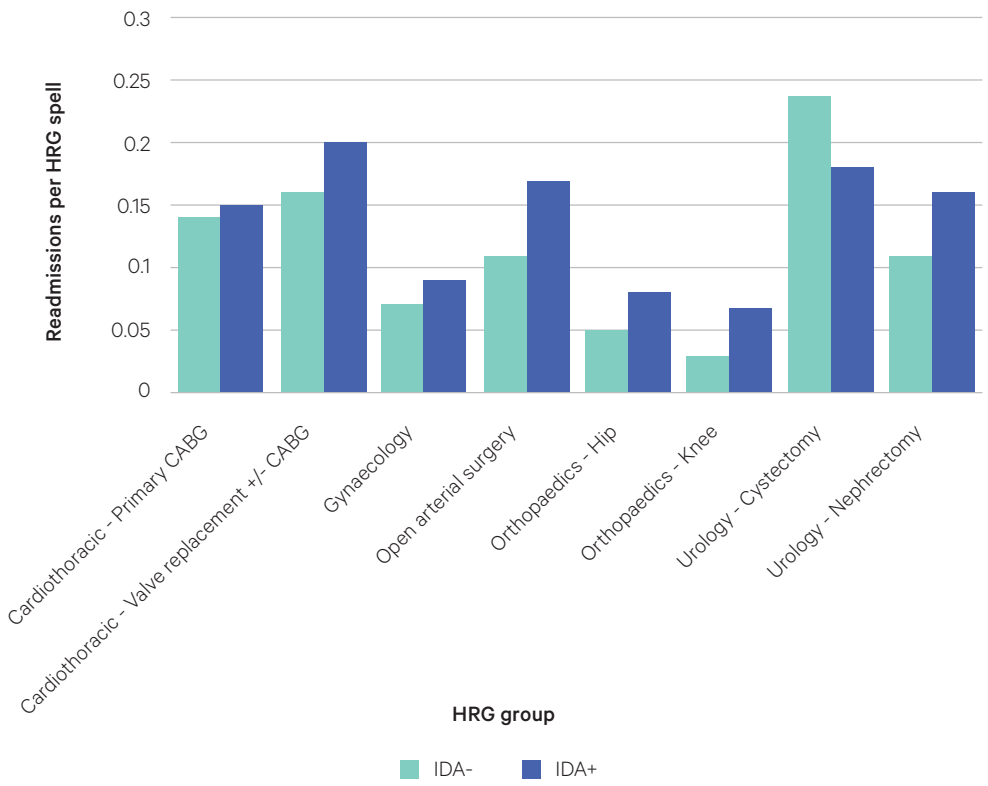


For every HRG cohort, IDA+ patients had a higher mean cost of spell: £6,722 as compared to £4,884 for IDA- patients. This represents a 38% increase in commissioner cost for IDA spells.

Table 8
Average indicative cost per spell

HRG Type	Mean cost per spell	
	IDA-	IDA+
Cardiothoracic - Primary CABG	£8,723	£10,772
Cardiothoracic - Valve replacement +/- CABG	£10,953	£12,927
Gynaecology	£2,877	£3,239
Open arterial surgery	£5,674	£7,945
Orthopaedics - Hip	£5,774	£6,775
Orthopaedics - Knee	£4,478	£6,275
Urology - Cystectomy	£9,022	£11,136
Urology - Nephrectomy	£6,048	£7,219

Fig 9
Average readmissions per HRG spell



Of the 317,035 spells recorded, 16,210 (5%) were readmitted within 30 days. Overall, IDA+ patients had a readmission rate of 0.10 versus 0.05 for IDA no patients.

Every HRG cohort except urology-cystectomy had a higher number of 30-day readmissions per spell for patients with IDA. Notably, the orthopedic-knee readmission rate was over double among IDA+ patients.

Below are the average costs of readmission for each HRD group, again IDA+ patients readmit more frequently and their mean costs per admission are higher. The cost details are set out below in Table 10.

Table 10

HRG Type	Mean cost per readmission spell	
	IDA-	IDA+
Cardiothoracic - Primary CABG	£11,395	£14,272
Cardiothoracic - Valve replacement +/- CABG	£14,963	£18,894
Gynaecology	£2,960	£3,404
Open arterial surgery	£6,829	£8,529
Orthopaedics - Hip	£6,150	£7,380
Orthopaedics - Knee	£5,566	£6,953
Urology - Cystectomy	£10,539	£10,620
Urology - Nephrectomy	£6,766	£7,996

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Of the 307,625 patients recorded, 216,275 (70.3%) patients had an outpatient appointment in the six weeks before their surgery. The proportion of IDA yes patients who had an outpatient appointment was comparable to that of the overall dataset: of the 12,450 IDA+ patients, 8,550 (68.7%) had an outpatient appointment during this pre-operative period.

Looking at individual HRG codes, a similar number of patients have outpatient appointments in their specialty of HRG spell, or anaesthetics in the six weeks prior to their HRG spell.

