NHS
Blood and Transplant

Comparative Audit

2018/19 Audit of the Management of Maternal Anaemia and Iron Deficiency in United Kingdom and Republic of Ireland

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HOSPITALS THAT AGREED TO PILOT THE AUDIT

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HOSPITALS THAT AGREED TO TAKE PART IN THE AUDIT

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Contents

Executive Summary

Iron deficiency is the most prevalent form of anaemia during pregnancy and is associated with significant morbidity for both mothers and their babies. This audit documents the prevalence of anaemia and evaluates the screening and treatment of the condition. The standards against which screening and management were audited are taken from the British Society for Haematology (BSH) Guideline for the management of anaemia in pregnancy. Our recommendations are found in the next section of the report.

The notable findings from the report are:

- Overall 97- 98% of pregnant women were screened for anaemia, as recommended at 'booking' in the first trimester; at presentation with a pregnancy if outside this time and in the third trimester at around 28 weeks' gestation.

- 2.6% of women were anaemic at the first trimester screen. This increased to a total of 4.14% when those whose 'booking' appointment was later than the first trimester were included in the figures.

- 16.3% of women were newly diagnosed with anaemia at 28 weeks' gestation.

- A further 9.5% of women were diagnosed with anaemia at other stages of pregnancy.

- The overall prevalence of ***diagnosed*** anaemia during pregnancy was 25.4% but when included those that were ***undiagnosed*** but had a haemoglobin below the threshold for the diagnosis the prevalence rose to 30.4%. (Table 9)

- Clinical records show that only half of the women who were anaemic in the first trimester or at first presentation were started on iron and it was started in only 30% of those newly diagnosed at 28 weeks.

- Only 7.6% of the women diagnosed at other stages of pregnancy were started on oral iron.

- 64% of the women documented as started on oral iron were followed up 2 to 4 weeks after treatment started.

- The prevalence of anaemia in the puerperium (birth to 6 weeks postnatal) was 41.3% of those tested. For the whole cohort this represented 20.7% of women.

- 74% of postnatally diagnosed women were treated with oral iron and discharged home with treatment.

- The cohort of women who were diagnosed with anaemia had significantly more women from the Black and south Asian groups, were more likely to have assisted vaginal deliveries and higher levels of blood loss post-delivery.

Recommendations

- Review and update local guidelines for the detection and management of anaemia in pregnancy to align local guidance with the latest BSH and NICE guidelines.
- Audit local screening uptake at the first trimester/presentation and at 28 weeks ensuring that it exceeds 95%
- Act on all gestationally adjusted abnormal haemoglobin results within 2 weeks by starting affected women on treatment.
- Offer treatment with oral iron in the first instance and document the type, frequency and dose of iron in the care record.
- Provide written information on how to take oral iron to maximise absorption.
- Provide written dietary information to maximise the availability of iron through diet.
- Review anaemic women within 2 to 4 weeks of starting treatment depending upon the gestation, checking the haemoglobin level and response.
- Document the response to treatment and any side effects experienced by the woman.
- If the response is sub-optimal, (<10-20g/L), check the woman's level of B12 and folate, and treat accordingly.
- Audit the testing and treatment in the pueperium to ensure that all at-risk women are tested. (See the audit tool appendix on page 26)
- Provide clear documentation and a plan for primary care detailing the on-going management required in the postnatal period.

Background

Iron deficiency (ID) accounts for most cases of anaemia in pregnant women. It is most commonly due to insufficient iron stores to meet the demands of pregnancy that results from an increase in red cell mass, fetal growth, placental development and variable blood losses during delivery. Overall, the physiological requirements for iron in pregnancy are three times higher than in non-pregnant menstruating women and the iron requirement increases as pregnancy advances.

The National Institute for Health and Care Excellence (NICE) advises that women should be offered screening for anaemia at booking and at 28 weeks of gestation, and if the Hb level suggests anaemia then a two week trial of iron is started.

The prevalence of iron deficiency anaemia (IDA) in pregnancy has been reported to be between 25% and 40%. Given the physiological changes that evolve during pregnancy and adjustments made because of haemodilution, the prevalence is likely to vary by gestation. One study in the UK reported that the point prevalence of IDA during pregnancy was 29%. In a recent large local audit over two years in Wolverhampton, 343 (4.8%) women had anaemia before 16 weeks, and of these, 64% were still anaemic at 28 weeks.

Overall, these figures suggest an estimated 200,000 pregnant women develop anaemia annually in the UK, indicative of a continuing high burden of anaemia during pregnancy.

Maternal anaemia has important consequences; it is a risk factor for low birth weight, preterm birth, post-partum haemorrhage, perinatal mortality and maternal death as a result of a range of complications of pregnancy, including haemorrhage and sepsis.

It appears that the current strategies for anaemia management are not working effectively, although clear national guidance exists.

Aims of the audit

- To determine the prevalence of iron deficiency anaemia (IDA) during pregnancy and the pueperium in a sample of women.
- To provide national comparative data on the screening, recognition and treatment of anaemia in pregnancy
- To present information on adherence to best practice as recommended in the BSH and NICE guidelines.
- To examine the steps in the management pathway for iron deficiency anaemia in pregnancy from screening through to treatment and follow-up of women during and immediately after pregnancy.
- To compare the pregnancy outcomes of the women who developed iron deficiency anaemia in pregnancy, with those from the cohort who did not develop anaemia.

Audit standards

The definitions of iron deficiency anaemia in pregnancy comply with current standards.

1. The definitions for anaemia in pregnancy comply with international standards. The standards for the audit were derived from the guidelines of the British Society of Haematology and NICE.

- Antenatal anaemia is defined as: Haemoglobin (Hb) <110g/L in the first trimester & Hb <105g/L in the second and third trimester.
- Postnatal anaemia is defined as Hb <100g/L

Screening for anaemia

2. All women are offered a full blood count (FBC) to screen for iron deficiency anaemia at first appointment (usually 8-12 weeks' gestation) and repeated at 28 +/- 2 weeks' gestation.

3. Women who present at other times with symptoms of anaemia (fatigue, dizziness, palpitations, chest pain, fainting, or shortness of breath) are offered a full blood count.

4. A full blood count is offered to all women the day following delivery when -

- The estimated blood loss is greater than 500ml; and/or
- The baby is delivered by caesarean section (elective or emergency); and/or
- The woman has symptoms of anaemia post-delivery; and/or
- When antenatal anaemia has not been fully corrected.

5. If a woman is discharged on the day of birth the FBC is not taken until at least 6 hours after the birth of the baby.

Women at increased risk of iron depletion and anaemia

6. Women identified to be at increased risk of iron depletion at first antenatal appointment are offered a serum ferritin test. Those at risk are women with previous iron deficiency anaemia; Multiparity >/=3; Previously gave birth < 1 year ago; Are aged under 20 years of age; have multiple pregnancy.

6a. If the serum ferritin is < 30ug/l a prophylactic dose of oral iron (65mg of elemental iron) is prescribed for the duration of pregnancy to ensure iron stores replete.
6b. If these women develop anaemia the prophylactic iron dose is increased to a treatment dose.

Results interpretation & management

7. Maternity units have a system in place to ensure that all routine blood results, including full blood counts, are reviewed promptly and acted upon, ideally within 2 weeks of taking the sample.

