AMJ Australasian Medical Journal [AMJ 2019;12(2):56-62]

Early endoscopic intervention in acute gastrointestinal bleeding may reduce the need for blood transfusion

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RESEARCH

Please cite this paper as: Ferman M, Sheikh M, Shawki M, Leung E, Al-Ansari M. Early endoscopic intervention in acute gastrointestinal bleeding may reduce the need for blood transfusion. AMJ 2019;12(2):56–62.
https://doi.org/10.21767/AMJ.2018.3543

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ABSTRACT

Background

Acute gastrointestinal bleeding (GIB) is a common gastroenterological emergency worldwide with significant morbidity and mortality of 6 per cent–14 per cent. The main causes of death in patients with GIB include shock, aspiration, and therapeutic procedure carried out for the management of the GIB. Thus, the resuscitation strategy of blood transfusion plays a very important role in these patients before any other specific treatment. Currently, endoscopy is considered the mainstay of diagnosis and treatment for patients with GIB.

Aims

To assess the effect of an early endoscopic intervention on the need for blood transfusion in patients presented with GIB.

Methods

We retrospectively analysed the data for patients presented with hematemesis, melena, or hematochezia, from July 2015 to July 2016, in Ballarat Base Hospital (BHS) in Victoria, Australia. Data were extracted from the hospital coding system related to patient's demographic history, alcohol intake, comorbidity, procedure details including the timing and the type of procedure performed, and the number of units of blood transfused. Additionally, the laboratory blood test results for each patient were examined through the electronic records to assess the haemoglobin level before and after the blood transfusion.

Results

A total of 92 eligible patients with GIB during the 12 months study period, were included in this observational study. The median age of the study population was 67 years (range 24-96) at the time of admission. A total of 67 patients (73 per cent) underwent inpatient endoscopic procedure with gastroscopy performed in 52 patients, colonoscopy in 5 patients, flexible sigmoidoscopy in 3 patients, and combined gastroscopy and colonoscopy in 7 patients. In the enrolled population (n=92), at time of presentation, 11 patients (12 per cent) had the haemoglobin level below 7grams per decilitre (g/dL), 17 patients (18 per cent) had haemoglobin level between 7 and 8g/dL, and 64 patients (70 per cent) had haemoglobin level greater than 8g/dL. Out of the 67 patients who had inpatient endoscopy, 12 patients underwent endoscopic procedure within 12 hours of admission (<12 hours group), including 5 patients who received blood transfusion; and 55 patients underwent endoscopic procedure greater than 12 hours after admission (>12 hours group), including 31 patients who received blood transfusion. Among participants who received a blood transfusion in the two groups, 1 out of 5 patients in the <12 hours group and 19 out of 31 patients in the >12 hours group had haemoglobin level below 8g/dL at the time of transfusion.

Conclusion

Trends of greater blood transfusion in patients with delayed (>12 hours) endoscopic procedure and administering blood transfusion at haemoglobin level >8g/dL in patients with early (<12 hours) endoscopic procedure were observed without achieving statistical significance. The results obtained from this study indicate that more saving in terms

of cost of treatment from blood transfusion can be achieved by adopting an optimized restrictive transfusion strategy.

Key Words
Gastrointestinal bleeding, gastroscopy, endoscopy

What this study adds:

1. What is known about this subject?
Most guidelines recommend performing endoscopic procedures within 24 hours of acute GI bleeding.

2. What new information is offered in this study?
This study assesses the time to perform an endoscopic procedure in patients presenting with acute GIB in relation to the need for blood transfusion. There is a trend towards having more blood transfusion with delayed endoscopic procedure (>12 hours).

3. What are the implications for research, policy, or practice?
More prospective studies are needed to further assess the role of early endoscopic intervention in patients with acute GIB.