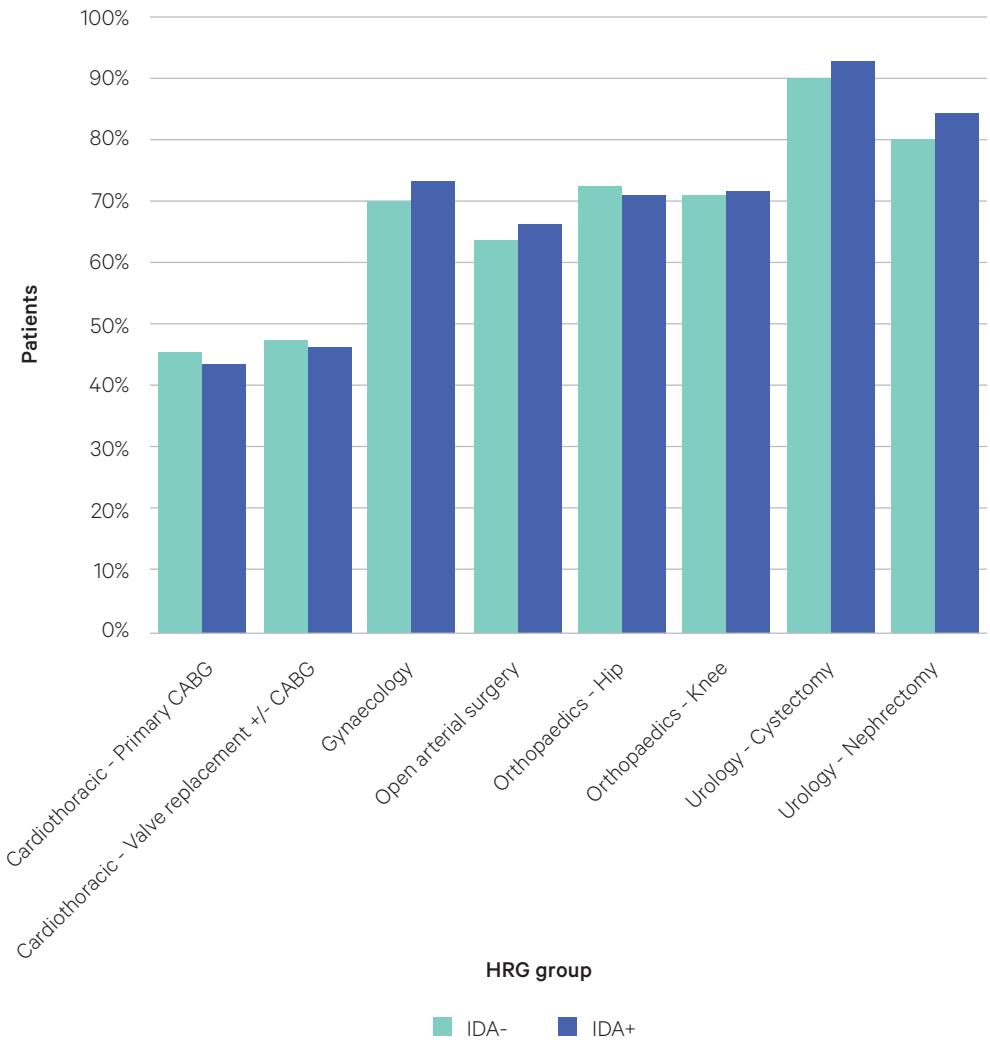

Figure 11
Percentage of patients who had an outpatient appointment in the six weeks prior to their HRG spell

Despite the majority (68.7%) of IDA+ patients being seen in outpatients six weeks prior to their surgery, less than 15% of IDA+ patients were given IV iron or blood transfusions during, or 6 months prior to, their HRG spell.

The analysis shows that the overall average elective surgery waiting period per spell is 83.7 days, and 85.1 days for IDA+ patients. This suggests that there is ample time during waiting periods to screen for and treat anaemia.