Treatment

8. Women identified with iron deficiency anaemia are offered oral elemental iron or IV iron supplementation, preferably within 14 days of diagnosis of iron deficiency anaemia.

9. Women are offered written information on the correct administration of iron and how to maximise absorption.

Follow up of treatment

10. A full blood count is repeated 2 - 4 weeks following the start of therapeutic iron treatment.

11. Assessment of tolerability and GI symptoms for women talking oral iron is undertaken and appropriate advice given including dose modification.

12. Once the haemoglobin concentration has returned to the normal range, supplementation continues for 3 months and at least until 6 weeks' post-delivery to replenish the iron stores.

Referral

13. Women with significant symptoms of anaemia *(lethargy, pallor, weakness, headache, palpitations, dizziness, dyspnoea, irritability and restless legs)*; Pica *(a craving for non-food items such as ice [pagophagia] and soil [geophagia])*; severe anaemia *(Hb <70g/L)*; anaemia at greater than 34 weeks' gestation or who fail to respond to oral treatment are referred to secondary care specialist obstetrician or haematologist for assessment and further management.

14. Women who cannot tolerate oral iron are offered parenteral iron from the second trimester onwards.

Special Circumstances

Haemoglobinopathy

15. Women with a known haemoglobinopathy have their serum ferritin level checked and are offered oral supplements if their level is <30ug/l.

Non-anaemic iron deficiency

16. Non-anaemic women at increased risk (See the audit tool appendix on page 26) of iron deficiency anaemia should have their serum ferritin checked and are offered oral supplements (65mg of elemental iron daily), if their ferritin level is < 30ug/l. A repeat Hb and serum ferritin is performed after 8 weeks.

Intra-partum care and delivery

17. Anaemic women are delivered in the hospital setting, where there is ready recourse to blood and blood products if required.

17a. Anaemic women are group and saved as a minimum when in labour

17b Anaemic women are advised on and offered active management in the third stage of labour

Transfusion

18. Red cell transfusions are avoided in stable mothers antenatally without adequate investigation of anaemia, or post-partum unless Hb < 70 g/L associated with significant bleeding.

METHODOLOGY

All hospitals with a maternity unit were invited to enrol in the audit, and to audit a sample of 10 consecutive live births per maternity unit.

There was an agreed 72 hour time frame in which these births occurred, and if sites have 10 births in first 24 hours, they could stop collecting data. Otherwise, they would continue until the target of 10 births was reached.

Data collection stopped after 72 hours from the start of the audit period, regardless of how many births had been audited.

Data was submitted either using an online data collection tool, or sites could return completed audit proformas when data was entered by Comparative Audit staff.

Data was cleaned and analysed by the Project Group and an interim report was issued in August 2019.

STATA v15.1 was used to perform the analyses. Chi^2 was used for significant testing of categorial data.

ORGANISATIONAL AUDIT

In additional to collecting data on the clinical management of women, sites were asked to complete an organisational questionnaire, which was designed to gather information about the context in which maternity care is delivered.

Organisational data was returned from 72 sites. The questionnaire is shown at Appendix B.

Births in 2017

Sites reported a total of 325,825 births in 2017. The number of births ranged from 95 to 9316, and the median number of births was 4524. Of the total births, singletons comprised 98%, Twins 1.9% and higher order number (triplets, etc) 0.1%.

Table 1 shows the reported percentage of ethnic mix at the time of the audit:

Table 1

Ethnicity of NHS Trust populations	%
UK & Northern European	77
South Asian	6
South East Asian	3
African/African Caribbean	3
Others	11

Routine Haemoglobinopathy screening

59/72 (82%) sites reported that they conducted routine haemoglobinopathy screening on all pregnant women who presented for care.

Midwifery-Led Units (MLU)

61/72 (85%) sites reported that they had midwifery-led units within their organisation, and of these 42 (69%) were reported to be “alongside” (that is to say that they were in close proximity to or on the same site as the Consultant unit); 8 (13%) were reported to be “distant” or stand-alone MLU, while 11 sites (18%) reported that they operated both types of midwifery led unit, “stand alone” and “alongside”.

Guidelines for the investigation & management of anaemia

62/72 (86%) sites reported that they had guidelines for the investigation & management of anaemia.

Referring women to a Haematologist

70/72 (97%) sites reported that they had a mechanism whereby staff were able to refer a woman to haematologist for further advice, investigation or management.

CLINICAL AUDIT

The audit was conducted in November 2018 and 86 maternity units from around the United Kingdom and the Republic of Ireland took part and contributed data on 860 births. Data was received and collated by the end of March 2019 when the audit was closed.

PATIENT DEMOGRAPHICS

The age of the women who gave birth ranged from 16 to 60 years, median age 31 years. Their BMI ranged from 16-51kg/m^2, mean BMI 26.2kg/m^2. 12.8% of women were smokers, while a further 15% were ex-smokers. There were differences in the proportions of smokers between the anaemic women and those without anaemia, figures are shown Table 18.

Ethnicity

The ethnicity in this sample was diverse and broadly reflects the ethnic distribution of the general pregnant population taken from the Office of National Statistics data for 2018 and 2019. (Table 2) Haemoglobinopathies (both disease and traits) have an impact on the level of haemoglobin and must be borne in mind when assessing a woman for anaemia.

Table 2

Ethnicity of women audited	%
White British	71.2
South Asian	9.5
South east Asian	1.2
African & African-Caribbean	3.7
South European & other European	5.9
Other non-European	2.4
Not stated	6

Medical Disorders

238 (27.7%) women were reported to have a medical condition that could have an impact on a woman's level of haemoglobin, or alternatively have a low haemoglobin which might adversely affect the medical condition, aggravating its symptoms or health impact on the woman, with anaemia aggravating the pathophysiology in pregnancy resulting from the disease (Table 3).

Psychiatric disorders were pre-eminent in the group. They include a wide range of disorders from anxiety to more significant disorders of psychosis. It is known that both anaemia and psychiatric disorders in general predispose individuals to postnatal depression. Suicide associated with severe postnatal depression is now a leading cause of maternal mortality. It is therefore, important to note this in the context of any audit of anaemia.

Table 3

Please note some women experienced more than one medical condition.

Medical disorders	n
Hypertension	8
Diabetes (Pre-existing)	3
Cardiac disease	4
Respiratory disease	70
Renal disease	16
Endocrine disorders	44
Psychiatric disorders	128
Pre-pregnancy haematological disorders	29
Inflammatory bowel disease	7
Autoimmune disease	7
Cancer	3
HIV	1

Pre-pregnancy medications

Some medications interfere negatively with the absorption of iron in the gut. Although there were 7 women in this cohort with inflammatory bowel diseases, 37 were taking medications that antagonise iron absorption; 4 women were taking vitamin B12 and a significant proportion were taking folic acid, probably as a result of the well-known recommendation about periconceptual folate and the reduction in incidence of neural tube defects.(Table 4).

