

An evaluation of the need for pre-operative full blood count screening and audit of appropriate follow-up prior to dental care under general anaesthesia at Bradford Royal Infirmary

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Introduction

All Bradford Community Dental Service (CDS) patients attending Bradford Royal Infirmary (BRI) for dental care under general anaesthesia (GA) currently have a routine pre-operative full blood count (FBC) screening carried out, where patient co-operation allows. This practice was implemented a number of years ago when sickle testing of all Asian patients was best practice; this is no longer recommended (NICE, 2016). However, at that time BRI anaesthesia colleagues anecdotally observed that such patients in Bradford were more likely to have low haemoglobin levels (Hb) which could impact on the patients suitability for care under GA. Of note, other dental hospitals in Yorkshire (including Leeds Dental Institute), do not routinely carry out a FBC screen prior to GA.

From a service user/ carer perspective, the additional appointment required at St Luke's Hospital for the FBC can be inconvenient and the patient can find the venepuncture uncomfortable. A Canadian study found that 27% of children had memories of pain experienced during a former hospitalization; pain experience included venepuncture and cannulation (St-Laurent-Gagnon et al., 1999). In addition, the financial cost for each FBC screening, facilitated by Bradford Teaching Hospital Foundation Trust, is £8.00 per blood test completed.

Interestingly, a clinical trial conducted in Kentucky University which investigated laboratory test anomalies in dental patients concluded that "male sex was associated with low hemoglobin", "blacks were more likely to have low haemoglobin and Asian Americans were more likely to have high total protein in serum" (Miller and Westgate, 2014).

Guidance for the health visiting teams in Bradford has reported that Iron Deficiency Anaemia (IDA) is one of the most commonly reported nutritional disorder in early childhood. Unlike adults IDA in children is difficult to detect by clinical observation however interestingly some risk factors identified include: dental decay and prolonged breast feeding.

The National Institute for Health and Care Excellence (NICE) have produced guidance regarding pre-operative tests for elective surgery in patients over the age of 16 (NICE 2016); no guidance exists for under 16 year old patients. Pre-operative blood tests required prior to GA depend on the patient's American Society of Anesthesiologists (ASA) grade and surgery grade (Appendix 1 and 2). Of note, any ASA grade 4 patients are referred to Leeds General Infirmary for GA. Within the NICE guidance, NICE do not recommend FBC tests for minor surgery procedures under GA with dental extractions deemed as minor surgery (Appendix 3).

Aims/Objectives

Primary Aim

- To identify the number of patients with FBC test abnormalities identified from the routine pre-GA FBC screen.

Secondary Aims

- To identify the demographics of patients receiving pre-GA FBC screen and link with any FBC anomalies to assist in development of any appropriate new local guidance. Demographics will include:
 - R4 Number
 - Ethnicity
 - Age
 - ASA grade
 - Weight
 - Medical issues
 - List type: extractions- only GA or comprehensive care GA
 - FBC test results (Appendix 4),
 - Social history (CPP/CAF in place)
 - Interpreter required
 - Postcode (to link to deprivation category) (Appendix 5)
- To evaluate the clinical implications of any abnormal pre- op blood tests results and confirm if appropriate follow- up had been completed.
- To evaluate the financial implications of routine pre-operative FBC screening.

Guidelines/Standards

NICE Guidelines state FBC tests for minor surgery procedures, such as dental extractions under general anesthesia, are not routinely required in individuals 16 years and older. There are currently no guidelines for under 16 year olds.

Hb Ranges:

Normal range Hb : 115-150 g/dl.

Minor Hb abnormalities: 101-114 g/dl (probably safe level for GA but anaemic and requiring follow-up with GMP/ Paediatrician)

Abnormal Hb: <100g/dl (below the safe level for GA)

Standard 1:

From discussions with the BRI anesthetic team it was provisionally agreed that if the results from this evaluation found >1% of patients presenting with abnormal Hb and/or >10% with minor Hb abnormalities, FBC would continue to be required for the local population as a routine pre-operative investigation. If <1% of patients presented with abnormal Hb and/or <10% with minor Hb abnormalities then routine pre-op FBC should be ceased.