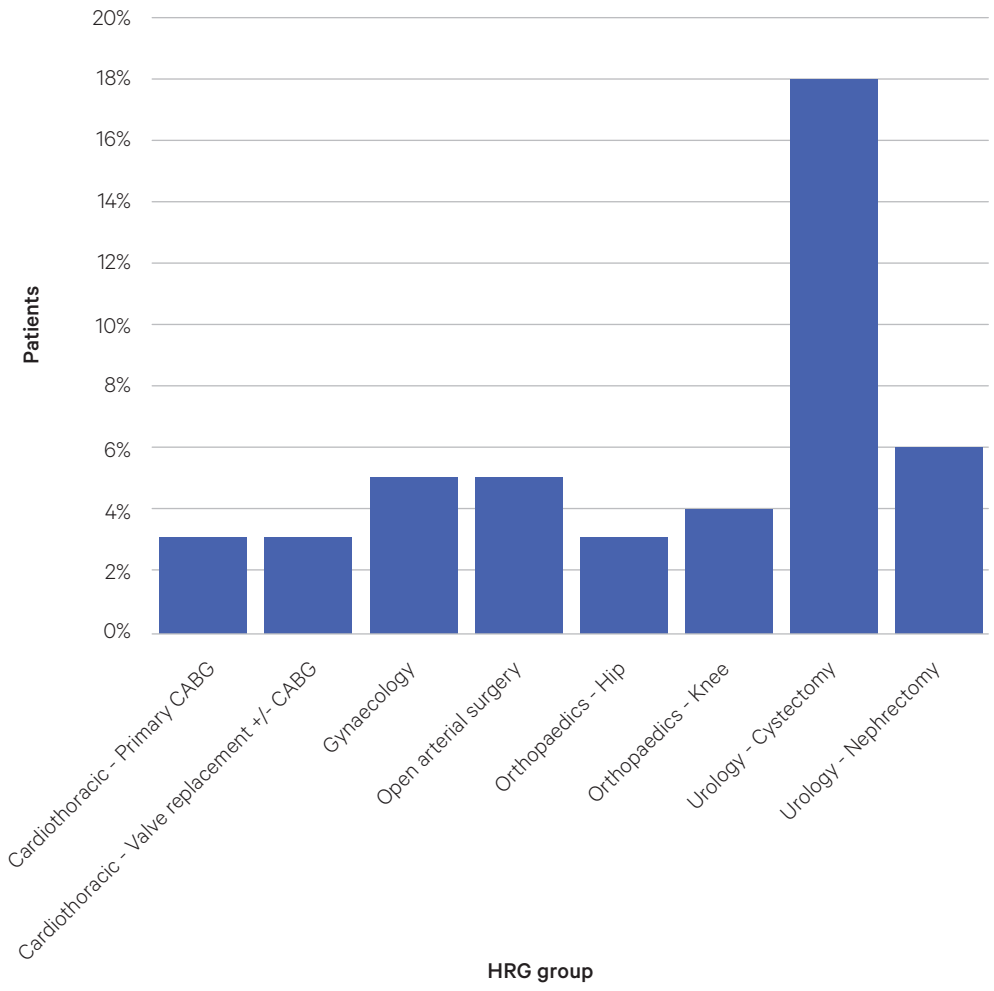

Fig 12
Percentage IDA+ patients who coded to have had received IV iron in the six months prior to or during their HRG spell

Figure 12 highlights the large opportunity to improve the number of identified IDA+ patients that receive treatment prior to their elective surgery. Which will then contribute to the potential efficiency savings as detailed earlier in the report.

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4. Conclusion: Start addressing the problem of anaemia

This report highlights the urgent need for services to adopt robust strategies for treating individuals with underlying IDA in order to optimise post-operative outcomes and reduce overall costs. Many people are unaware of their anaemia; however, it is a condition that can be easily addressed.

IDA is a known modifiable risk factor among patients undergoing surgery with morbidity and mortality consequences which carry a health economic burden. Providers should therefore prioritise testing, diagnosing and treating IDA, and ensure that the appropriate coding is provided in order for the allocation of sufficient healthcare resources. Simple quality measures could be put in place to monitor improvements.

Integrated care pathways are key to improved outcomes, by increasing healthcare professional awareness of the importance of identifying and treating individuals who might have IDA. As part of a holistic framework for addressing the burden of anaemia, commissioners should prioritise pre-operative IV iron services. Steps to actively resolve anaemia will prevent unnecessary health complications for patients and reduce the demand that anaemia currently places on healthcare resources.

Recommendations

1. Patient groups at risk of IDA need to be an essential focus of efforts to mitigate the impact of IDA on patients specifically those needing surgical interventions.
2. Care pathways should be reviewed from a multi-stakeholder group. Improved data collection and implementation of quality measures will support increased use of intravenous iron treatment where indicated.
3. Increase health professionals' access to resources and pathway templates to support the move to earlier intervention with IV iron.
4. Incentivise commissioning to promote uptake of quality and outcomes-based service design.
5. Disseminate best practice examples of alternative, outcomes-based commissioning models that demonstrate the benefit and value of earlier treatment of IDA.

If the challenge from the Long Term Plan (NHS England, 2019) to tackle ASCSs and from the Royal College of Anaesthetists to optimise peri-operative care is to be achieved, there needs to be a concerted effort to diagnose and treat individuals with IDA who are scheduled for elective surgery. With a rapidly ageing population, pre-operative anaemia presents an important opportunity for NHS stakeholders; a concentrated and more strategic commissioning focus is needed. A focus on elderly people is essential, as well as other at-risk groups such as pre-menopausal women, patients with poor nutrition, and those with other long-term health conditions.

These areas could be a starting point for commissioners and HCP's and efficiencies could be created through integrating simple testing pathways as part of the elective surgery process. Introducing a primary care checklist for signs of anaemia and reminders about when to check haemoglobin levels are simple changes with the potential to deliver large gains for both patients and NHS budgets.

Failure of NHS stakeholders to recognise and act presents a major impact on individuals in terms of their quality of life and a major financial challenge to the NHS. Early diagnosis can significantly address these costs and ICS now provide us with an opportunity to strategically integrated services for pre-, intra- and post-operative care.

Benefits of treating amaenia early

Patients

Proactive management is a lot simpler for patients - it avoids the distress of complications and associated treatment and reduces the level of time needed for engaging with healthcare services.

Healthcare professionals

Clinicians, surgeons and other healthcare professionals benefit from better outcomes for their patients and better workforce capacity as a result of reduced complications, which can be focused on where it is needed most.

Providers

Intravenous iron treatment is less time and resource intensive than blood transfusion. Business managers within trusts save operational time and benefit from better capacity to treat more patients effectively and more safely too.

Commissioners

In addition to improving healthcare quality and outcomes, early treatment can make a big different to the local healthcare economy.

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10 recomendations for stakeholders to improve services

This ten-point plan outlines strategic steps that commissioners, providers and healthcare professionals can to take to understand what is happening in their locality and what potential opportunities there are to improve patient care and improve NHS efficiencies.

1. **Use data to understand the impact of IDA in your locality**
   How many people undergo surgery in your area and could benefit from pre-operative optimisation?

2. **Understand the cost of IDA in your area**
   Do you know what the cost impact of IDA is within your health economy?