Table 4

Pre-pregnancy medications	n
Antacids	9
Anti-emetics	14
H_2 Antagonists	3
Proton Pump inhibitors	11
Vitamin B12	4
Folic acid	540

Pre-pregnancy Haematological disorders

29 (3.4%) women were known to have a haematological disorder prior to pregnancy, and this was mostly iron deficiency anaemia (2.3%). (Table 5)

Table 5

Haematological disorder (n=29)	n (%)
Sickle cell trait	2 (0.2)
Thalassaemia trait	1 (0.1)
Thrombophilia	3 (0.3)
Pernicious anaemia	2 (0.2)
Haemochromatosis	1 (0.1)
Iron deficiency anaemia	19 (2.3)
VTE	1 (0.1)

Previous pregnancy history

579 (67.3%) women had previously been pregnant and 431(74.4%) of these women had delivered a live baby in a previous pregnancy. (Table 6)

For those 579 women who were multigravida, there last pregnancy outcome was:
Live births – 431/579 (74.4%); Miscarriage 112 (19.3%), Stillbirth 4 (0.7%); ToP 32 (5.6%)

Table 6

Parity	**%**
Primigravida	32.7
Multigravida	67.3
Previous pregnancy outcome of multigravid women (n=579)	**%**
Live birth at more than 24 weeks	74.4
Miscarriage	19.3
Stillbirth	0.7
Termination of Pregnancy	5.6

NATIONAL CLINICAL AUDIT RESULTS

SECTION A : Screening for anaemia

765 (88.9%) women had their Hb checked in the 1st Trimester (up to 14 weeks and 6 days of pregnancy). The mean gestational age at booking in these women was 10 weeks 0 days, and the mean haemoglobin value was 128.7g/L. 20/765 (2.6%) women were anaemic.

80 women presented to healthcare providers for the first time later than 14 weeks and 6 days, but had their Hb checked at this presentation. 3 of these women booked at around 28 weeks and 19 women booked later than 32 weeks. The mean gestational age at presentation in this group was 23 weeks 5 days and the mean Hb value was 117g/L. This was 11g/L lower than in the mean haemoglobin in the first trimester reflecting the later stage of pregnancy.

Overall, 845 (98.2%) women were screened for anaemia either in the first trimester or at first presentation.

The MCV and MCH was recorded for 31/35 (88%) women. The mean MCV was 80.8, and the mean MCH was 40.6.

84 women were started on oral iron although they did not fulfil the criteria for a diagnosis of anaemia. These women had no symptoms documented and there were no obvious risk factors. 61/84 (73%) women went on to develop anaemia at some stage later in their pregnancy.

Table 7

First Trimester – Screening in 1st Trimester / at presentation	
Total number of women	860
Number screened in the 1st trimester	765 (88.9%)
Mean gestational age at screening	10 weeks
Mean haemoglobin	128.7 g/L
Number screened at first presentation but >14+6 weeks gestation	80
Mean gestation	23+5 weeks
Mean haemoglobin	117 g/L
Total number screened in 1st trimester and at 1st presentation	845 (98.2%)
Number anaemic at 1st trimester	20/765 (2.6%)
Mean haemoglobin	104.5 g/L
Number anaemic in 1st trimester and at 1st presentation	35/845 (4.14%)

Screening at 28 weeks +/- 2 weeks

812/860 (94.4%) women had their haemoglobin checked around 28 weeks' gestation. The mean haemoglobin value was 114.5 g/L. This was 14 g/L lower than the first trimester. In 24 women who booked before 20 weeks, there was no record of follow up screening at around 28 weeks. Overall; 815/841 (97%) women were screened at 28 +/- weeks gestation.

133/815 (16.3%) women screened at around 28 weeks were found to be anaemic. Their mean haemoglobin value was 99.6g/L. This was a further 14g/L lower than the mean at 28 weeks' gestation.

105/133 (79%) women had their MCV and MCH recorded. The mean MCV was 93.6 and the mean MCH was 31.5.

118/133 (89%) women were not previously diagnosed with anaemia. 15 women who were anaemic at 28 weeks were also diagnosed with anaemia in the first trimester.

Table 8

Third Trimester (28 weeks) - Screening	
Total number of women	841
Number screened in the 3rd trimester	815 (97%)
Gestation at screening	28 +/- 2 weeks
Mean haemoglobin	114.5 g/L

Anaemia at other stages in pregnancy

66 women were diagnosed with anaemia at other stages during pregnancy, and their Hb value was corrected for gestational age at diagnosis. The mean Hb value in this group was 101.4g/L

Ferritin levels were checked in 105/860 (12.2%) women, and the value was recorded for 99 women. The mean ferritin value was 46.4 ug/l. 18/99 (18%) women had a ferritin less than 30 u/gl and were anaemic.

SECTION B : Treatment

Anaemia at booking

20/765 (2.6%) women screened in the 1st trimester were found to be anaemic.
Their mean Hb value was 104.5g/L. Iron supplements were documented to have been started in 3 (15%) women. In 15/20 women the use of iron supplements was deemed 'not applicable', even though the haemoglobin value was diagnostic of anaemia. No reasons were given for these decisions. In all 3/20 women who were started on oral iron, while the type of iron and frequency was documented in 2/3. The dose was documented in 1/3.

Taking into account the number of women screened at presentation (845), a total of 35 (4.14%) of women were found to be anaemic. 17/35 (48%) women were started on oral iron, 1 declined and 17 were not treated.

Those started on oral iron: (n=17)
Of those 17 women who were started on oral iron, 8 remained anaemic despite the treatment.

Those not started on oral iron: (n=17)
For those 17 women not started on oral iron, 2 had worsening anaemia (20-22 g/L drop in haemoglobin), 8 remained anaemic and in 8 the anaemia was corrected (in 2 there was no actual improvement in Hb value, however when accounting for the haemodilution of pregnancy they were no longer anaemic).

Anaemia at 28 weeks screening:
33/118 (30%) women newly diagnosed with anaemia at 28 weeks screening were started on oral iron. The type, dose and frequency of oral iron was documented in 23 cases, while only the type of iron was documented in 5 cases.

Anaemia at other stages in pregnancy:
66 women were diagnosed with anaemia at other stages in pregnancy. 5/66 (7.6%) were started on oral iron.

Antenatal oral iron supplementation documentation and dosage:
Overall, 49 women were started on oral iron antenatally. 22 were started on treatment within 2 weeks.

Information leaflets:
It was documented that written information was given to 14/860 (1.6%) women who were audited and 14/219 (6.3%) women who were diagnosed with anaemia.

Dietary information:
It was documented that dietary advice was given to 32/860 (3.7%) women who were audited and 25/219 (11.4%) women who were diagnosed with anaemia in pregnancy. It was unknown If dietary advice was given to 129 women.

Summary: Anaemia during pregnancy: prevalence and treatment

Table 9

Diagnosis & Treatment of Anaemia	
1st trimester & 1st presentation	
Number diagnosed with anaemia 1st trimester	20/765 (2.6%)
Number diagnosed with anaemia 1st trimester and 1st presentation	35/845 (4.14%)
Number commenced on oral iron	17/35
Number responding to treatment	9/17
3rd Trimester (28 weeks' gestation)	
Number newly diagnosed with anaemia at 28 weeks' gestation	118/815(14.4%)
Number with anaemia from the 1st trimester & remaining anaemic. All taking iron	15
Total number anaemic in 3rd trimester	133/815 16.3%)
Number started on iron	33/118 (30%)
Number diagnosed at other stages of pregnancy	66 (8.1%)
Total number diagnosed with anaemia	219 (25.4%)
Number with **undiagnosed** anaemia (Hb < gestation threshold)	43
Total number of women with anaemia	**262 (30.4%)**

SECTION C: Follow up

Women being treated for iron deficiency anaemia during pregnancy need follow up between 2 to 4 weeks after initiating treatment to ensure that their haemoglobin level is improving. An increase of between 10-20g/L is the response required to conclude that the iron treatment is working. If the required increase is not seen, then the reasons for the sub-optimal response should be explored with the woman and further advice given.

