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UK Comparative Audit of Upper Gastrointestinal Bleeding and the Use of Blood

Transfusion Extract

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St. Elsewhere's Hospital

National Comparative Audit of Blood Transfusion

Executive Summary

Acute Upper Gastrointestinal Bleeding (AUGIB) is the commonest reason for emergency admission to UK hospitals with a gastrointestinal disorder [Laine L, 1993]. It also occurs frequently in patients already in hospital for other reasons, and has been shown to carry a particularly high risk of morbidity and mortality in this group. Provision of emergency care including therapeutic endoscopy is central to the management of AUGIB. AUGIB accounts for over 13% of all Red Blood Cell (RBC) transfusions in the UK [Wallis, 2006]. The appropriateness of transfusions in this group has never been investigated on a large scale. In 1993/4 Rockall *et al* carried out a large multi-centre prospective audit of AUGIB in four health regions in England [Rockall, 1997]. This 2007 audit aims to compare the organisation of care, the process of care and outcomes from AUGIB with data from the previous audit, and to measure current practice against audit standards for all key areas of management, including transfusion. The relationships between service provision and outcomes are examined.

Data were collected from 217 hospitals, with 208 hospitals supplying 6750 cases for inclusion in the audit, and 205 hospitals providing organisational data. Consecutive cases were identified prospectively between 1st May and 30th June 2007. 12% of cases were incomplete and could not be used. **Hospital audit support to complete this national audit was highly variable and too frequently absent, which had a substantial impact on the number of completed cases submitted from some hospitals.**

Results

- 6750 cases were analysed: median age 68 years; 82% (5547) new admissions, 16% (1099) inpatients.
- Mortality overall was 10% (675/6750) - a reduction from 14% in the previous audit in 1993/4 [Rockall, 1995 (A)]. Mortality among inpatients was 26% (288/1099) and 7% (379/5547) in new admissions – both reduced from the previous audit.
- Varices were identified in 8% (544/6750) of all cases – increased from 4% from the audit in 1993/4 [Rockall, 1995 (A)]. They were diagnosed in 11% of those endoscoped.
- 2% (127/6750) of cases had surgery for AUGIB – a reduction from 7% in the previous audit in 1993/4 [Rockall 1997].
- 43% (2922/6750) of cases received at least one red blood cell transfusion for AUGIB
- 59% (3973/6750) of cases presented out of hours, with 20% (1328/6750) presenting between midnight and 8am.
- The majority of cases presented to general medicine, and 42% of inpatient bleeds were in under the care of general medicine.
- 26% (1746/6750) of patients did *not* have an inpatient endoscopy for AUGIB, 17% (304/1746) of whom died without having an endoscopy.
- 17% (840/5004) of *first* endoscopies were performed out of hours. Of patients who presented to the 83 hospitals where there was no out of hours endoscopy on call rota, 13% (254/1980) of *all* endoscopies were out of hours, indicating a substantial "good will" component to essential care.
- Mortality unadjusted for case mix was unrelated to whether or not hospitals had an out of hours on call endoscopy rota.
- 79% (4380/5547) of new admissions were discharged within 28 days of presentation with a median length of stay of 4 days following AUGIB in this group.
- Of new admissions with AUGIB, 11% (575/5384) for whom a date of admission was recorded) were still alive in hospital 4 days or more after admission, and did *not* have an endoscopy during their admission (this number excludes those who had surgery or radiology for AUGIB without endoscopy).

The standards used in this report are all available and referenced in Appendix 2.

Organisation of Care

1. Standard:

"Facilities for undertaking gastrointestinal endoscopy for all patients admitted with acute UGI bleeding should be available, and urgent endoscopy should be available in high risk patients."

Although nearly all hospitals have facilities for performing emergency endoscopy on site (99%), only 56% of hospitals in the audit (106/189 with access to endoscopy facilities out of hours) have an out of hours emergency endoscopy rota. Of the patients who presented to these hospitals without official endoscopy on call rotas, 13% (254/1980) underwent endoscopy out of hours. This reflects the "ad hoc" and "goodwill" service provision in these hospitals.

2. Standard:

"There should be an appropriately trained therapeutic endoscopist with nursing support and availability of equipment for achieving haemostasis. Capability for placing a Sengstaken-Blakemore or Minnesota tube in patients with uncontrolled variceal haemorrhage is required."

The majority of consultants (74%) on call for emergency endoscopy were regarded as competent at the basic haemostatic techniques. However, the majority of those not regarded as competent at all four procedures (see Organisational audit questionnaire, Appendix 4) were reported not to be competent at either variceal banding or placement of Sengstaken-Blakemore or Minnesota balloon tamponade for varices.