3. **Know your local screening and treatment rates for IDA**
   Do you know how many people are currently being screened for IDA ahead of surgery? How many receive treatment?

4. **Review your current local care pathways**
   Do you know how current care pathways manage pre-operative anaemia?

5. **Familiarise yourself with NICE guidance and the latest clinical guidance**
   How is the guidance being implemented locally??

6. **Prioritise at-risk patient groups**
   Are you aware of the groups of patients that may be susceptible to IDA

7. **Plan services**
   Develop services that strategically target missed opportunities in the IDA chain. Develop simple quality measures that enable you to audit your service.

8. **Identify and expand good practice**
   Are you aware of models of good practice in effective testing and treatment see our examples in section 2.3.

9. **Create a joined-up anaemia care pathway**
   So that all health professionals are following the same protocols and the development of an integrated pathway will support this aim

10. **Use pre-assessment clinics to optimise patients for surgery**
    Surgical pre-assessment clinic protocols can enable effective rollout of a joined-up anaemia care pathways

5. Methodological Points

ACSC	Ambulatory care sensitive condition
Bed days	Overall bed days in spell, the mean, standard deviation and variance
BSG	British Society of Gastroenterology
CCG	Clinical Commissioning Group
Cost	Overall cost, mean, standard deviation and variance based on spells
HES	Hospital Episode Statistics
HRG	Healthcare Resource Group
HSCIC	Health and Social Care Information Centre
IDA	Iron deficiency anaemia
LOS	Length of stay
Readmissions	Overall readmissions and readmission length of stays including, the mean, standard deviation and variance based on spells

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7. Appendix

Appendix 1: Hospital inpatient data analysis

Within Hospital Episode Statistics (HES) each inpatient episode is coded with one primary diagnosis and up to 19 secondary diagnoses. Diagnosis information is recorded to the ICD-10 (International Statistical Classification of Diseases and Related Health Problems) 4th edition. The currency for admitted patient care is the healthcare resource group (HRG). HRGs are clinically meaningful groups of diagnoses and interventions that consume similar levels of NHS resources. Costs are calculated using the HRG code and applying a Market Forces Factor (MFF) to reflect the difference in prices in various parts of the country.

Appendix 2: Surgical ferronomics methodology

Cohort creation

Elective (inpatient and day case) spells that had taken place on an adult (18+ years) starting between 1st April 2017 and ending by 31st March 2018] that were coded with any one of the supplied HRGs were collected. The HRGs were separated into 8 group as listed in the appendix. The rational behind the grouping, which is closely matched to the NCA, but has some variation due to coding practices. The 1st April 2017 was chosen as this is the date that the new HRGs went into force.

Patients were tracked backwards 3 months from the spell end data to see if they have previously had a diagnosis of IDA (D500, D508, D509 or D649) in their relevant inpatient history (spell containing the applicable HRG inclusive). Patients were grouped into either IDA+ or IDA- categories as to their IDA history for each HRG group they appear in.

Analysis

Analysis was performed at spell level.

The analysis was performed on the metrics below to give results at the level of:

[Had IDA in inpatient** history* vs did not have IDA in inpatient history (but did have a previous inpatient admission for non-IDA in the previous history]. The inclusion of a group with inpatient history in a similar timeline means a closer matching of the groups is achieved as both types of patient were 'sick' enough to be admitted in the history.

*history means 3 months

**inpatient means day case or planned care spell.

Methodology Metrics

Spells: How many spells were coded for in each group, how many patients does this relate to? (A patient may have more than one relevant spell in the time frame).

Costs: For each group total admission cost (£) and average admission cost per patient (£) was calculated. Costs are based on the cost of the admissions spell, derived from PbR data, utilising the HRG tariff and uplifted by any relevant market force factors.

Critical care: How many critical care episodes for each group was there?

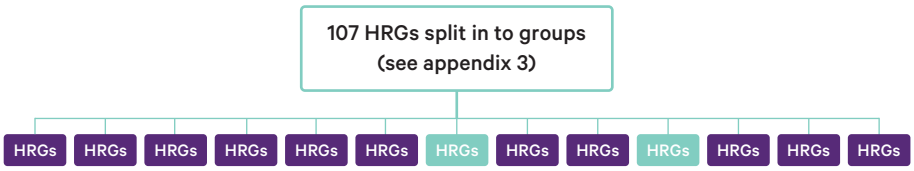
Length of stay: What is the average length of the stay in hospital (spell)?

Readmission rate and MLOS of readmission: Defined by having a further inpatient admission within 30 days of discharge.

Outpatients -how many had an outpatient appointment in the 6 weeks prior to the HRG spell AND that was in either anaesthetics OR the same consultant specialty of the HRG spell.

Comorbidity Increase – HRG -.HRGs applied to each spell were analysed. Patients who were in the lowest co-morbidity banding possible were removed, so only those for which a removal of IDA as a possibility to reducing HRG cost remain. Patients were split into individual HRGs and the base tariff cost (defined in annex A national Tariff workbook - for elective spells) applied. The cost of the next HRG co-morbidity band down was calculated and the difference between the totals calculated. This is the total potential savings seen in the report. NB. This methodology assumes that removal of IDA as a co-morbidity changes the co-morbidity scoring enough (IDA has a points score of 1 or 2 depending on the HRG) to move the patient down into the next co-morbidity banding (not always the case). Costs also do not account for excess bed days payments (lower payment given for patients who stay past the trim point) or other cost factors, so potential savings are based on changing the HRG only.

