

# Impact of protocol-based guidelines on the management and outcome of acute upper gastrointestinal hemorrhage in a district general hospital

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A prospective audit of acute upper gastrointestinal (GI) hemorrhage was conducted between January and September 2000 at Frimley Park Hospital to determine the impact of introducing an upper GI bleeding protocol based on Rockall's initial risk scoring system.

Fifty-seven patients and 52 patients were in the pre- and postprotocol phases of the study respectively. Fifty per cent (28) of the patients in the first phase and 40% (21) of the patients in the second phase belonged to the high risk group. In the preprotocol phase, endoscopy was performed in 86% (49) of cases with 60% of patients having an esophagogastroduodenoscopy within 24 h. Thirty-three per cent of the high risk group failed to have an endoscopic examination within 24 h. Only two of 57 patients required surgery and the mortality was 14%. In the postprotocol phase, endoscopy was performed in 79% (42) of patients and 68% (36) patients had endoscopy within 24 h. Only four of 21 patients belonging to the high risk group had their endoscopy after 24 h of the admission. Patients were better monitored and mortality was reduced to 7.5%. Reduction of mortality from upper GI hemorrhage followed the introduction of an agreed protocol based on risk scoring.

**Key Words:** *Audit; Risk scoring; Upper gastrointestinal bleeding*

Most audits of acute upper gastrointestinal (GI) hemorrhage usually involve an initial retrospective study to determine the management and outcome, followed by a prospective analysis that attempts to ascertain the impact of specific alteration in clinical practice, making comparison complex and unreliable (1). A prospective audit was started at Frimley Park Hospital (FPH), United Kingdom, in January 2000.

The purpose of the audit is:

- To establish the current practice and outcome of upper GI hemorrhage in FPH.
- To introduce protocol, educate and train the health care professionals involved.
- Assess the impact of protocol on practice and outcome.

Les répercussions de directives fondées sur des protocoles sur la prise en charge et l'issue d'une hémorragie gastro-intestinale supérieure aiguë dans un hôpital général de district

Une vérification prospective d'hémorragies gastro-intestinales (GI) supérieures a été menée entre janvier et septembre 2000 au *Frimley Park Hospital* afin de déterminer les répercussions de l'implantation d'un protocole sur les saignements GI supérieurs d'après le système de pointage du risque initial de Rockall.

Cinquante-sept patients ont participé à la phase préprotocole de l'étude, tandis que 52 ont participé à la phase postprotocole. Cinquante pour cent (28) des patients de la première phase et 40 % (21) de ceux de la deuxième phase faisaient partie du groupe à haut risque. Pendant la phase préprotocole, une endoscopie a été exécutée dans 86 % (49) des cas, et 60 % de ces patients ont subi une œsophagogastroduodénoscopie dans un délai de 24 heures. Trente-trois pour cent du groupe à haut risque n'ont pas subi d'endoscopie dans un délai de 24 heures. Seulement deux des 57 patients ont dû se faire opérer, et le taux de mortalité s'est élevé à 14 %. Pendant la phase postprotocole, une endoscopie a été exécutée chez 79 % (42) des patients, et 68 % (36) ont subi une endoscopie dans un délai de 24 heures. Seulement quatre des 21 patients faisant partie du groupe à haut risque ont subi leur endoscopie plus de 24 heures après leur hospitalisation. Les patients étaient mieux surveillés, et le taux de mortalité a chuté à 7,5 %. La réduction du taux de mortalité découlant d'une hémorragie GI supérieure a fait suite à l'implantation d'un protocole consensuel fondé sur un indice élevé.

The first phase of the audit to assess the management and outcome of upper GI hemorrhage was completed in April 2000. An agreed protocol on the management of patients with upper GI hemorrhage at FPH was drawn up in light of the findings of the first phase of the audit. The health care professionals involved with care of such patients had been instructed and informed of the protocol. The protocol involved management guidelines for patients with upper GI hemorrhage. Any change in practice and outcome following the introduction of the protocol was monitored through the second phase of the prospective audit, which was completed in September 2000.