Table 10

Follow up in women treated with oral iron	n
Anaemia at 1st contact	35
Number of women started on treatment	17
Anaemia (de novo) at 28 weeks follow up	118
Number of women started on treatment	33
Anaemia persisting from the 1st trimester	15
Anaemia at other stages of pregnancy	66
Number of women started on treatment	5
Total number of anaemic women started on oral iron	55
Follow up after 2 weeks	35 (64%)

Side effects at follow up

Many women experience symptoms that they ascribe to side effects caused by oral iron. The table below shows the side effects reported by women who were reviewed.

Table 11

Side effects	n
Constipation	4
Diarrhoea	1
Constipation and nausea	1
Nausea	3
No side effects reported	9

Haematinics

47 women had haematinics checked, but not all were women who were being treated for iron deficiency anaemia. 11 women were found to have B12 deficiency, and 6/11 were treated. 7 women were found to be folate deficient, and 5/7 were treated with folic acid

Table 12

Test	n checked
Ferritin only	15
Ferritin & transferrin	1
Ferritin, transferrin & TIBC	1
Ferritin, transferrin, TIBC, B12 & folate	4
Ferritin, transferrin, B12 & folate	2
Ferritin & B12	1
Ferritin, B12 & folate	18
TIBC only	1
B12 & folate	4

When oral therapy fails women should be offered intravenous iron replacement. 17 women were given an IV iron preparation.

Table 13

IV iron	n treated
Cosmofer	2
Venofer	1
Monofer	7
Ferrinject	7
Ferritin checked prior to IV iron	15
Hb checked after IV iron	5

SECTION D: Referral

Women who fail to have an appropriate response to iron therapy should be referred to secondary care for further management. Of the 35 without an adequate response, 27 were either not referred or there was no documentation to that effect.

Table 14

Women with inadequate response/ uncorrected anaemia >34 weeks	n
Already in secondary care	7
Referred to secondary care	1
Not referred	11
Not documented/ unknown	16

SECTION E: Labour and birth

35 women had uncorrected anaemia at or beyond 34 weeks' gestation. Of these, 10/35 (29%) remained anaemic when determined by the last measured Hb closest to labour, but their Hb was not rechecked when they presented in labour.

Table 15

Onset of labour	n & %
Spontaneous	410 (47.7%)
Induction of labour	285 (33.1%)
No labour	165 (19.2%)

Table 16

Mode of delivery	n & %
Normal vaginal delivery	470 (54.7%)
Ventouse	58 (63.1%)
Forceps	49 (5.7%)
Emergency caesarean	136 (15.8%)
Elective caesarean	145 (16.9%)
Vaginal breech	2 (0.2%)

Gestational age at delivery

This was recorded for 839/860 (97.6%) women. 55/839 (6.5% of recorded) babies were born before 37 weeks' gestation. 27/55 (49%) babies had a birth weight of less than 2500 grams. Gestational age ranged from 24 weeks 3 days to 36 weeks 6 days and the mean was 34 weeks 6 days.

Table 17

Gender of babies	n & %
Male	457 (52.4%)
Female	411 (47.1%)
Not recorded	4 (0.5%)

Fetal birthweight

Fetal birthweight was recorded for the newborn of all audited women and ranged from 600 grams to 4950 grams. The mean was 3354.7grams. 21 babies born after 37 weeks had a birth weight of less than 2500 grams

6/21 babies were born to women who had antenatal anaemia, 3 of which were uncorrected.

Management of the third stage of labour

Management of the third stage of labour was by the use of uterotonics in 787 women (93%); Physiological 48 women (6%); Surgical 1 woman; Not stated for 15 women.

SECTION F: Additional analysis

Comparisons between the anaemia and non-anaemia groups of women

The audit methodology allows us to compare outcomes between those women who developed anaemia at some time during their pregnancy and those that did not. Effectively, we have 2 non-anaemic women for every 1 case of anaemia. The comparisons made between these two groups are shown in table 18. There were significantly more women from the black and Asian ethnic minorities and fewer white women in the group who developed anaemia at some point during pregnancy. There were also more women from the anaemic group with pre-existing medical disorders although this did not reach statistical significance. There were significantly fewer women in the anaemia group having assisted vaginal delivery (p=0.041), but slightly more had a caesarean section. Most significant was the difference between the two groups for blood loss at the time of delivery. There were significantly more women in the anaemia group who lost more than 500mls of blood after birth, and the gap widened for greater than 1000mls.(p< 0.000)

Table 18

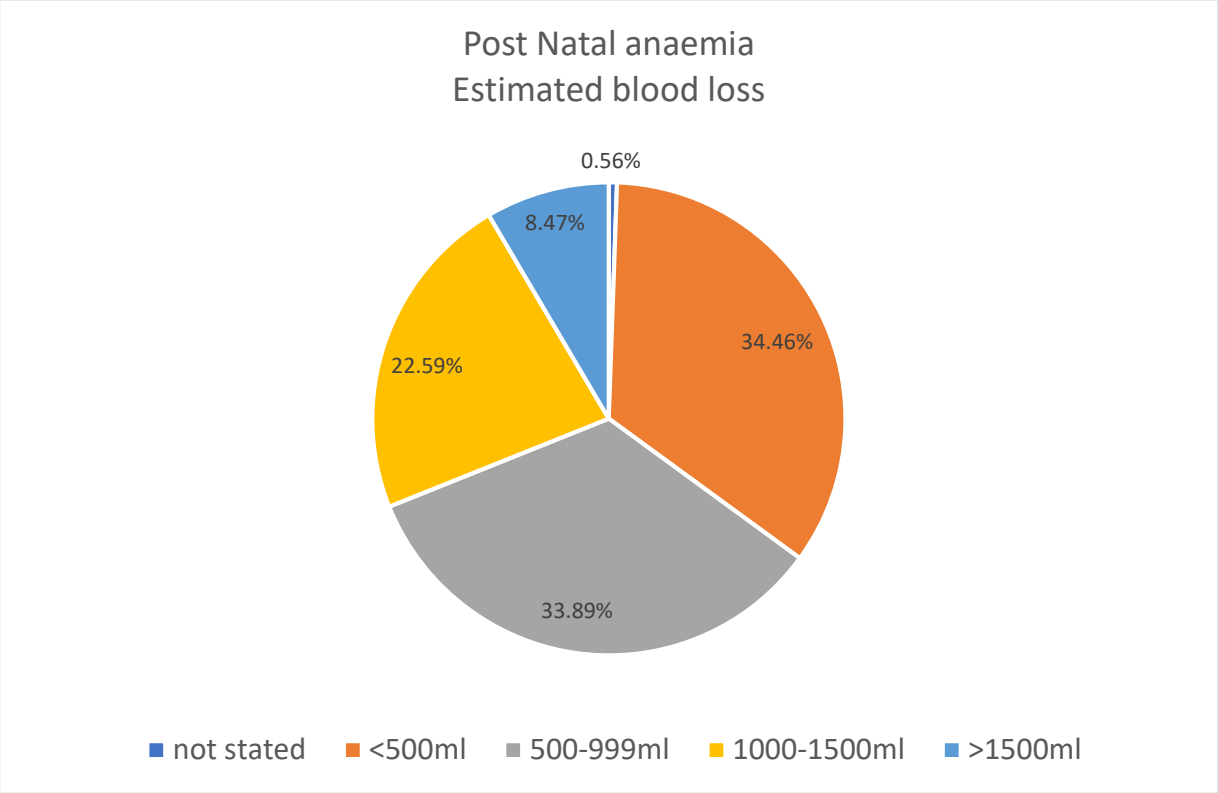
Cross group comparisons	**Anaemia n = 262**	**No anaemia n = 595**	**P<0.05**
Haemoglobin			
1st Trimester / presentation mean Hb	121.9 g/L	130.3 g/L	P<0.000
28 weeks / 3rd Trimester mean Hb	105.1 g/L	118.4 g/l	P<0.000
Ethnicity			P<0.001
British European	165 (67.2%)	445 (74.8%)	
Other European	8 (3%)	13 (2.2%)	
Southern Europe and other	14 (5.3%)	37 (6.2%)	
African & Caribbean	15 (5.7%)	17 (2.9%)	
South Asian	39 (14.9%)	43 (7.2%)	
South East Asian	2 (0.7%)	8 (1.3%)	
Missing	19 (7.2%)	32 (5.35)	
BMI kg/m^2	25.7	26.6	
Smoking	36 (13.7%)	74 (12.4%)	
Pre-pregnancy haematological disorders	12 (4.5%)	16 (2.6%)	
Pre-existing medical disorders	83 (31.7%)	154 (25.9%)	P=0.08
Nulliparous	79 (29.8%)	185 (31.9%)	
Multiparous	183 (70.2%)	394 (68%)	