Flow chart



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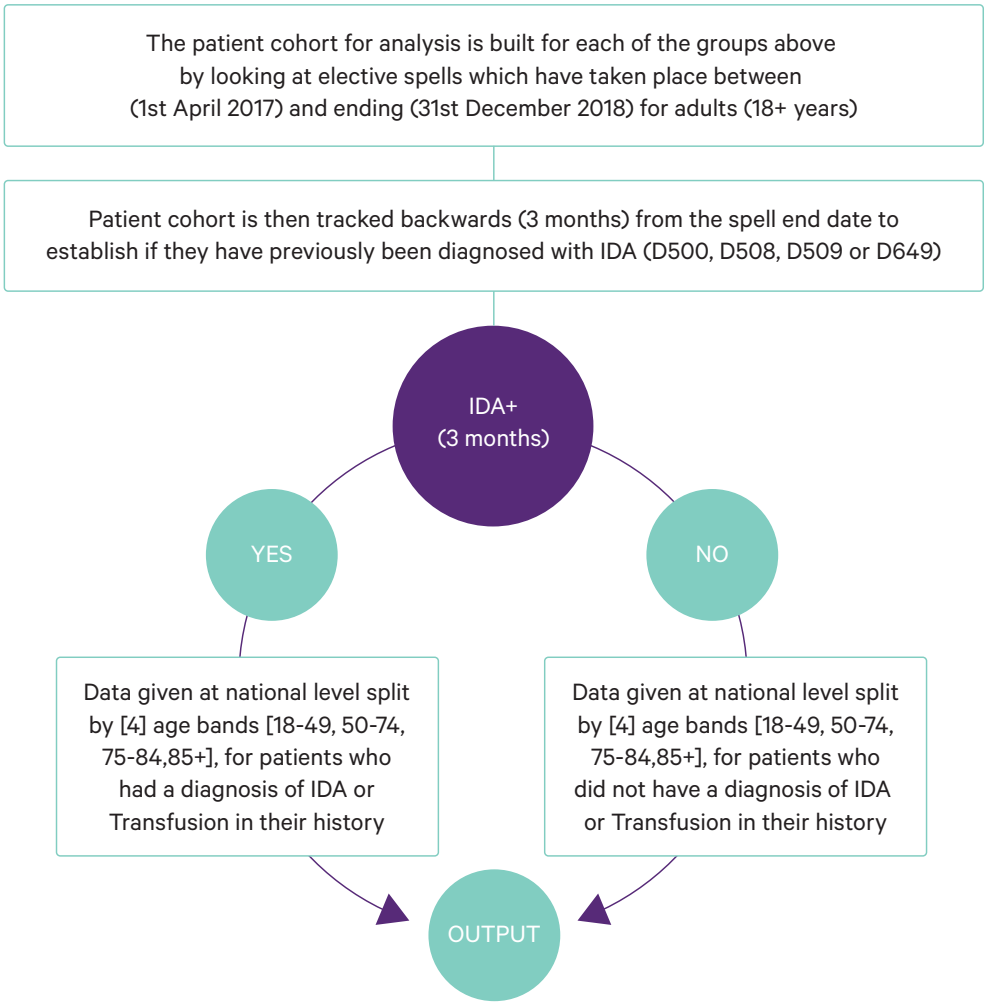
The patient cohort for analysis is built for each of the groups above by looking at elective spells which have taken place between (1st April 2017) and ending (31st December 2018) for adults (18+ years)
Patient cohort is then tracked backwards (3 months) from the spell end date to establish if they have previously been diagnosed with IDA (D500, D508, D509 or D649)
IDA+ (3 months)
YES
NO
Data given at national level split by [4] age bands [18-49, 50-74, 75-84,85+], for patients who had a diagnosis of IDA or Transfusion in their history
Data given at national level split by [4] age bands [18-49, 50-74, 75-84,85+], for patients who did not have a diagnosis of IDA or Transfusion in their history
OUTPUT

Appendix 3: HRG code groups overview

See spreadsheet for full groupings and NCA group matching as of July 2019.