Background

Acute gastrointestinal bleeding (GIB) is a common gastroenterological emergency worldwide with incidences ranging between 50 and 150 per 1,00,000 population. The incidence of GIB is associated with significant morbidity and mortality of about 6 per cent to 14 per cent.[1-5] Patients with GIB are usually presented with symptoms such as hematochezia, melena, hematemesis, and progressive anaemia. According to reported data, the main causes of death in patients with GIB include shock resulted from the blood loss, aspiration, and therapeutic procedure carried out for the management of the GIB.[5]

Thus, the resuscitation strategy of blood transfusion has proved to be lifesaving, especially in case of patients with massive GIB.[6] Various studies have shown that restrictive transfusion strategy is more effective than liberal transfusion strategy for resuscitation in GIB setting.[6] This data has been incorporated in the European Society of Gastrointestinal Endoscopy (ESGE) guidelines that now recommends a target haemoglobin level between 7 and 8grams per decilitre (g/dL) for transfusion. Although, the current guidelines recommend that a higher threshold should be considered for patients with advanced age or significant comorbidities.[7-10] However, it is important to understand that blood transfusion, on one hand, is an effective modality to reverse the hazardous consequences of blood loss, but on the other hand, it is associated with significant adverse effects and higher cost.[11-15] Thus, it is not always recommended to frequently transfuse blood products, especially in limited-resource settings.[13,14,16]

Currently, endoscopy is considered the mainstay of diagnosis and treatment for patients with GIB. Endoscopy not only helps in the identification of the cause of bleeding but also delivers an appropriate treatment to the site of bleeding.[5,7] Most guidelines recommend that endoscopy should be performed within 24 hours of presentation of patients with acute GIB and immediately after adequate resuscitation for hemodynamically unstable patients.[9,13,15,16] Due to different results obtained from various clinical research studies the appropriate timing of endoscopy procedure for the management of acute GIB is under debate and requires to be validated in future randomized clinical studies.[7,8,10]

However, many of these clinical studies have shown that early endoscopic intervention has the potential to reduce the number of blood transfusions required in patients presented with acute GIB.

Thus, to understand whether an early endoscopic intervention could affect the need or decrease the number of units of blood transfusion, in the current study, we assessed the effect of time to endoscopic intervention on the number of blood transfusion needed in patients presented with GIB.

Method

Study design

This observational retrospective study was conducted in Ballarat Base Hospital (BHS) in Victoria, Australia. The BHS has a capacity of 350 inpatient beds and 26 beds in the emergency department. According to collected data, the emergency department in BHS provides medical care to more than 53,000 patients annually among whom about 78 per cent are adults. The gastroenterology services unit is a part of the general and acute care medicine department. One full time and two part-time gastroenterologists work in the gastroenterology services unit. The endoscopy service unit is shared by both the gastroenterology and the general surgery teams. The BHS has an electronic database system, BOSSNET, which is used to save all patients' demographic information, inpatients' notes, procedures' details, and pathology results.

Data collection

Data were collected by a medical registrar and a medical officer not associated with the gastroenterology unit to avoid any data collection bias. Using the hospital coding system, we collected data for all the patients presented to the emergency department with hematemesis, melena, and or hematochezia between July 2015 and July 2016. Following data were extracted from the electronically saved medical records (BOSSNET): patients' demographics (age and gender), history of alcohol intake, comorbidity, procedure details including the timing and the type of procedure performed, and the number of units of blood transfused. Additionally, the laboratory blood test results for each patient were examined through the electronic records to assess the haemoglobin level before and after the blood transfusion.

Statistical analysis was performed on the collected data using tools such as windows statistical analysis, number empire, Chi-square and Fisher's exact calculator. Descriptive statistics were reported for selected study variables (frequencies and percentages). Results obtained for patient's outcome were compared between groups with a significance level of 0.05.

Ethics committee approval and patients' consent were not collected because this study was performed retrospectively by reviewing patients' medical records with no physical contact with patients during the data collection, and the personal details were kept anonymous.

Results

A total of 92 patients were found eligible and were included in this observational study. Among the 92 patients, 42 were females, and 50 were males. The median age of the study population was 67 years (24-69 years), at the time of admission. Twenty-five patients (27 per cent) were noted to have a history of heavy alcohol intake, and among them, 15 patients had liver cirrhosis. presenting complaints included hematemesis (n=24), melena (n=36), hematemesis and melena (n=19), hematochezia (n=15), microcytic (n=13), and syncopal episode (n=5). Out of 92 patients, 73 (79 per cent) presented with single complaint [hematemesis (n=22), melena (n=26), hematemesis and melena (n=16), and hematochezia (n=9), 18 patients (20 per cent) presented with two complaints [melena and anaemia (n=8), hematochezia and anaemia (n=1), hematemesis and anaemia (n=1), hematemesis and melena with anaemia (n=2), hematochezia and syncope (n=3), melena and syncope (n=1), hematemesis and hematochezia (n=1), hematemesis and melena with hematochezia (n=1), and 1 patient (1 per cent) presented three complaints (melena, anaemia, and syncope) (Figure 1).