3. Standard:

"Guidelines should be available for the transfusion management of patients with massive haemorrhage."

49% (101/205) of hospitals reported having transfusion guidelines for patients with major haemorrhage in their hospital. It is possible that some other hospitals do have transfusion guidelines, but their distribution and availability may be inadequate, such that the consultant lead completing the organisational audit tool is unaware of them. The dissemination of clinical guidelines to the appropriate people and places is just as important as having them at all.

Process of care

1. Standard:

"Patients with AUGIB to be admitted by or referred early to specialist medical or surgical gastroenterology."

13% (722/5547) of new admissions with AUGIB were admitted directly under GI bleeding/gastroenterology teams. Of the remainder, 31% (1476/4825) of patients had their care subsequently transferred to GI bleeding/gastroenterology teams. Inpatients with AUGIB had their care transferred in 17% (188/1099) of cases, with only 11% (109/958) of those not already under gastroenterology having their care transferred there, even though this group of patients has the highest mortality and highest risk of continued bleeding.

2. Standard:

"Patients to be assessed for bleeding severity and categorised into high, medium or low risk."

Only 19% (1250/6750) of cases in the audit had a risk score recorded in the medical notes.

3. Standard

"Circulating volume to be restored using crystalloid or colloid. Initial resuscitation should not be with red blood cells unless ongoing haematemesis with shock."

There was wide variation in practice regarding resuscitation, and documentation was poor. 33% (2241/6750) of patients received RBC transfusion within 12 hours of presentation, and in 8% (514/6750) this was the only fluid replacement documented as used.

4. Standard

"Endoscopy to be performed within 24 hours of presentation in all medium and high risk cases."

The median (IQR) time from presentation to endoscopy was 23 (12-51) hours. For patients with pre-endoscopy Rockall score of 3 or more (i.e. medium to high risk patients), median (IQR) time to endoscopy was 23 (11-55) hours.

Having a medium to high pre-endoscopy risk score appears to have no impact on the time to endoscopy. It is disappointing that there has been no significant rise in the proportion of high risk cases receiving early endoscopy since the 1993/4 audit [Rockall, 1997].

5. Standard

"Haemostatic therapy to be administered to varices, ulcers with active bleeding or non-bleeding visible vessel. Endoscopy to be repeated if further bleeding or high risk lesion at first endoscopy."

65% of patients presenting with AUGIB with varices at endoscopy (338/520) received haemostatic therapy at endoscopy. 76% of actively bleeding ulcers (598/789), and 92% of non-bleeding visible vessels (292/318) received endoscopic therapy. In all categories, the number of repeat endoscopies was low, with less than a third of cases getting repeat procedures. The reasons for these low levels of therapy and repeat procedures need investigation.

6. Standard

"Parenteral vitamin K to be administered to those on warfarin with active bleeding..."

48% (225/473) of patients with AUGIB who were on warfarin received vitamin K. 28% (133/473) of patients on warfarin with AUGIB received FFP at some stage during the episode, and in 31/133 (23%) of these, no vitamin K or other clotting factors were used. FFP alone is not recommended for reversal of coagulopathy in this group.

7. Standard

"Proton pump inhibitor (PPI) therapy should be started in patients with peptic ulcer active bleeding or non-bleeding visible vessel at endoscopy after endoscopic therapy."

"Vasopressin analogues to be started in those with known or suspected variceal haemorrhage."

Intravenous PPIs were started in 70% of patients with an ulcer who received endoscopic therapy at the first endoscopy (460/656), and were also administered to 16% of patients where no ulcer was documented (147/928). Vasopressin analogues were started in 44% of all cases with varices or portal hypertensive gastropathy seen at the first endoscopy (266/601).

8. Standard

"Transfuse red blood cells if haemodynamically unstable and/or haemoglobin <10g/dL at time of presentation with suspected acute upper GI bleeding."

5% (345/6750) of all patients received RBC transfusion (15% of all 2241 RBC transfusions within 12 hours of presentation) when they were haemodynamically stable and had a haemoglobin (Hb) above 10g/dL or no Hb recorded.

9. Standard

"In those actively bleeding correct platelets if <50 x 10^9."

42% (79/189) of platelet transfusions were to patients with a platelet count ≥50 x 10^9, or to patients who had no platelet count recorded prior to the transfusion.