HRG	Type	Group Name	HRG Code	HRG Description
1	Orthapaedics - Hip	Very Major Hip	HN12A	Very Major Hip Procedures for Non-Trauma with CC Score 10+
1	Orthapaedics - Hip	Very Major Hip	HN12B	Very Major Hip Procedures for Non-Trauma with CC Score 8-9
1	Orthapaedics - Hip	Very Major Hip	HN12C	Very Major Hip Procedures for Non-Trauma with CC Score 6-7
1	Orthapaedics - Hip	Very Major Hip	HN12D	Very Major Hip Procedures for Non-Trauma with CC Score 4-5
1	Orthapaedics - Hip	Very Major Hip	HN12E	Very Major Hip Procedures for Non-Trauma with CC Score 2-3
1	Orthapaedics - Hip	Very Major Hip	HN12F	Very Major Hip Procedures for Non-Trauma with CC Score 0-1
1	Orthapaedics - Hip	Major Hip	HN13A	Major Hip Procedures for Non-Trauma, 19 years and over, with CC Score 10+
1	Orthapaedics - Hip	Major Hip	HN13B	Major Hip Procedures for Non-Trauma, 19 years and over, with CC Score 6-9
1	Orthapaedics - Hip	Major Hip	HN13C	Major Hip Procedures for Non-Trauma, 19 years and over, with CC Score 4-5
1	Orthapaedics - Hip	Major Hip	HN13D	Major Hip Procedures for Non-Trauma, 19 years and over, with CC Score 2-3
1	Orthapaedics - Hip	Major Hip	HN13E	Major Hip Procedures for Non-Trauma, 19 years and over, with CC Score 1
1	Orthapaedics - Hip	Major Hip	HN13F	Major Hip Procedures for Non-Trauma, 19 years and over, with CC Score 0
1	Orthapaedics - Hip	Major Hip	HN13G	Major Hip Procedures for Non-Trauma, 18 years and under, with CC Score 1+
1	Orthapaedics - Hip	Major Hip	HN13H	Major Hip Procedures for Non-Trauma, 18 years and under, with CC Score 0
1	Orthapaedics - Hip	Immediate Hip	HN14A	Intermediate Hip Procedures for Non-Trauma, 19 years and over, with CC Score 6+
1	Orthapaedics - Hip	Immediate Hip	HN14B	Intermediate Hip Procedures for Non-Trauma, 19 years and over, with CC Score 4-5
1	Orthapaedics - Hip	Immediate Hip	HN14C	Intermediate Hip Procedures for Non-Trauma, 19 years and over, with CC Score 2-3
1	Orthapaedics - Hip	Immediate Hip	HN14D	Intermediate Hip Procedures for Non-Trauma, 19 years and over, with CC Score 1
1	Orthapaedics - Hip	Immediate Hip	HN14E	Intermediate Hip Procedures for Non-Trauma, 19 years and over, with CC Score 0
1	Orthapaedics - Hip	Immediate Hip	HN14F	Intermediate Hip Procedures for Non-Trauma, between 6 and 18 years, with CC Score 1+
1	Orthapaedics - Hip	Immediate Hip	HN14G	Intermediate Hip Procedures for Non-Trauma, between 6 and 18 years, with CC Score 0

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HRG	Type	Group Name	HRG Code	HRG Description
2	Orthopaedics - Knee	Intermediate Knee	HN24A	Intermediate Knee Procedures for Non-Trauma, 19 years and over, with CC Score 4+
2	Orthopaedics - Knee	Intermediate Knee	HN24B	Intermediate Knee Procedures for Non-Trauma, 19 years and over, with CC Score 2-3
2	Orthopaedics - Knee	Intermediate Knee	HN24C	Intermediate Knee Procedures for Non-Trauma, 19 years and over, with CC Score 0-1
2	Orthopaedics - Knee	Intermediate Knee	HN24D	Intermediate Knee Procedures for Non-Trauma, between 6 and 18 years, with CC Score 1+
2	Orthopaedics - Knee	Intermediate Knee	HN24E	Intermediate Knee Procedures for Non-Trauma, between 6 and 18 years, with CC Score 0
2	Orthopaedics - Knee	Very Major Knee	HN22A	Very Major Knee Procedures for Non-Trauma with CC Score 8+
2	Orthopaedics - Knee	Very Major Knee	HN22B	Very Major Knee Procedures for Non-Trauma with CC Score 6-7
2	Orthopaedics - Knee	Very Major Knee	HN22C	Very Major Knee Procedures for Non-Trauma with CC Score 4-5
2	Orthopaedics - Knee	Very Major Knee	HN22D	Very Major Knee Procedures for Non-Trauma with CC Score 2-3
2	Orthopaedics - Knee	Very Major Knee	HN22E	Very Major Knee Procedures for Non-Trauma with CC Score 0-1
2	Orthopaedics - Knee	Major Knee	HN23A	Major Knee Procedures for Non-Trauma, 19 years and over, with CC Score 4+
2	Orthopaedics - Knee	Major Knee	HN23B	Major Knee Procedures for Non-Trauma, 19 years and over, with CC Score 2-3
2	Orthopaedics - Knee	Major Knee	HN23C	Major Knee Procedures for Non-Trauma, 19 years and over, with CC Score 0-1
2	Orthopaedics - Knee	Major Knee	HN23D	Major Knee Procedures for Non-Trauma, 18 years and under, with CC Score 1+
2	Orthopaedics - Knee	Major Knee	HN23E	Major Knee Procedures for Non-Trauma, 18 years and under, with CC Score 0

HRG	Type	Group Name	HRG Code	HRG Description
3	Cardiothoracic - Primary CABG	Major Coronary Artery Bypass	ED26A	Complex Coronary Artery Bypass Graft with CC Score 10+
3	Cardiothoracic - Primary CABG	Major Coronary Artery Bypass	ED26B	Complex Coronary Artery Bypass Graft with CC Score 5-9
3	Cardiothoracic - Primary CABG	Major Coronary Artery Bypass	ED26C	Complex Coronary Artery Bypass Graft with CC Score 0-4
3	Cardiothoracic - Primary CABG	Major Coronary Artery Bypass	ED27A	Major Coronary Artery Bypass Graft with CC Score 10+
3	Cardiothoracic - Primary CABG	Major Coronary Artery Bypass	ED27B	Major Coronary Artery Bypass Graft with CC Score 5-9
3	Cardiothoracic - Primary CABG	Major Coronary Artery Bypass	ED27C	Major Coronary Artery Bypass Graft with CC Score 0-4
3	Cardiothoracic - Primary CABG	Coronary Artery Bypass	ED28A	Standard Coronary Artery Bypass Graft with CC Score 10+
3	Cardiothoracic - Primary CABG	Coronary Artery Bypass	ED28B	Standard Coronary Artery Bypass Graft with CC Score 5-9
3	Cardiothoracic - Primary CABG	Coronary Artery Bypass	ED28C	Standard Coronary Artery Bypass Graft with CC Score 0-4