Standard 2:

All abnormal blood test results should be followed-up with the GMP/ Paediatrician as appropriate with further investigations possibly required depending on the patients' co-morbidities and number of extractions required.

Sample

The first 100 patients treated since February 2016 were identified from the CDS K-drive database and data collected retrospectively.

Methodology

Demographics and FBC results from the R4 dental electronic patient records were retrospectively collected on a standardised data collection form (Appendix 5). Data was transferred to an Excel Spreadsheet and simple statistical analysis completed.

Auditors

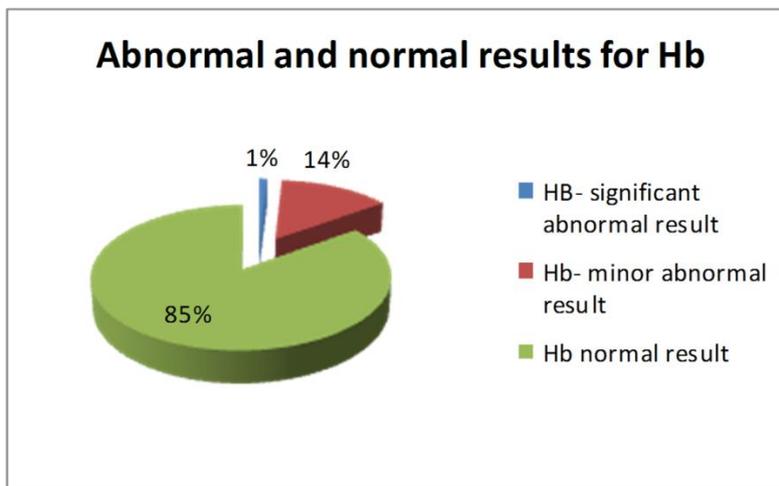
Linzi Maybin
Frankie Soldani

Results

Two patients from the first 102 patients treated had refused blood tests due to anxiety and were therefore excluded from further data collection.

In total, minor abnormal Hb results were found in 14% of patients with abnormal Hb results (Hb at 91 indicating microcytic hypochromic anaemia) noted in one patient (Figure 1).

Figure 1: Abnormal and normal Hb results



Other FBC parameter abnormalities were noted in 36% of all patients (some patients had a number of abnormalities) which included:

- Mean Corpuscular Volume- 10 abnormalities
- Platelets-20 abnormalities
- White Cell Count- 7 abnormalities
- Sickle cell disease carriers- 3 patients
- Neutrophils-5 abnormalities

Twelve patients had multiple abnormalities in a number of FBC parameters including Hb. The majority of patients with any abnormal FBC parameter, other than Hb, were ASA grade 2 (Table1).

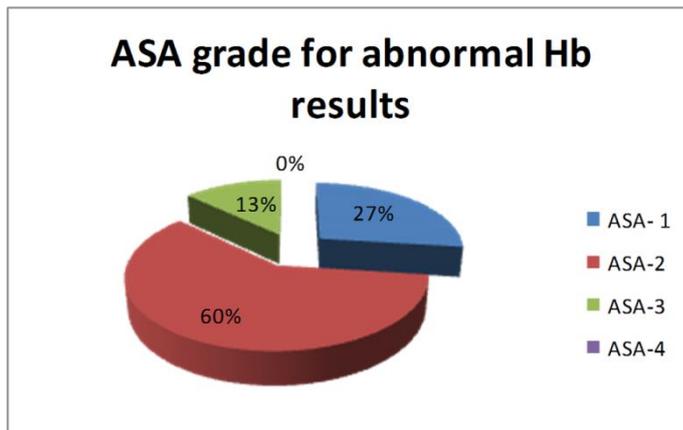
The medical conditions of these patients included Down’s Syndrome, asthma, autistic spectrum disorder, speech delay, hypoadrenalism, deficiency in growth and steroid hormone and Ketotic hypoglycaemia.