10. Standard

"In those actively bleeding correct INR if >1.5x normal or prothrombin time (PT) >3 seconds prolonged"

FFP was given to 7% (503/6750) of all cases of AUGIB and in 27% (138/503) of these, FFP was not indicated.

Recommendations

General

On presentation, risk assessment using a validated scoring system should be a standard of care (and recorded) as there is a strong relationship between such assessments and outcome of AUGIB.

Patients with significant AUGIB, in particular those at high risk – inpatients, elderly, and those with high risk scores, should where appropriate, be referred early to specialist care.

Greater attention to medical therapies after endoscopy is needed to ensure timely and appropriate use of proton pump inhibitors (PPI) and vasopressin analogues. Hospitals should monitor their use of PPIs to avoid excessive use, and the reasons for the low use of vasopressin analogues need to be identified.

Endoscopy

Reasons for delay in endoscopy need to be identified, and service provision needs to be assessed to ensure those at high risk have access to early endoscopy.

Endoscopy for AUGIB should be performed by someone competent in endoscopic therapy for both non-variceal and variceal bleeding. Patients with high risk lesions should have a repeat endoscopy planned with the potential for repeat therapy available.

In view of the increasing proportion of AUGIB due to varices, all consultants providing emergency endoscopy should be competent in at least one method of haemostasis for varices (including balloon tamponade). Investigation is needed into the reasons (organisational and/or care process) why a third of patients with varices and AUGIB do not have a therapeutic procedure performed.

Transfusion

Fluid replacement strategies need clarifying and guidelines for the appropriate use of blood components in AUGIB need reviewing, as a collaboration between gastroenterologists and transfusion specialists, e.g. BSG and British Committee for Standards in Haematology (BSCH).

The process of completing transfusion guidelines (for RBC, platelets and FFP) should include the development of strategies for disseminating them amongst gastroenterologists and clinicians caring for those with AUGIB.

Clinicians should be reminded of the risks of transfusion and the need to document the clinical indication for transfusion in all cases.

The reasons underlying the apparent high levels of inappropriate transfusion need to be investigated.

Clinical research is required to develop a stronger evidence base for transfusion in AUGIB.

Conclusions

This is the first UK wide audit of AUGIB and the use of blood transfusion, providing valuable data to clinicians and hospital managers as to current practice in AUGIB. The majority of patients with AUGIB are elderly and have significant medical co-morbidities. Unadjusted mortality overall has declined from 14% to 10% since the 1993/4 audit (from four health regions), despite an increase in the proportion of patients with variceal bleeding since the previous audit. Blood transfusion is common, and inappropriate transfusion more common for platelet and FFP transfusions than for red blood cells. The use of therapeutic endoscopy and medical therapies after endoscopy is disappointingly low. The relationships between service provision and outcomes (in particular with reference to interventions and outcomes in emergency endoscopy) need more detailed investigation.

This document contains only section 8 of the full report and focusses on the transfusion aspects of the audit. For a full copy of the audit for your hospital, please contact:

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Section 8 - Blood Transfusion

8.1 Red Blood Cells

The BSG guidelines for the management of non-variceal upper gastrointestinal haemorrhage recommend that red blood cells (RBC) are transfused when:

> *"Bleeding is extreme as judged by active haematemesis and / or haematemesis with shock....When the haemoglobin concentration is less than 100g/L* (except in those with chronic anaemia).*"* [BSG, 2002]

A multi-centre randomised controlled trial of transfusion in non-bleeding critical care patients [Hebert, 1999], recommends RBCs be transfused:

> *"If the haemoglobin is <7g/dL in haemodynamically stable non-bleeding patients.....If the haemoglobin is <8g/dL in haemodynamically stable non-bleeding patients aged >65years, and in those with significant cardio-respiratory co-morbidities."*

An ongoing Cochrane systematic review of RBC transfusion in AUGIB will identify how much good quality data is available on this subject [Hearnshaw, 2007]. At the present time it is very hard to establish the appropriateness of RBC transfusion in AUGIB. Assessing whether a patient is "actively bleeding" or not at the time of transfusion is sometimes difficult, and the haemoglobin value alone at presentation may not accurately reflect blood loss and or help decision-making about the need for RBC transfusion.