A total of 67 patients (73 per cent) underwent inpatient endoscopy procedure (Figure 2). Among the patients who underwent inpatient procedures, gastroscopy was performed in 52 patients (78 per cent), colonoscopy was performed in 5 patients (8 per cent), flexible sigmoidoscopy was performed in 3 patients (4 per cent), and combined gastroscopy and colonoscopy was performed in 7 patients (10 per cent). Out of 92 enrolled patients, 25 patients (27 per cent) did not have inpatient endoscopy procedure, out of which 9 patients were stabilized and discharged from the centre and were followed up on an outpatient basis. Other reasons for not having inpatient endoscopy procedure included self-discharge (n=3), private referral (n=2), transfer to different hospital (n=1), and conservative management (n=10).

In the enrolled population (n=92), at time of presentation, 11 patients (12 per cent) had the haemoglobin level below 7g/dL, 17 patients (18 per cent) had haemoglobin level between 7 and 8g/dL, and 64 patients (70 per cent) had haemoglobin level greater than 8g/dL. A total of 38 patients (41 per cent) received a blood transfusion, 18 females and 20 males, including 14 patients (37 per cent) who had haemoglobin level above 8g/dL at the time of transfusion. Out of the 67 patients who had inpatient endoscopy procedure, 12 patients underwent endoscopic procedure within 12 hours of admission (<12 hours group), and 55 patients underwent endoscopic procedure greater than 12 hours after admission (>12 hours group). Among the patients who underwent endoscopic procedure within 12 hours of admission (<12 hours group), 5 patients received blood transfusion, and among the patients who underwent endoscopic procedure greater than 12 hours after admission (>12 hours group), 31 patients received blood transfusion. The proportion of patients who received blood transfusion among the two groups (<12 hours group [5/12] *versus* >12 hours group [31/55]) was not significantly different (p-value =0.354) (Figure 3).

Among participants who received a blood transfusion in the two groups, 1 patient out of 5 patients in the <12 hours group and 19 patients out of 31 patients in the >12 hours group had haemoglobin level below 8g/dL at the time of transfusion. No significant difference was observed in the results obtained for the proportion of participants who received a blood transfusion at haemoglobin level of <8g/dL among the two groups (*p*-value=0.633) (Figure 4). The number of units of blood transfused ranged from 1 to 6

units, with a median of 2.5 units per patient among patients who received a blood transfusion (n=38).

Discussion

This study evaluated the effect of time of endoscopy in patients presented with GIB on the requirement of blood transfusion. Most of the patients presented with GIB underwent endoscopic procedures, and more than one-third of them received a blood transfusion. However, only a small number of patients were presented with a low haemoglobin level (<7g/dL). A trend of greater blood transfusion was observed in patients with delayed (>12 hours) endoscopic procedure, but a statistical significance was not achieved. This might be attributed to the use of the liberal strategy for blood transfusion. Another trend of giving blood transfusion at haemoglobin level >8g/dL in patients with early (<12 hours) endoscopic procedure was also observed, but again a level of statistical significance could not be achieved. These results indicate that with the use of an optimized restrictive transfusion strategy, a significant saving can be achieved in terms of fewer number of blood transfusion and fewer adverse effects.