## MATERIALS AND METHODS

All patients admitted with a presumptive diagnosis of upper GI hemorrhage or all patients who bled acutely from the upper GI tract while in hospital for treatment of some other condition at

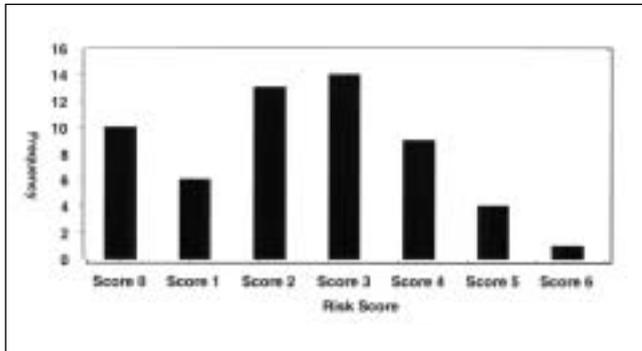
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**Figure 1)** Frequency of risk score in the first phase. Fifty per cent had risk score of 2+

FPH between January and April 2000 and then between June to September 2000 were included in the study. All patients had historical and/or clinical evidence of hematemesis and/or melena. Upper GI hemorrhage has been defined in this study as vomit containing red blood (or coffee ground like material, observed by a doctor or a nurse), and/or the stool has been black or red-black confirmed by observation or rectal examination.

Patients were identified using the surgical admission database and by questioning the teams on call for emergency admission on a daily basis.

Data were collected by the completion of two separate proformas: an upper GI bleed endoscopy form, that specified esophagogastroduodenoscopy (EGD) and its findings; and an upper GI bleed general form, specific to the management and outcome of upper GI hemorrhage.

Data were collected on age and sex distribution, risk factors, High Dependency Unit (HDU) admission, monitoring and record keeping. Data collected on endoscopy involved time of endoscopy, grade (seniority) of endoscopist and therapeutic intervention carried out. Data were also collected on surgical intervention, morbidity and in-hospital mortality.

Risk score was assessed once data were available using Rockall's initial risk scoring system (2). This system, although very simplistic, is reproducible. It involves an additive score of the number of important risk factors. The risk factors are age over 60 years, systolic blood pressure of less than 100 mmHg, hemoglobin less than 10 g/dL, any major comorbidity, a diagnosis of upper GI malignancy or varices, the presence of stigmata of recent hemorrhage and rebleeding.

## RESULTS

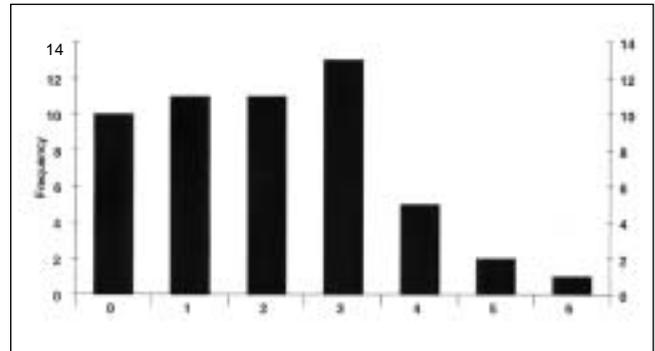
### Demographic data

**First phase:** Fifty-seven patients had a presumptive diagnosis of upper GI hemorrhage during the study period. Their mean age was 69 years and median of 76 years, range 16 to 95 years, with a male to female ratio of 3:2.

**Second phase:** Fifty-two patients were admitted with a diagnosis of upper GI bleed. Their mean age was 62 years, median age 69 years and mode 81 years with a range of 15 to 92 years.

### Risk score, blood transfusion and monitoring

**First phase:** Twenty-eight (50%) patients belonged to the high risk group (risk factor 2+) (Figure 1). None of the patients was admitted to the HDU after the initial assessment. Twenty-



**Figure 2)** Frequency of risk score in the second phase. Forty per cent had risk score of 2+

nine (51%) patients received blood transfusion in whom 24 (42%) had documented urinary output monitoring. Central venous pressure monitoring was used only in six (10%) patients.