A **Hb of >10g/dL** has been used as a cut off for inappropriate transfusion in those patients who **did not present with signs or symptoms of shock** (BP<100), as per BSG guidelines [BSG, 2002]. RBC transfusion is not indicated in haemodynamically stable patients where *no* haemoglobin value is available. Transfusion in those who are haemodynamically unstable at presentation with acute bleeding, is regarded as appropriate. For patients who have stopped bleeding but are regarded as being at high risk of re-bleeding or death, a top-up transfusion to a haemoglobin of 10g/dL is reasonable. It is important to exclude those patients who for religious or cultural reasons refuse blood component transfusion. In this audit 55 cases (1%) were Jehovah's Witnesses and 31% (17/55) of these were transfused within 12 hours of presentation, 47% (26/55) during the episode as a whole, rates that are consistent with those for the whole audit population. They were included in these analyses.

Standard

> *"Transfuse red blood cells if haemodynamically unstable and or haemoglobin <10g/dL at time of presentation with suspected acute UGI bleeding."*

8.1.1 Transfusion within first 12 hours

TABLE 73

Hb at presentation (FBC1g/dL)	Haemodynamic status at presentation	**Transfused within 12 hours (Q24)**			
		National Audit		Your site	
		%	N	%	N
<7	Hypotensive (systolic BP<100)	93	214/229	100	1/1
	Systolic BP>=100	90	493/545	100	6/6
	Not known	71	10/14		/0
7-8	Hypotensive (systolic BP<100)	93	124/134	100	1/1
	Systolic BP>=100	77	305/398	50	1/2
	Not known	75	3/4		1/1
8.1-10	Hypotensive (systolic BP<100)	72	156/216	100	3/3
	Systolic BP>=100	46	440/955	89	8/9
	Not known	38	8/21		/0
>10	Hypotensive (systolic BP<100)	32	93/287		/0
	Systolic BP>=100	7	**230**/3378	9	3/35
	Not known	2	1/42		/0
No Hb value	Hypotensive (systolic BP<100)	65	41/63		/0
	Systolic BP>=100	29	**115**/402	50	1/2
	Not known	13	8/62		/0
	ALL PATIENTS	33	2241/6750	42	25/60

The median time from baseline to first the full blood count (FBC) was 0.9 hours.

5% (345/6750) of all patients received transfusion when they were haemodynamically stable and had a haemoglobin above 10g/dL or no Hb recorded (highlighted bold in the table). These are regarded as inappropriate transfusions.

25 patients who were both haemodynamically unstable and had haemoglobin of 8g/dL or less (229-214 for Hb <7g/dL (=15) *PLUS* 134-124 for Hb 7-8g/dL (=10)*)*, did *not* receive RBC transfusion, despite it being clinically indicated.

8.1.2 Rockall score

Is there a relationship between the use of RBC transfusions and risk score (Rockall score) for AUGIB?

TABLE 74

Rockall score (final)	National Audit		Your site	
	Transfused RBC *first 12 hours* Q24B		Transfused RBC *first 12 hours*	
	%	N	%	N
0-2	20	279/1408	33	5/15
3-5	38	831/2204	56	9/16
6-8	61	747/1225	64	9/14
>8	76	116/152	100	2/2
No endoscopy*	15	267/1746	0	0/13

*Note patients who did not have an endoscopy (1746) cannot have a final Rockall score calculated.

From the UK data, the higher the Rockall score for AUGIB the higher the percentage of patients receiving transfusion.

8.1.3 Re-bleeding

Is there a relationship between RBC transfusion and re-bleeding?

TABLE 75

Rockall score (final)	National Audit					
	Did the patient receive RBC transfusion *during episode* of AUGIB*?		If yes, was there evidence of ongoing or further bleeding after first endoscopy? (Q40, Q41)		If no, was there evidence of ongoing or further bleeding after first endoscopy? (Q40,41)	
	%	N	%	N	%	N
0-2	27	379/1408	13	47/373	2	22/1007
3-5	52	1142/2204	18	202/1125	3	27/1041
6-8	76	929/1225	32	292/917	4	12/288
>8	80	122/152	45	54/121	37	11/30
No endoscopy	20	349/1746	-	-	-	-

* This includes any RBC transfusion including those received in the first 12 hours.

These data suggest that transfusion, independent of the patient's risk of re-bleeding (as obtained by Rockall score), is associated with an increased risk of re-bleeding. For all Rockall scores the rate of re-bleeding is higher in the transfused group. This is possibly due to "confounding by indication" i.e. the clinical judgement that transfusion was appropriate, might reflect the clinician's judgement that there was *already* ongoing or re-bleeding. A randomised controlled trial in 1986 (which has never been repeated) demonstrated a higher rate of re-bleeding in those receiving early RBC transfusion [Blair, 1986]. This is a key area for further investigation.

8.2 Platelets

Standard

"In those actively bleeding, correct platelets if <50 x 10^9."