Outcomes			
Pregnancy complications (FGR,PET,GDM, etc)	52 (19.8%)	100 (16.8%)	
Mean birth weight	3390 gms	3332 gms	
Birth weight < 2.5kg	14 (5.3%)	34 (5.7%)	
Gestational age at delivery < 37 weeks	16 (6.1%)	39 (6.3%)	
Gestational age at delivery > 37 weeks	246 (93.9%)	557 (93.6%)	
Mode of delivery			
Normal vaginal delivery	150 (57.2%)	317 (53.3%)	
Assisted vaginal delivery inc Breech	21 (8.0%)	88 (14.7%)	P = 0.04
Elective caesarean section	46	99	
Emerg caesarean section	45	91	
Total caesarean section	91 (34.7%)	190 (31.9%)	
Blood Loss			P <0.001
Estimated blood loss <500mls	176 (67.2%)	439 (73.8%)	
EBL 501 – 999 mls	50 (19%)	106 (17.8%)	
EBL 1000-1500mls	25 (9.5%)	31 (5.2%)	
EBL > 1500 mls	6 (2.3%)	11 (1.8%)	
Apgar < 7 at 5 mins	21 (8.0%)	0	

SECTION G: Postnatal anaemia

431/860 (50%) women had their Hb checked postnatally. Postnatal anaemia was defined as a haemoglobin value <100g/L. 177 (41.3%) women were found to be anaemic, and the mean haemoglobin value of the group was 88.8 g/L. The prevalence of postnatal anaemia in the whole sample was 20.7%.

Figure 1 – Estimated blood loss



Postnatal anaemia

18/177 (10%) of women with anaemia were not treated. 131/177 (74%) were treated with and discharged home on oral iron.

8/177 (4.5%) women were treated with IV iron in combination with oral iron or red cell transfusion. There was no documentation of oral iron on discharge.

20/177 (11%) women received a red cell transfusion. 13 of these women had reported symptoms of weakness, lethargy, palpitations, dizziness, chest pain, shortness of breath and pallor. Symptoms were not documented for 5 women and 2 women were reported as being asymptomatic, with haemoglobin values of 77g/L and 89 g/L respectively. The range of red cells used was 1 to 4 units, the mean was 1.56 units and the mode was 2 units. The number of units given was not recorded for 1 woman. 4/20 (20%) women were not reviewed following each unit transfusion. There was no documentation of oral iron on discharge.

SECTION H: Discussion

The findings of this national audit have confirmed that iron deficiency anaemia (IDA) is very prevalent during pregnancy (30.4% of women audited).

The findings should be interpreted alongside the strengths and weaknesses of the audit. The population sampled reflects the general population. The proportions of nulliparous, multiparous, ethnicities and the mean age and BMI of the 860 women were as expected from the general population. The results of the audit are therefore considered a true representation of the current state of anaemia management in maternal care. It could be argued that a sample size of 10 cases is small, but we had to consider the burden of data collection at hospital sites. No data verification was possible and it is likely the recording of treatment is under represented.

The main finding of this audit is that the prevalence of diagnosed IDA during pregnancy was 25.4%. When women who had a haemoglobin below the threshold but were not formally diagnosed with anaemia were added into the figures, the prevalence increased to 30.4%.

Despite standards and recommendations in national guidelines which require the need for pathways to support timely recognition and treatment of IDA in pregnancy, the results suggest that they are not effective. Even if the findings of the audit are affected by poor record keeping, the concern is that IDA in pregnancy is not being treated with the thoroughness that it warrants, especially given the risks known and consequences of anaemia for the mother and infant.

There is more uncertainty regarding the documented prevalence in the pueperium of 41.3%, given that only 50% of the total cohort were tested.

The audit shows ‘failures’ of screening are very low, and are generally due to women booking after the first trimester or moving between maternity units, making the case record incomplete. Overall 97-98% of women had their haemoglobin checked at their first presentation and at around 28 weeks’ gestation. This is in line with the published guidelines including NICE guidance on antenatal care.

Greater attention needs to be devoted towards the pathways for treatment of IDA in maternity care. Of the small number of women (35) diagnosed with IDA at first presentation, only 17 (51%) were recorded as being started on oral iron. Of those 17, 9 showed a response to iron. There were another 84 women who were started on oral iron despite not meeting the criteria for the diagnosis of IDA. From this group 73% went on to develop anaemia later in pregnancy. This suggests that some risk for IDA was recognised by the managing clinicians. For women diagnosed with IDA at 28 weeks gestation, only 30% were recorded as commenced on oral iron. For women diagnosed with anaemia at other stages of pregnancy, the record details treatment in 7.6%.

Of the women who were tested postnatally a large proportion were anaemic. This is as equally concerning as anaemia during pregnancy. Managing with a newborn whilst anaemic is difficult and it is known that the incidence of postnatal depression is higher in women who suffer from anaemia. In addition, wound healing is impaired by anaemia and so women who have had a caesarean section or an episiotomy / perineal tear are at risk

of wound complications. It is possible that there may be other, yet to be defined negative effects and further research needs to be undertaken into this area.

The cohort did not have any women affected by a haemoglobinopathy and it is important to note that anaemia in these women needs to be treated differently. The guidance for these women can be found in the BSH guideline.

Conclusion

Screening for anaemia in pregnancy is very good with high levels of attainment. However, treatment and follow up, once anaemia is detected, appears to be poor. The findings of this audit may have been hampered by poor recording in women's care records. Nevertheless, poor documentation is probably a reflection of the lack of weight or importance placed upon the diagnosis of anaemia in pregnancy. More attention needs to be placed on managing anaemic women in pregnancy and the puerperium with greater thoroughness.