Only three patients with minor Hb abnormality results were fit and well. Additionally, four patients with minor Hb abnormality results were on the non-Dales suite exodontia list. In total, 60% of patients with abnormal and minor Hb abnormality results were ASA grade 2 (table 1, figure 2).

Table 1: ASA grade of all patients

ASA Grade	Abnormal and minor Hb abnormality result	Any other abnormal FBC parameter results	All data
1	4	10	28
2	9	22	60
3	2	4	12
4	0	0	0

Figure 2: ASA grade for abnormal Hb results.



The majority of all patients treated were Asian British Pakistani (Table 2) and thus made up the largest proportion of those with abnormal and minor Hb results and/or any other abnormal FBC result; overall 47% of all Asian British Pakistanis had some form of Hb or FBC anomaly. Interestingly, 53% of all “other white background” patients had some form of Hb anomaly.

Table 2: Ethnic background of all patients

Race	Abnormal and minor Hb abnormality result	Any other abnormal FBC parameter results	All results
Declined	2	9	18

White British	1	6	19
Other white background	7	3	13
Asian British Pakistani	4	14	38
Other ethnic background	1	2	6
Other black background	0	1	1
Asian British Bangladeshi	0	1	3
White and Asian	0	0	1
Other Asian	0	0	1

The majority of patients treated (94%) had no safeguarding concerns or social worker; 3 of those with abnormal FBC results had safeguarding concerns or a social worker.

Of the total data, 15% of patients surveyed required an interpreter. Out of all the abnormal FBC parameters 11 patients required interpreters. These languages included Hungarian, Romanian, Slovak, Urdu, Bengali.

Overall, 89% of patients lived in the areas of greatest deprivation(1-3) (Table 3); all those with an abnormal or minor Hb abnormality lived in these areas.

Table 3: Postcode and area of deprivation for all patients

Postcode	Abnormal /minor Hb abnormality result	Any other abnormal FBC parameter result	All results	Area of deprivation 1= most deprivation 10 = least deprivation
BD1 BD2 BD3 BD4 BD5 BD6 BD7 BD8 BD9 BD14 BD29	15	32	89	1-3
BD10 BD13	0	4	11	4-10

BD15				
BD16				

With regards to patient weight, in total seven patients were overweight and two patients were underweight; none of these patients had abnormal Hb. Two overweight patients had raised neutrophils and one underweight patient had low MCV.

Overall, 60% of patients with abnormal results were followed- up (Table 4). Interestingly 6 patients had multiple follow-up actions completed with a number of health care professionals or repeat FBC blood tests actioned.

Table 4: Follow-up of all FBC anomalies

Follow-up requested from:	Number of patients
GMP	17
Paediatrician	8
Consultant Haematologist	2
St Luke's Hospital	1
Repeat FBC	6
No follow- up requested	17

Conclusion

In conclusion, one patient had an abnormal Hb level result which confirmed microcytic hypochromic anaemia; 14% of patients had minor Hb abnormalities. A number of other FBC parameter abnormalities were picked up and while the majority of patients were followed-up this was not the case for all.

Discussion

Of the Hb results, only one patient had a significant Hb abnormal result which confirmed microcytic hypochromic anaemia and 14% of patients had minor Hb abnormalities. These results would suggest that routine FBC tests for all patients undergoing comprehensive dental care under GA should continue. Furthermore, the FBC results identified 36 patients with other abnormal FBC results; some patients had multiple abnormal parameters. Within the other abnormal FBC parameters results three patients were diagnosed as sickle cell disease carriers.

Of note, the two patients who refused the blood test (and were subsequently excluded from data collection) indicating that some children find blood tests an anxiety inducing process. It may also suggest that as a service we are effective at identifying patients that can cooperate for a blood test or otherwise.

All of the patients with abnormal/minor abnormality Hb results and 89% of patients with other abnormal FBC results lived in the highest areas of deprivation in Bradford (1-3). This would suggest that those in more deprived areas might benefit more from routine pre-op FBC than those in more affluent areas; the reasons for this likely to be complex and multi-factorial. It should also be noted that the sample size for this evaluation was small and thus the results should be interpreted with caution and generalisations difficult to make.