HRG	Type	Group Name	HRG Code	HRG Description
4	Cardiothoracic - Valve replacement +/- CABG	Major Coronary Artery Bypass	ED22A	Complex, Coronary Artery Bypass Graft with Single Heart Valve Replacement or Repair, with CC Score 11+
4	Cardiothoracic - Valve replacement +/- CABG	Major Coronary Artery Bypass	ED22B	Complex, Coronary Artery Bypass Graft with Single Heart Valve Replacement or Repair, with CC Score 6-10
4	Cardiothoracic - Valve replacement +/- CABG	Major Coronary Artery Bypass	ED22C	Complex, Coronary Artery Bypass Graft with Single Heart Valve Replacement or Repair, with CC Score 0-5
4	Cardiothoracic - Valve replacement +/- CABG	Coronary Artery Bypass	ED23A	Standard, Coronary Artery Bypass Graft with Single Heart Valve Replacement or Repair, with CC Score 11+
4	Cardiothoracic - Valve replacement +/- CABG	Coronary Artery Bypass	ED23B	Standard, Coronary Artery Bypass Graft with Single Heart Valve Replacement or Repair, with CC Score 6-10
4	Cardiothoracic - Valve replacement +/- CABG	Coronary Artery Bypass	ED23C	Standard, Coronary Artery Bypass Graft with Single Heart Valve Replacement or Repair, with CC Score 0-5
4	Cardiothoracic - Valve replacement +/- CABG	Valve Repair	ED24A	Complex, Single Heart Valve Replacement or Repair, with CC Score 11+
4	Cardiothoracic - Valve replacement +/- CABG	Valve Repair	ED24B	Complex, Single Heart Valve Replacement or Repair, with CC Score 6-10
4	Cardiothoracic - Valve replacement +/- CABG	Valve Repair	ED24C	Complex, Single Heart Valve Replacement or Repair, with CC Score 0-5
4	Cardiothoracic - Valve replacement +/- CABG	Valve Repair	ED25A	Standard, Single Heart Valve Replacement or Repair, with CC Score 11+
4	Cardiothoracic - Valve replacement +/- CABG	Valve Repair	ED25B	Standard, Single Heart Valve Replacement or Repair, with CC Score 6-10
4	Cardiothoracic - Valve replacement +/- CABG	Valve Repair	ED25C	Standard, Single Heart Valve Replacement or Repair, with CC Score 0-5

HRG	Type	Group Name	HRG Code	HRG Description
5	Open arterial surgery	Open Aortic Procedures	YQ03A	Open Repair of Abdominal Aortic Aneurysm with CC Score 6+
5	Open arterial surgery	Open Aortic Procedures	YQ03B	Open Repair of Abdominal Aortic Aneurysm with CC Score 0-5
5	Open arterial surgery	Open Aortic Procedures	YQ05A	Single Open Procedure, on Aorta or Abdominal Blood Vessel, with CC Score 4+
5	Open arterial surgery	Open Aortic Procedures	YQ05B	Single Open Procedure, on Aorta or Abdominal Blood Vessel, with CC Score 0-3
5	Open arterial surgery	Multiple Open Aortic Procedures	YQ01A	Multiple or Revisional, Open Repair of, Abdominal or Thoracoabdominal Aortic Aneurysm, with CC Score 6+
5	Open arterial surgery	Multiple Open Aortic Procedures	YQ01B	Multiple or Revisional, Open Repair of, Abdominal or Thoracoabdominal Aortic Aneurysm, with CC Score 0-5
5	Open arterial surgery	Multiple Open Aortic Procedures	YQ04A	Multiple Open Procedures, on Aorta or Abdominal Blood Vessels, with CC Score 4+
5	Open arterial surgery	Multiple Open Aortic Procedures	YQ04B	Multiple Open Procedures, on Aorta or Abdominal Blood Vessels, with CC Score 0-3
5	Open arterial surgery	Blood Vessel Procedures	YQ10A	Multiple Open Procedures on Blood Vessels of Lower Limbs with CC Score 11+
5	Open arterial surgery	Blood Vessel Procedures	YQ10B	Multiple Open Procedures on Blood Vessels of Lower Limbs with CC Score 7-10
5	Open arterial surgery	Blood Vessel Procedures	YQ10C	Multiple Open Procedures on Blood Vessels of Lower Limbs with CC Score 4-6
5	Open arterial surgery	Blood Vessel Procedures	YQ10D	Multiple Open Procedures on Blood Vessels of Lower Limbs with CC Score 0-3
5	Open arterial surgery	Blood Vessel Procedures	YQ11A	Single Open Procedure on Blood Vessel of Lower Limb with Imaging Intervention, with CC Score 7+
5	Open arterial surgery	Blood Vessel Procedures	YQ11B	Single Open Procedure on Blood Vessel of Lower Limb with Imaging Intervention, with CC Score 4-6
5	Open arterial surgery	Blood Vessel Procedures	YQ11C	Single Open Procedure on Blood Vessel of Lower Limb with Imaging Intervention, with CC Score 0-3
5	Open arterial surgery	Blood Vessel Procedures	YQ12A	Single Open Procedure on Blood Vessel of Lower Limb with CC Score 11+
5	Open arterial surgery	Blood Vessel Procedures	YQ12B	Single Open Procedure on Blood Vessel of Lower Limb with CC Score 7-10
5	Open arterial surgery	Blood Vessel Procedures	YQ12C	Single Open Procedure on Blood Vessel of Lower Limb with CC Score 4-6
5	Open arterial surgery	Blood Vessel Procedures	YQ12D	Single Open Procedure on Blood Vessel of Lower Limb with CC Score 0-3