Considering the financial aspect of blood transfusion, according to the National Blood Authorities (NBA) indicators for 2016/2017, the price per one unit of packed red blood cells (PRBC) is around AU$400.11 Based on data reported in one study from the UK hospitals, acute GIB represents a large burden for UK hospitals with the most important cost drivers being the inpatient stay, endoscopy, and blood product transfusions.22 Apart from the associated cost, there are several health implications of the blood transfusion. Blood transfusions are usually associated with many adverse effects, some of them results in life-threatening consequences.[14,15] Thus, reducing the number of blood transfusion for the management of patients with GIB will help in reducing the overall cost of treatment and improve the patient's overall quality of life. The influence of blood transfusion in patients with upper GIB on various clinical outcomes was evaluated in a multi-centre large observational study involving 59,188 patients admitted to the emergency department of different hospitals in Taiwan.[17,18] Favourable results (low in-hospital mortality and re-bleeding) were reported for patients who did not receive red blood cell (RBC) transfusion compared to those who received RBC transfusion. Based on the results obtained from this study, the authors suggested adopting a restrictive transfusion strategy to lower the number of transfusions administered in patients with GIB.

Many previous studies have reported favourable results of the restrictive transfusion strategy (haemoglobin threshold for blood transfusion =7g/dL) compared to liberal transfusion strategy (haemoglobin threshold for blood transfusion =9g/dL) in patients presented with GIB. In a randomized study of 921 participants with severe acute upper GIB, 461 participants were assigned to the restrictive strategy and 460 participants were assigned to the liberal strategy.[6] The authors reported favourable outcomes (a decrease in the numbers of blood transfusion required, mortality, rebleeding event, length of hospital stay, complications, and rescue therapy requirement) in the patients assigned to the restrictive transfusion strategy compared to those assigned to the liberal transfusion strategy. Another recent randomized study (TRIGGER) carried out in the UK evaluated the impact of a restrictive transfusion strategy (haemoglobin threshold used <8g/dL) versus liberal transfusion strategy (haemoglobin threshold used <10g/dL) on various clinical outcomes (mortality, length of hospital stay, therapeutic intervention, surgical or radiological intervention, thromboembolic events, and serious adverse events).[19-21] The results showed that there was no significant difference in the clinical outcome for the 2 transfusion strategies.

In the current study, no significant difference was observed in the number of blood transfusion administered to participants between the two groups, participants who received endoscopic intervention in <12 hours and >12 hours. A number of previous studies have reported mixed results for the effect of an early endoscopy on the clinical outcomes in the patients with GIB. In a retrospective study carried out in Japan, 33 patients with GIB were treated by emergency physicians (EP) with endoscopy, and 51 patients with GIB were treated by a non-emergency physician (NEP)[17] The authors reported favourable results in the EP group for blood transfusion requirements, length of hospital stay, and in-hospital mortality rates. Another retrospective study was carried out on 502 patients with suspected upper GIB patients who were admitted to the university hospital of the London. This study compared the clinical outcomes in patients with endoscopy procedure done within 6 hours versus those with endoscopy procedure done from 6 to 24 hours of admission.[7] No significant difference in outcomes (mortality and the requirement of transfusion) was reported for the two groups. Lower haemoglobin level was reported as the major factor that predicted increased transfusion requirement. A retrospective study involving 361 patients with a complaint of upper GIB admitted to an academic hospital in the USA reported no significant difference in mortality from urgent (<12 hours) versus non-urgent (>12 hours) endoscopy.[8] However, urgent endoscopy was

reported to be associated with poor clinical outcomes (inpatient re-bleeding, need for surgery or interventional radiology, or repeat endoscopic intervention). A large cohort study of 12,601 patients, admitted to a hospital in Denmark with peptic ulcer bleeding, reported that endoscopy 12 to 36 hours after admission was associated with lower inpatient mortality compared to endoscopy outside of this timeframe in hemodynamically stable patients.[10] In hemodynamically unstable patients, endoscopy performed between 6 and 24 hours after hospital admission was associated with optimal outcome. A recent Korean study involving 1,101 patients with upper GIB who underwent endoscopy, retrospectively evaluated the effect of timing of endoscopy on the clinical outcomes.[19] The results obtained from the study indicated that delayed endoscopic procedure (>24 hours) was associated with increased mortality and longer hospital/emergency department stay compared to the early endoscopic intervention (<24 hours) in the study population. However, another recent retrospective observational study involving 179 patients with acute non-variceal upper GIB reported no statistically significant difference in mortality, re-bleeding, and length of hospital stay between two groups of patients who underwent endoscopy within 24 hours of admission versus greater than 24 hours of admission.[20-22] Our results revealed the non-significant effect of time to endoscopy on the need for blood transfusion.in patients with GIB. The findings are in agreement with the results reported by many previous studies.