The majority of patients with any type of Hb anomaly was ASA grade 2 (60%) and ASA grade 1 (27%). This is perhaps not surprising as the majority of patients on this general anaesthetic list are ASA 2.

In relation to race, 39% 'other abnormal FBC parameter' results were Asian British Pakistani, 8% were other white background and 17% were white British. Interestingly, 53% of all 'other white background' patients had Hb abnormalities, also 37% of Asian British Pakistani patients had other FBC parameter abnormalities. The small sample size makes it difficult to come to any specific conclusions as to recommendations around which patients would benefit most from pre-op FBC screening.

Importantly, the results show the need for improvement of follow-up with only 60% of patients followed up by repeat blood test or correspondence with GMP, paediatricians or haematologists. This is disappointing given a standardised pro-forma already exists for staff use and further exploration as to the challenges surrounding this needs to take place.

Finally, these results clearly show that 1% of patients had a significant abnormal Hb and >10% of patients had a minor Hb abnormality result which will necessitate the continuation of pre-op FBC testing. The financial cost for each FBC screening, facilitated by Bradford Teaching Hospital Foundation Trust, is £8.00 per blood test completed. Of note, the one patient with an abnormal Hb result had their general anaesthetic cancelled until such a time as a repeat FBC blood test noted the Hb to have improved. Having this information in advance reduced the GA risk for this individual patient and allowed the cancelled GA slot to be filled thus preventing a GA slot being unused at significant cost to the service and NHS overall. It could be argued that the £800 required to facilitate the 100 FBC completed was 'recovered' with the identification of this one patient; patient risk was minimized and full- utilization of GA capacity was facilitated. However it could be argued that patients who haven't had the FBC blood test are still having the GA anyway.

The Quality and Safety team of BDCFT CDS is in ongoing discussion with the medical and dental teams regarding how best to move forward given the complexities of multiple GA lists/ sites/ trusts/ pre-assessment pathways that our patients go through for not only our BRI GA patients, but also those who have GA at Airedale General Hospital Dales Suite and Main Theatre Suite.

Recommendations

- Results to be presented at BDCFT peer review meeting, BSPD conference, ADA conference.
- Results to be discussed with the BTHFT Anaesthetic and Paediatric Medical teams to confirm or otherwise if routine pre-GA FBC should continue for all patients.
- All patients with abnormal FBC should be followed- up appropriately
- Re-audit in 12 months.

Learning points

Not all patients were followed- up appropriately and robust systems are required to ensure that this occurs. A standardised letter is already available for clinicians to

use where abnormal FBC results are noted; all clinicians involved in the BRI lists must ensure this is used in a timely manner where abnormal FBC results are noted.

Acknowledgements

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References:

NICE Guidelines. 2016. Routine pre-operative tests for elective tests for elective surgery. Accessed on 10/12/16:

<https://www.nice.org.uk/guidance/ng45/resources/routine-preoperative-tests-for-elective-surgery-1837454508997>

Miller, C. Westgate, P. 2014. Implications of medical screenings of patients arriving for dental treatment: the results of a comprehensive laboratory screening. Journal of the American Dental Association. Vol. 145 (no. 10); p. 1027-1035.

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Assurance & Overall Reporting Tables

The Ratings Table below shows the standards for assigning an assurance level to each of the criteria audited.

Assurance rating	Percentage range
Full assurance	100%
Significant assurance	90% - 99%
Moderate assurance	61% - 89%
Limited assurance	40% - 60%
No assurance	<40%

Criteria Audited (n=1)	Standard Achieved	Assurance rating
<ul style="list-style-type: none"> To evaluate the clinical implications of any abnormal pre- op blood tests results and confirm if appropriate follow- up has been completed. 	60% (26/43)	Moderate assurance

The Overall Reporting Table below provides a summary of the assurance ratings given to each of the audit criteria.