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Appendix A – Clinical Audit Tool

1. What is the woman's year of birth?

What is her ethnicity? Please tick appropriate box or tick Q8 if unknown

2. *African or African/Caribbean* Yes ☐ No ☐

If known please specify

☐ Caribbean Islands
☐ Central Africa (Angola, Cameroon, Chad, Congo, Gabon, Sao Tome)
☐ East Africa (Burundi, Ethiopia, Kenya, Malawi, Mozambique, Somalia, Uganda)
☐ North Africa (Algeria, Egypt, Libya, Morocco, Sudan, Tunisia)
☐ South African Black (Botswana, Lesotho, Namibia, South Africa, Swaziland)
☐ South African European (Botswana, Lesotho, Namibia, South Africa, Swaziland)
☐ West African (Benin, Gambia, Ghana, Ivory Coast, Mali, Nigeria, Senegal, Togo)

3. *South Asian* Yes ☐ No ☐

If known please specify

☐ India/African-Indian/Sri Lanka
☐ Pakistan
☐ Bangladesh

4. *South East Asian* Yes ☐ No ☐

If known please specify

☐ China and Hong Kong
☐ Taiwan
☐ Singapore/Thailand/Indonesia/Burma/Malaysia/Vietnam/Phillipines/Cambodia/Laos

5. *Other non-European* Yes ☐ No ☐

If known please specify

☐ Middle East (Saudi Arabia, Iran, Israel, Kuwait, UAE, Yemen, Lebanon, Turkey)

6. *Southern and Other European* Yes ☐ No ☐

If known please specify

☐ Cyprus/Greece/Italy/Portugal/Spain/Sardinia/Other Mediterranean country/Albania/Czech Republic/Poland/Romania/Russia

7. *United Kingdom and Northern European* Yes ☐ No ☐

If known please specify

☐ United Kingdom
☐ Republic of Ireland
☐ Austria/Belgium/France/Germany/Netherlands/Switzerland
☐ Scandinavia (Norway, Sweden, Denmark, Finland, Iceland)
☐ Mixed African European
☐ Mixed Caribbean European
☐ Other

8. ☐ Ethnicity not stated

9. What was the woman's height? ☐☐☐ **cm**

10. What was the woman's weight? ☐☐☐ **Kg**

11. What was the woman's BMI? ☐☐☐ **Kg/m^2**

12. Does the woman smoke?

Yes ☐ No ☐ Ex-smoker ☐

KNOWN MEDICAL DISORDERS PRIOR TO PREGNANCY

13. Any medical disorder? Yes ☐ No ☐

If yes, answer questions 14 to 25 as appropriate. If no, go to Q26

14. Hypertension? Yes ☐ No ☐

14a. If yes, was it

☐ Essential
☐ Secondary e.g. renal, Cushing's, etc.

15. Diabetes? Yes ☐ No ☐

15a. If yes, was it

☐ Pre-existing Type 1 Diabetes Mellitus
☐ Pre-existing Type 2 Diabetes Mellitus

16. Cardiac disease? Yes ☐ No ☐

16a. If yes, was it

☐ Ischaemic Heart Disease
☐ Uncorrected congenital heart disease
☐ Other, please state

17. Respiratory disease? Yes ☐ No ☐

17a. If yes, was it

☐ COPD
☐ Asthma
☐ Other, please state

18. Renal disease? Yes ☐ No ☐

18a. If yes, was it

☐ Chronic kidney failure
☐ Requiring dialysis
☐ Other, please state

19. Endocrine disorders? Yes ☐ No ☐

19a. If yes, please specify

20. Psychiatric disorders? Yes ☐ No ☐

20a. If yes, was it

☐ Anxiety disorder
☐ Depression
☐ Psychoses requiring therapy
☐ Eating disorder

21. Pre-pregnancy haematological disorders Yes ☐ No ☐

21a. If yes, was it

☐ Iron deficiency anaemia
☐ Pernicious anaemia

☐ Sickle cell disease
☐ Sickle cell trait

 Thalassaemia trait (no regular transfusions)
 Thalassaemia Major (requires regular transfusions)

☐ Thrombophilia: e.g. Factor V Leiden, etc. (Please specify):

☐ Bleeding disorder: e.g. Haemophilia (Please specify):

22. Inflammatory disorders Yes ☐ No ☐

22a. If yes, was it

☐ Crohn's disease
☐ Ulcerative colitis

23. Autoimmune disease Yes ☐ No ☐

23a. If yes, was it

☐ Coeliac disease
☐ Rheumatoid arthritis
☐ SLE

24. Cancer Yes ☐ No ☐

24a. Please give details

25. HIV Yes ☐ No ☐

PRE-PREGNANCY MEDICATION HISTORY

26. Was the woman prescribed or self-medicating with any of the following prior to pregnancy? *(Please tick all that are appropriate)*

Antacids (e.g. Gaviscon, etc.) ☐
H2 antagonists (e.g. Ranitidine, etc.) ☐
Proton pump inhibitors (e.g. Omeprazole, etc.) ☐
Anti-emetics (e.g. Cyclizine, Stemetil, etc.) ☐
Vitamin B12 (e.g. Cyanocobalamin, etc.) ☐
None ☐

27. Was the woman taking Folic acid? Yes ☐ No ☐

27a. If yes, what was the dosage?

☐ 400 µg
☐ 5 mg
☐ Other
☐ Not known

28. Was the woman taking iron? Yes ☐ No ☐

28a. If yes, and it was oral iron, what was the dose and dosage?

☐ **Mg** 28b **OD / BD / TDS** ☐ Not known

28c. The woman was being given IV iron ☐

29. OBSTETRIC HISTORY *(previous pregnancies only – not the pregnancy you are auditing)*

Please supply the following numbers

Total number of previous pregnancies	Deliveries at ≥ 24 weeks	Babies alive at birth	Stillbirths	Neonatal deaths	Miscarriages & Ectopic	Terminations of pregnancy

30. What was the type of pregnancy that preceded the current pregnancy?

Not applicable ☐
Live birth after 22 weeks' gestation ☐
Stillbirth > 24 weeks' gestation ☐
Miscarriage 4 – 24 weeks / Ectopic ☐
Termination of pregnancy ☐

31. What was the date that this preceding pregnancy finished? *(mm/yyyy)*

☐ Not applicable m m y y y y

☐☐ ☐☐☐☐

CURRENT PREGNANCY

32. What was the gestation at first (booking) contact? ☐☐ weeks ☐ days

33. What was the first (booking) haemoglobin (Hb) result? ☐☐☐ g/L

34. What was the 28-week Hb result in pregnancy? ☐☐☐ g/L

35. Was the woman diagnosed with anaemia at any point during the pregnancy?

Yes ☐ No ☐

If yes, go to Q36. If no, go to Q40

36. What was the gestation at the time of diagnosis? ☐☐ weeks ☐ days

37. At the time of diagnosis what was the Hb concentration? ☐☐☐ g/L

38. What were the laboratory blood indices at the time of diagnosis of anaemia?

MCV ☐ MCH ☐ MCHC ☐

39. What symptoms did the woman experience at the time of diagnosis of anaemia?

- ☐ None
- ☐ Not documented
- ☐ Chest pain
- ☐ Dizziness
- ☐ Headache
- ☐ Irritability
- ☐ Lethargy
- ☐ Pallor
- ☐ Palpitations
- ☐ Pica
- ☐ Shortness of breath
- ☐ Weakness

40. Was there evidence of a haemoglobinopathy from a blood count/film taken in this pregnancy? *(Disease or trait)*

Only answer this question if Q21 is "No" or if the answer to Q21 is "Yes", but the Sickle Cell and Thalassaemia options in Q21 have not been ticked

Yes ☐ No ☐ Not Checked ☐

40a. If yes, was it

- ☐ Sickle cell disease
- ☐ Sickle cell trait
- ☐ Thalassaemia trait (no regular transfusions)
- ☐ Thalassaemia Major (requires regular transfusions)

41. Was the ferritin level checked at booking? Yes ☐ No ☐

If yes, go to Q42. If no, go to Q44

42. What was the ferritin level? ☐☐☐ µg /l

43. If ferritin was less than 30 micrograms/L, and one risk factor (see Appendix A) was present, were iron supplements started?