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HRG	Type	Group Name	HRG Code	HRG Description
5	Open arterial surgery	Blood Vessel Procedures	YQ13A	Bypass to Tibial Arteries with CC Score 7+
5	Open arterial surgery	Blood Vessel Procedures	YQ13B	Bypass to Tibial Arteries with CC Score 0-6
5	Open arterial surgery	Blood Vessel Procedures	YQ31A	Single Open Procedure on Carotid Artery with CC Score 5+
5	Open arterial surgery	Blood Vessel Procedures	YQ31B	Single Open Procedure on Carotid Artery with CC Score 0-4
5	Open arterial surgery	Blood Vessel Procedures	YQ32A	Single Open Procedure, on Blood Vessel or Upper Limb with CC Score 5+
5	Open arterial surgery	Blood Vessel Procedures	YQ32B	Single Open Procedure, on Blood Vessel or Upper Limb with CC Score 0-4
5	Open arterial surgery	Blood Vessel Procedures	YQ41A	Open Operations, on Other or Unspecified Blood Vessels, with CC Score 2+
5	Open arterial surgery	Blood Vessel Procedures	YQ41B	Open Operations, on Other or Unspecified Blood Vessels, with CC Score 0-1
6	Gynaecology	Gynaecological	MA02A	Very Major Open, Upper or Lower Genital Tract Procedures, with CC Score 4+
6	Gynaecology	Gynaecological	MA02B	Very Major Open, Upper or Lower Genital Tract Procedures, with CC Score 2-3
6	Gynaecology	Gynaecological	MA02C	Very Major Open, Upper or Lower Genital Tract Procedures, with CC Score 0-1
6	Gynaecology	Gynaecological	MA07E	Major Open Upper Genital Tract Procedures with CC Score 5+
6	Gynaecology	Gynaecological	MA07F	Major Open Upper Genital Tract Procedures with CC Score 3-4
6	Gynaecology	Gynaecological	MA07G	Major Open Upper Genital Tract Procedures with CC Score 0-2
6	Gynaecology	Gynaecological	MA08A	Major, Laparoscopic or Endoscopic, Upper Genital Tract Procedures, with CC Score 2+
6	Gynaecology	Gynaecological	MA08B	Major, Laparoscopic or Endoscopic, Upper Genital Tract Procedures, with CC Score 0-1
7	Urology - Cystectomy	Urological	LB39C	Cystectomy with Urinary Diversion and Reconstruction, with CC Score 3+
7	Urology - Cystectomy	Urological	LB39D	Cystectomy with Urinary Diversion and Reconstruction, with CC Score 0-2

HRG	Type	Group Name	HRG Code	HRG Description
8	Urology - Nephrectomy	Urological	LB60C	Complex, Open or Laparoscopic, Kidney or Ureter Procedures, with CC Score 7+
8	Urology - Nephrectomy	Urological	LB60D	Complex, Open or Laparoscopic, Kidney or Ureter Procedures, with CC Score 4-6
8	Urology - Nephrectomy	Urological	LB60E	Complex, Open or Laparoscopic, Kidney or Ureter Procedures, with CC Score 2-3
8	Urology - Nephrectomy	Urological	LB60F	Complex, Open or Laparoscopic, Kidney or Ureter Procedures, with CC Score 0-1
8	Urology - Nephrectomy	Urological	LB61C	Major, Open or Percutaneous, Kidney or Ureter Procedures, 19 years and over, with CC Score 10+
8	Urology - Nephrectomy	Urological	LB61D	Major, Open or Percutaneous, Kidney or Ureter Procedures, 19 years and over, with CC Score 7-9
8	Urology - Nephrectomy	Urological	LB61E	Major, Open or Percutaneous, Kidney or Ureter Procedures, 19 years and over, with CC Score 4-6
8	Urology - Nephrectomy	Urological	LB61F	Major, Open or Percutaneous, Kidney or Ureter Procedures, 19 years and over, with CC Score 2-3
8	Urology - Nephrectomy	Urological	LB61G	Major, Open or Percutaneous, Kidney or Ureter Procedures, 19 years and over, with CC Score 0-1
8	Urology - Nephrectomy	Urological	LB62C	Major Laparoscopic, Kidney or Ureter Procedures, 19 years and over, with CC Score 3+
8	Urology - Nephrectomy	Urological	LB62D	Major Laparoscopic, Kidney or Ureter Procedures, 19 years and over, with CC Score 0-2
8	Urology - Nephrectomy	Urological	LB63C	Major, Open or Laparoscopic, Kidney or Ureter Procedures, 18 years and under, with CC Score 2+
8	Urology - Nephrectomy	Urological	LB63D	Major, Open or Laparoscopic, Kidney or Ureter Procedures, 18 years and under, with CC Score 0-1

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