There were several limitations of this study. The number of participants included in the study was small and the study period was short. Additionally, this was a retrospective study carried out at a single centre. A prospective study design with a longer study period might have yielded different results. Due to the retrospective nature of the study and small size of the study population, the results cannot be generalized to all patients with GIB.

Conclusion

Two different trends of greater blood transfusion in patients with delayed (>12 hours) endoscopic procedure and administering blood transfusion at haemoglobin level >8g/dL in patients with early (<12 hours) endoscopic procedure were observed without achieving significance. This might be attributed to the fact that a liberal transfusion strategy was used by the hospital staff for administering blood transfusion. The results obtained from this study indicate that more saving in terms of cost of treatment from blood transfusion can be achieved by adopting an optimized restrictive transfusion strategy, and performing endoscopic procedure in less than twelve hours. More prospective studies are warranted to further assess the role of early endoscopic procedure in patients with GIB and to device an optimized restrictive transfusion strategy.

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PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

FUNDING

None

ETHICS COMMITTEE APPROVAL

This is a low risk quality assurance project, it did not require ethics committee approval in our centre.

Figure 1: Number of patients with different presenting symptoms

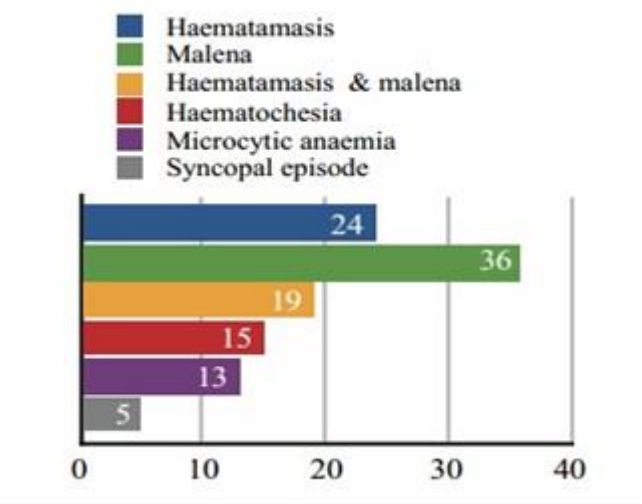

Figure 2: Proportion of different types of endoscopic procedures carried out on inpatient basis

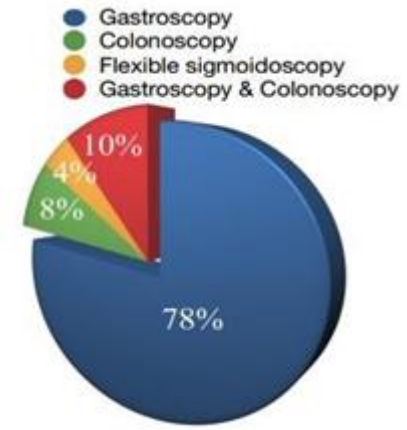

Figure 3: Comparison of proportion of participants requiring blood transfusion between the two groups of participants who underwent endoscopy at <12 hours and at >12 hours of admission

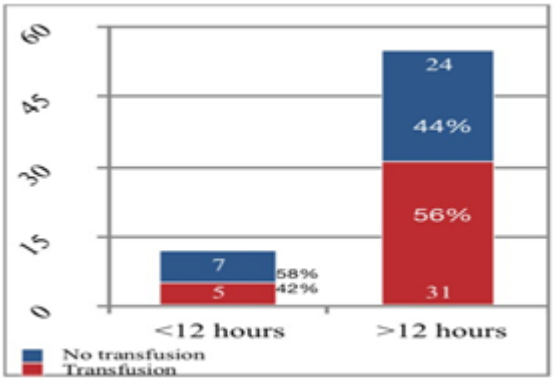

Figure 4: Comparison of proportion of participants who received blood transfusion at hemoglobin (Hb) level <8g/dL between the two groups, i.e., <12 hours and >12 hours of endoscopic procedure