Yes ☐ No ☐ Ferritin not less than 30 ☐

44. What was the length of time from Hb result to starting iron supplementation?

☐☐ weeks ☐ days ☐ Not known

45. What *type, dose* *frequency* of the oral iron preparation?

(For example, Ferrous Fumarate 200mg BD)

Type	*Dose*	*Frequency*

☐ Not known

46. Was written information about taking oral iron given at the start of treatment?

Yes ☐ No ☐ ☐ Not known

46a. Was written information about diet given at the start of treatment?

Yes ☐ No ☐ ☐ Not known

FOLLOW-UP

47. Was the Hb repeated after 2 – 4 weeks to check for a response to oral iron?

Yes ☐ **Go to Q49** No ☐ **Go to Q48**

48. Was the Hb rechecked at any point?

Yes ☐ **Go to Q49** No ☐ **Go Q50**

49. At what gestational age was the Hb retested to check for a response to oral iron?

☐☐ weeks ☐ days

50. Were side effects of oral iron therapy reported? Yes ☐ No ☐

If yes, go to Q51. If no, go to Q52

51. Which side effects did the woman experience?

- ☐ None
- ☐ Not documented
- ☐ Black stools
- ☐ Constipation
- ☐ Heartburn
- ☐ Nausea

52. Was the dose / preparation modified? Not required ☐ Yes ☐ No ☐

If yes, go to Q53. If No or Not required, go to Q54

53. What was the new dose / preparation?

Type	*Dose*	*Frequency*

54. If there was an inadequate response to supplementation *(i.e. less than 10-20 g/L increase in Hb over 2 weeks)* **was the woman referred to secondary care?**

Yes ☐ No ☐ ☐ Adequate response

If yes, go to Q55. If not or not applicable, go to Q59

55. Were the other haematinics checked? Yes ☐ No ☐

If yes, go to Q56. If not, go to Q59

56. Which values were checked?

- ☐ Ferritin
- ☐ Transferrin
- ☐ TIBC
- ☐ Vitamin B12
- ☐ Folate

Using your normal laboratory reference ranges . . .

57. Was there evidence of vitamin B12 deficiency? Yes ☐ No ☐

57a. If yes, was the woman started on supplementation? Yes ☐ No ☐

58. Was there evidence of folate deficiency? Yes ☐ No ☐

58a. If yes, was the woman started on supplementation? Yes ☐ No ☐

59. Was the woman given IV iron? Yes ☐ No ☐

If yes, go to Q59a. If not, go to Q62

59a. What form of IV iron was given?

- ☐ Cosmofer
- ☐ Venofer
- ☐ Ferinject
- ☐ Monofer

60. Was ferritin checked before IV iron was given? Yes ☐ No ☐

If yes, go to Q60a. If not, go to Q61

60a. What was the ferritin level? ☐☐☐ µg /l

61. Was the Hb repeated after 2 – 4 weeks to check for a response to IV iron?

Yes ☐ **Go to Q63** No ☐ **Go to Q62**

62. Was the Hb rechecked at any point before 28 weeks?

Yes ☐ **Go to Q63** No ☐ **Go to SECTION 3**

63. At what gestational age was the Hb retested to check for a response to IV iron?

☐☐ weeks ☐ days

64. What was the difference in Hb values of the first Hb in pregnancy (Q33) and the Hb when re-tested?

Hb when re-tested ☐☐☐

Difference in Hb values ☐

REFERRAL

65. If there was an inadequate response to treatment *(i.e. less than 10-20 g/L increase in Hb over 2 weeks)* **were further investigations for anaemia undertaken?**

Yes ☐ No ☐ ☐ Adequate response

If the response was adequate, go to SECTION 3. If not, complete Q66

66. Was the woman referred to a specialist obstetrician or haematologist?

Yes ☐ No ☐ ☐ Already in secondary care

LABOUR, BIRTH AND THIRD STAGE

67. Was the Hb re-checked in the 7 days prior to the onset of labour?

Yes ☐ **Go to Q68** No ☐ **Go Q69**

68. At what gestational age was the Hb re-tested to check for a response to iron?

☐☐ weeks ☐ days

69. What was the onset of labour?

- ☐ Spontaneous
- ☐ Induction
- ☐ No labour

70. What was the mode of delivery?

- ☐ NVD
- ☐ Ventouse
- ☐ Forceps
- ☐ EL-LSCS
- ☐ EM-LSCS
- ☐ Vaginal breech

71. What was the outcome?

- ☐ Live birth
- ☐ Stillbirth
- ☐ Neonatal death

Space is provided in the following questions to accommodate those women who had twins. See guidance notes.

72. What was the gender of the baby?

Baby 1 ☐ Male ☐ Female *Baby 2* ☐ Male ☐ Female

73. What was the gestational age at delivery? ☐☐ weeks ☐ days

74. What was the birthweight of the baby in grams?

Baby 1 ☐☐☐☐ *Baby 2* ☐☐☐☐

75. What was the 5 minute Apgar score? *Baby 1* ☐☐ *Baby 2* ☐☐

76. What was used for pain relief?

☐ None
☐ Water
☐ Entonox
☐ Opiates
☐ Epidural
☐ Spinal
☐ General anaesthetic

77. What was the woman's Hb closest to the birth of the baby?

☐☐☐ g/L ☐ Hb Not done

78. What was used for the management of the third stage of labour?

☐ Physiological
☐ Oxytocin IM
☐ Syntometrine IM
☐ Oxytocin bolus IV
☐ Oxytocin infusion

79. What was the estimated blood loss?

☐ Less than 500 ml
☐ 501 - 999 ml
☐ 1000 - 1500 ml
☐ Greater than 1500 ml

POST DELIVERY

80. Was the woman's Hb <100 g/L at this point or at any other point within 72 hours of birth?

Yes ☐ No ☐

81. What was the lowest Hb within the first 72 hours from birth?

g/L ☐☐☐

☐ Hb not checked

82. How was the woman treated?

☐ Oral iron *Please also answer question 83*
☐ IV iron *Please also answer question 84*
☐ Blood transfusion *Please also answer questions 85 to 89*
☐ Declined treatment
☐ Not recorded

83. If oral iron was given, what was the *type, dose & frequency* of the oral iron preparation and the duration for which it was given?
(For example, Ferrous Fumarate 200mg BD for 4 weeks)

Type	*Dose*	*Frequency*	*How many weeks?*

84. If IV iron, what form of IV iron was given?

☐ Cosmofer
☐ Venofer
☐ Ferinject
☐ Monofer

Blood Transfusion:
Answer Q85 to Q95 if the woman had red cells to treat the anaemia. **Otherwise go to Q96**