Platelets were transfused to 189 patients. 61% (213/352) of patients with AUGIB with a platelet count < 50 x 10^9, did not receive a platelet transfusion.

TABLE 76

Rockall score (final)	National Audit				Your site	
	Did the patient receive a platelet transfusion during episode?		If yes, was the platelet count <50 x 10^9prior to transfusion*?		Did the patient receive a platelet transfusion?	If yes, was the platelet count <50 x 10^9 prior to transfusion?
	%	N	%	N	N	N
0-2	0.6	8/1408	83	5/6	0	
3-5	2.6	58/2204	60	33/55	0	
6-8	7.8	96/1225	59	54/92	3	1
>8	8.6	13/152	67	8/12	0	
No endoscopy	0.8	14/1746	71	10/14	1	0
ALL	2.8	189/6750	61	110/179*	4	1

*For ten patients no platelet count was recorded prior to platelet transfusion.

The higher the Rockall score the higher the proportion of patients receiving platelet transfusion.

In 42% (79/189) (189-110 =79 (from bottom row of table) / all patients receiving platelets =189) of platelet transfusions the platelet count was above 50x10^9/L or not recorded, so these are regarded as inappropriate transfusions. A very similar percentage (around 40%) of inappropriate platelet transfusions was found in the RCP/NHSBT National Comparative audit of platelet transfusions:

(http://blood.co.uk/library/pdf/Audit_of_platelet_use_in_St_Elsewheres.pdf).

Further investigation is warranted into the reasons why so many patients are receiving seemingly inappropriate platelet transfusions.

8.3 Coagulopathy

Please see Section 6.1 for data on patients who were taking warfarin.

Standard

"*In those actively bleeding correct INR if >1.5x normal or PT > 3 seconds prolonged."*

Coagulation abnormalities

15% (1017/6750) of *all* patients had an INR of >1.5 (or PT > 3 seconds prolonged if no INR recorded, or PT> 18 seconds if no control PT supplied). Excluding those on warfarin, there were 550 patients who had an INR >1.5 or PT > 3 seconds prolonged.

FFP use

FFP was given to 503 (7%) patients in total, 24% (121/503) of whom were on warfarin.

TABLE 77

Rockall score (final)		National Audit				Your site	
		Did the patient receive a FFP transfusion?		If yes, was the INR >1.5, or the PT >3secs prolonged before transfusion*?		Did the patient receive a FFP transfusion?	If yes, was the INR >1.5, or the PT >3secs prolonged before transfusion?
		%	N	%	N	N	N
Not on Warfarin:							
ROCKALL	0-2	0.7	9/1254	78	7/9	0	
	3-5	5	101/1854	65	64/99	0	
	6-8	16	171/1048	62	101/163	2	1
	>8	23	28/124	57	16/28	0	
No endoscopy		2	34/1500	69	22/32	1	1
Warfarin		26	121/473	96	111/116	0	
Warfarin Not Known		8	39/484	67	24/36	0	
TOTAL		7	503/6737[#]	71	345/483		

* For 20 patients no INR or PT was recorded prior to FFP transfusion

[#] 13 patients (*not* on warfarin) did not have Rockall score completed despite having endoscopy (see Section 1.5). The denominator for this total is therefore 6750-13= 6737.

20 patients receiving FFP (4% of all FFP transfusions), did not have an INR or PT recorded. 71% (345/483) of those receiving FFP who had an INR recorded, had an INR >1.5 (or PT > 3 seconds prolonged).

In 27% (138 (i.e. 483-345 from bottom row of table)/503) of patients receiving FFP transfusion the INR was <1.5 or the PT was ≤3 seconds prolonged, indicating that the FFP transfusion was inappropriate. Further investigation of the reasons given for FFP transfusion in these patients is required.

57% (314/550) of patients with an INR >1.5 (or PT > 3 seconds prolonged) who were not on warfarin (see coagulation abnormalities section above), did *not* receive FFP transfusion where this may have been appropriate (data not shown in table 77). Further investigation into the reasons for not transfusing these patients may also be required.

Other treatments used (data not shown)

Cryoprecipitate was given to 86 of 6750 patients within 24 hours. 64/86 were patients on warfarin, with 49/64 having an INR >1.5, or a PT >3 seconds prolonged. This indicates some patients received cryoprecipitate when either no INR was recorded, or the INR was not >1.5.

Prothrombin complex was given to 24 of 6750 patients within 24 hours. 21 were patients on warfarin, 2 were not warfarin, and for 1 patient warfarin status was not known.