Audit title & scope	Number of standards by assurance rating					Overall Rating	Exceptions (red / amber items)
An evaluation of the need for pre-operative full blood count screening and audit of appropriate follow-up prior to dental care under general anesthesia at Bradford Royal Infirmary	1	1	0	1	1	60% (26/43)	<ul style="list-style-type: none"> All patients with abnormal FBC results should be followed up with a GMP or paediatrician where appropriate.

Appendix 1: ASA Grades.

ASA 1	A normal healthy patient
ASA 2	A patient with mild systemic disease
ASA 3	A patient with severe systemic disease
ASA 4	A patient with severe systemic disease that is a constant threat to life

Appendix 2: NICE guidance on pre-operative tests prior to GA for surgery and ASA grades.

Table 1 Minor surgery

Test	ASA grade		
	ASA 1	ASA 2	ASA 3 or ASA 4
Full blood count	Not routinely	Not routinely	Not routinely
Haemostasis	Not routinely	Not routinely	Not routinely
Kidney function	Not routinely	Not routinely	Consider in people at risk of AKI ¹
ECG	Not routinely	Not routinely	Consider if no ECG results available from past 12 months
Lung function/arterial blood gas	Not routinely	Not routinely	Not routinely

AKI, acute kidney injury.

¹ See recommendation 1.1.8 of the NICE guideline on [acute kidney injury](#).

Table 2 Intermediate surgery

Test	ASA grade		
	ASA 1	ASA 2	ASA 3 or ASA 4
Full blood count	Not routinely	Not routinely	Consider for people with cardiovascular or renal disease if any symptoms not recently investigated
Haemostasis	Not routinely	Not routinely	Consider in people with chronic liver disease <ul style="list-style-type: none"> • If people taking anticoagulants need modification of their treatment regimen, make an individualised plan in line with local guidance • If clotting status needs to be tested before surgery (depending on local guidance) use point-of-care testing¹
Kidney function	Not routinely	Consider in people at risk of AKI ²	Yes
ECG	Not routinely	Consider for people with cardiovascular, renal or diabetes comorbidities	Yes

Appendix 3: NICE guidance on Surgery Grades

Surgery grades

Surgery grades	Examples
Minor	<ul style="list-style-type: none">• excising skin lesion• draining breast abscess
Intermediate	<ul style="list-style-type: none">• primary repair of inguinal hernia• excising varicose veins in the leg• tonsillectomy or adenotonsillectomy• knee arthroscopy

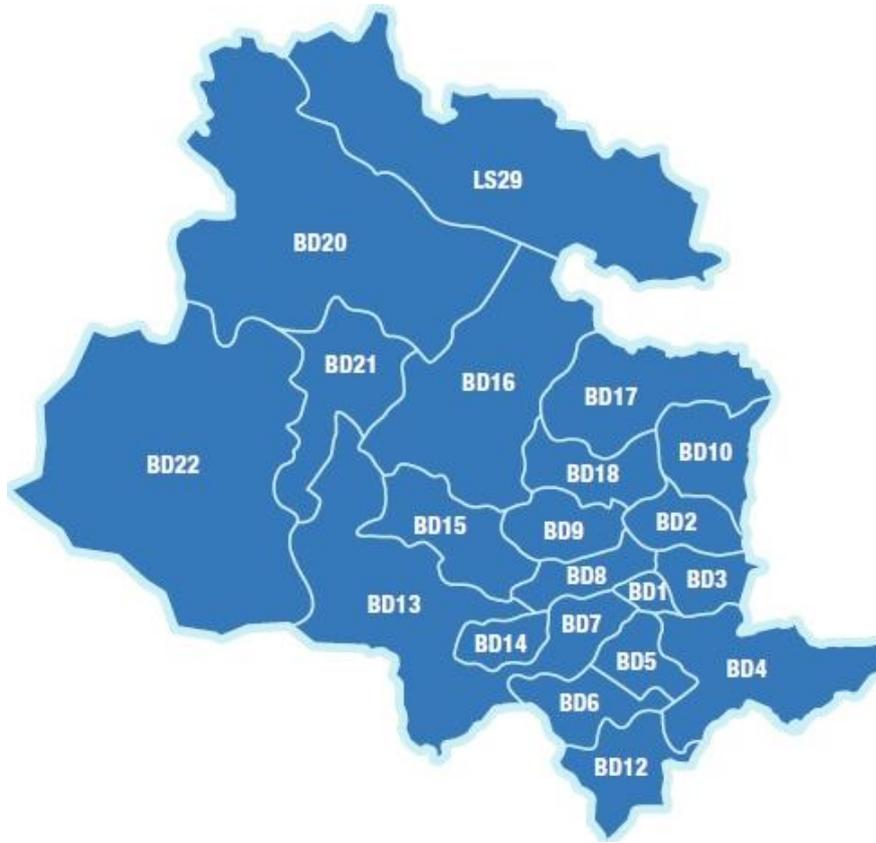
Appendix 4: Range of normal blood levels