85. Did the woman have symptomatic anaemia?

Yes ☐ No ☐ ☐ Not known

86. What symptoms did she experience?

☐ None
☐ Not documented
☐ Chest pain
☐ Dizziness
☐ Headache
☐ Irritability
☐ Lethargy
☐ Pallor
☐ Palpitations
☐ Shortness of breath
☐ Weakness

87. What was the pre-transfusion Hb? ☐☐☐ g/L

88. Is there documented evidence of consent for the transfusion?

Yes ☐ No ☐

89. Is there documented evidence that the woman was offered alternatives to transfusion?

Yes ☐ No ☐

90. How many units of red cells were transfused? ☐☐

91. Was the woman reviewed after each unit of red cells prior to further transfusion?

Yes ☐ No ☐ Only 1 unit transfused ☐

92. Was the Hb taken after each unit of red cells prior to further transfusion?

Yes ☐ No ☐ Only 1 unit transfused ☐

93. Did a transfusion reaction occur? Yes ☐ No ☐

93a. If yes, please give details

94. Was there a post-transfusion Hb check, done prior to discharge home?

Yes ☐ No ☐

95. If yes, what was the Hb? ☐☐☐ **g/L**

96. Was the woman discharged on oral iron? Yes ☐ No ☐

97. If oral iron was given, what was the *type, dose & frequency* of the oral iron preparation and the duration for which it was given?
(For example, Ferrous Fumarate 200mg BD for 4 weeks)

Type	*Dose*	*Frequency*	*How many weeks?*

☐ Not recorded

98. Was post-natal follow-up of Hb with a GP advised? Yes ☐ No ☐

PREGNANCY COMPLICATIONS

99. During the current pregnancy did the woman have any of the following obstetric complications?

Gestational Hypertension	Yes ☐	No ☐
Pre-eclampsia	Yes ☐	No ☐
Gestational Diabetes Mellitus	Yes ☐	no ☐
Fetal Growth Restriction	Yes ☐	no ☐
Placental complications, abruption, praevia or accrete	Yes ☐	no ☐

END OF QUESTIONNAIRE

Indications for assessment of serum ferritin.

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Anaemic women where estimation of iron stores is necessary

- Known haemoglobinopathy
- Prior to parenteral iron replacement

Non-anaemic women with high risk of iron depletion

- Previous anaemia
- Multiparity ≥P3
- Consecutive pregnancy <1 year following delivery
- Vegetarians
- Teenage pregnancies
- Recent history of bleeding

Non-anaemic women where estimation of iron stores is necessary

- High risk of bleeding
- Jehovah's witnesses

Appendix B – Organizational Audit Tool

National Comparative Audit of Blood Transfusion

SiteCode

NHS Blood and Transplant

2018 National Comparative Audit of the Management of Maternal Anaemia

Organizational Audit Tool

1. How many births did your maternity unit have in 2017? ____

2. Of these births, what percentage were:

   Singletons? ____

   Twins ____

   Higher order number (triplets, etc.) ____

3. What is the ethnic mix of your population in percentages (reasonable estimates are acceptable if precise figures are not available)?

Ethnicity	%
UK & Northern European	
South Asian	
South East Asian	
African/African Caribbean	
Others	

6. Do you conduct routine haemoglobinopathy screening on all pregnant women presenting for care? Yes No

7. Does your Trust manage a midwifery-led unit? Yes No

7a. If yes, is this

   "alongside" *(i.e. in close proximity to or on the same site as)* the Consultant unit? Yes No

   "Distant" (*i.e. on a different site or stand-alone*)? Yes No

8. Does your unit have guidelines for the investigation and management of maternal anaemia? Yes No

9. Are staff able to refer women to a haematologist for further advice/ investigation/management? Yes No

Appendix C – List of participating sites

Altnagelvin Hospital
Aneurin Bevan University Health Board
Antrim Area Hospital
Ashford and St. Peter's Hospitals NHS Foundation Trust
Barking Havering and Redbridge University Hospitals NHS Trust
Basildon and Thurrock University Hospitals NHS Foundation Trust
Bedford Hospital NHS Trust
Birmingham City Hospital
Birmingham Women's and Children's NHS Foundation Trust
Bolton NHS Foundation Trust
Brighton and Sussex University Hospitals NHS Trust
Calderdale and Huddersfield NHS Foundation Trust
Cambridge University Hospitals NHS Foundation Trust
Chesterfield Royal Hospital NHS Foundation Trust
City Hospital Campus Nottingham
City Hospitals Sunderland NHS Foundation Trust
Countess of Chester Hospital NHS Foundation Trust
Craigavon Area Hospital
Daisy Hill Hospital
Diana Princess of Wales Hospital
East and North Hertfordshire NHS Trust
East Kent Hospitals University NHS Foundation Trust
Frimley Park Hospital
Furness General Hospital
Gateshead Health NHS Foundation Trust
Good Hope Hospital
Guy's and St. Thomas' NHS Foundation Trust
Harrogate and District NHS Foundation Trust
Hinchingbrooke Hospital
James Paget University Hospitals NHS Foundation Trust
Kettering General Hospital NHS Foundation Trust
Kingston Hospital NHS Foundation Trust
Lancashire Teaching Hospitals NHS Foundation Trust
Leicester General Hospital
Leicester Royal Infirmary
Liverpool Women's NHS Foundation Trust
Maidstone and Tunbridge Wells NHS Trust
Medway NHS Foundation Trust
Milton Keynes University Hospital NHS Foundation Trust
National Maternity Hospital Dublin
Newham Hospital
NHS Tayside
Norfolk and Norwich University Hospitals NHS Foundation Trust
North Tees and Hartlepool NHS Foundation Trust
Northampton General Hospital NHS Trust
Oxford University Hospitals NHS Foundation Trust
Peterborough City Hospital

Poole Hospital NHS Foundation Trust
Queen Charlotte's & Chelsea Hospital
Queen's Medical Centre
Royal Berkshire NHS Foundation Trust
Royal Jubilee Maternity Hospital
Royal Lancaster Infirmary
Royal Stoke University Hospital
Royal Surrey County Hospital NHS Foundation Trust
Salisbury NHS Foundation Trust
Scarborough Hospital
Scunthorpe General Hospital
Sheffield Teaching Hospitals NHS Foundation Trust
South Tees Hospitals NHS Foundation Trust
South Tyneside NHS Foundation Trust
South Warwickshire NHS Foundation Trust
South West Acute Hospital Enniskillen
St. Helens and Knowsley Teaching Hospitals NHS Trust
St. Mary's Hospital, Manchester
St. Richard's Hospital
St.Helier Hospital
Surrey and Sussex Healthcare NHS Trust
The Newcastle upon Tyne Hospitals NHS Foundation Trust
The Rotherham NHS Foundation Trust
The Royal London Hospital
The Royal Wolverhampton Hospital
The Ulster Hospital
Torbay and South Devon NHS Foundation Trust
University Hospital North Durham
University Hospital of Wales
University Hospital Southampton NHS Foundation Trust
University Hospitals Coventry and Warwickshire NHS Trust
University Hospitals Plymouth NHS Trust
West Middlesex University Hospital
Westmorland General Hospital
Wexham Park Hospital
Whipps Cross Hospital
Worthing Hospital
Wye Valley NHS Trust
Wythenshawe Hospital
York Hospital