Hb level 11.5-15.0
WBC 6.00-14.00
Platelets 150-400
MCV 71-90
Neutrophils 2.00-6.00
Sickle status

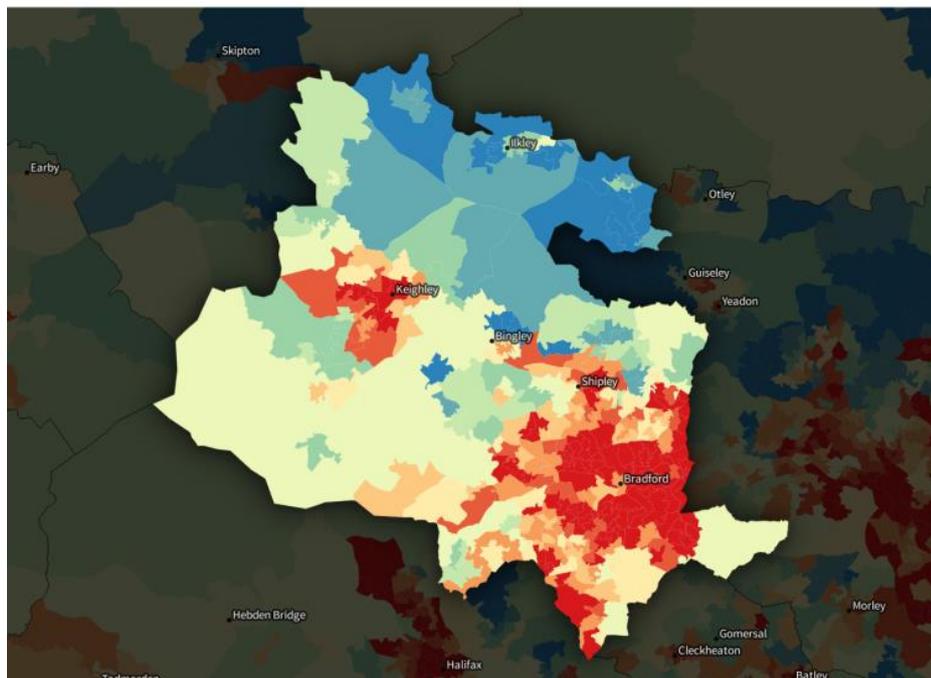
Appendix 5: Data collection form

R4 Number	
Age	
Postcode	
Ethnicity	
Weight	
Airedale Reject List	
BRI comp Care list	
ASA Grade	
Medical Issues	
HB	
WBC	
Platelets	
MCV	
Neutrophil	
Sickle status	
CAF/ CPP	
Interpreter	
Intervention for GA (deferred GA or continue GA)	
Follow up investigations- FBC, letter to GMP/paediatrician.	

Appendix 5: Postcode and deprivation categories



Bradford



Deprivation Decile

Indices of Deprivation 2015



Mapping: Alasdair Rae, University of Sheffield

Indices of Deprivation 2010



Deprivation Data: DCLG, 2015

Boundary Data: ONS Geography Portal, Open Government Licence

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