**Second phase:** Twenty-one patients (40%) belonged to the high risk group (Figure 2). In this phase of the study one patient was admitted in the intensive care unit (ICU) and one patient in the HDU. Twenty-nine (55%) received blood transfusion, four (7.5%) patients had central venous pressure monitoring and 46 (87%) patients had documented urinary output monitoring

### Endoscopy

**First phase:** Eighty-six per cent (49) of all patients underwent endoscopy some time during their admission. Of the eight patients who did not have an EGD, three refused endoscopic examination, two were young and stable and had a questionable diagnosis of upper GI bleed, one had EGD planned but died of a cerebrovascular accident and two had suspected Mallory-Weiss tears and no endoscopic examination was contemplated. Thirty-four (60%) patients had an EGD within 24 h and 22% had an EGD outside of normal working hours. Eleven (33%) of the high risk group failed to have an endoscopic examination within 24 h. Consultants/staff grade carried out endoscopy in 17 patients whereas in 32 patients specialist registrars performed the endoscopy. All endoscopies were performed by a surgeon. Twenty patients had therapeutic procedures at endoscopy and there were no complications from EGD.

**Second phase:** Forty-two patients (79%) had an upper GI endoscopy while inpatients in this admission. Four patients were deemed to have a minor bleed and were discharged home after observation with an outpatient endoscopy arranged, two patients were medically unfit to have an endoscopy and one patient refused to undergo an endoscopy. One patient, a pregnant woman, had a doubtful history of hematemesis and was only observed. Two patients were admitted with coffee ground vomit with a history of peptic ulcer disease, and in addition had small bowel obstruction.

Thirty-six patients (68%) had an EGD within 24 h of admission. Only four of 21 high risk patients had endoscopy after 24 h of their admission. Thirteen patients (24.5%) had therapeutic intervention at endoscopy. Consultant /staff grade

surgeons performed endoscopy in 31 patients whereas specialist registrars carried out endoscopy on 11 patients. Endoscopy was not associated with any complication.

### Surgery

**First phase:** Two patients, both males over the age of 75 years with a risk score of more than four, required surgery. They had diagnostic and therapeutic endoscopies within 24 h of admission and were each found to have a duodenal ulcer. Both required a second therapeutic EGD for rebleed and had oversewing of the bleeding ulcer at surgery. They were admitted to the HDU. One of them had severe respiratory comorbidity and died from respiratory failure postoperatively. The second patient was successfully discharged home three weeks after surgery.

**Second phase:** Two patients had surgery. A 15-year-old girl had collapsed secondary to a bleeding vascular malformation in the duodenum. Therapeutic intervention at endoscopy failed to stop the bleeding. Under-running of the vascular malformation was done at surgery. The other patient, a medical inpatient, had hematemesis from a gastric carcinoma diagnosed at endoscopy. At surgery he was found to have an inoperable gastric cancer. The patient was kept comfortable and died postoperatively.

### Mortality

**First phase:** Eight (14%) patients in the study died in hospital and/or within 30 days. They were all over the age of 79 years. Their average age was 87.5 years, median age 88 years with a range of 79 to 95 years. One refused any active intervention. Three suffered cerebrovascular accident before any therapeutic measures were instituted. One died postoperatively from respiratory failure. One had a myocardial infarction, one died of pneumonia and the other of multiorgan failure. The case notes of all the patients were carefully reviewed and it was concluded that their deaths were not preventable.

**Second phase:** Only four patients (7.5%) died during the second phase. One has been mentioned above. The second patient was a 33-year-old female patient admitted with coffee ground vomiting. Endoscopy was normal. Computed tomography revealed a brain tumour from which she succumbed. A 92-year-old gentleman, known to suffer from carcinoma of the esophagus, had a hematemesis. He was unfit for an EGD and subsequently died. Another, an 89-year-old man had a bleeding gastric ulcer seen on EGD that was injected. He continued to bleed. He was unfit for surgery and was kept comfortable.

## DISCUSSION

The agreed protocol used in the study was based on the guidelines for good practice in the management of upper GI hemorrhage recommended by the joint working group of the British Society of Gastroenterology, the Research Unit of the Royal College of Physicians of London and the Audit Unit of the Royal College of Surgeons of England (3).

Risk score in this study was assessed using Rockall's risk scoring system (2,4). Rockall's risk scoring system primarily allows determining case mix and calculating risk-standardized

**TABLE 1**  
Diagnoses of phase one patients

Diagnosis	n
Esophagitis	4
Barrett's esophagus	4
Esophageal varices	1
Esophageal tumour	1
Esophageal ulcer	5
Gastritis	10
Gastric ulcer	7
Gastric tumour	1
Gastric erosions	1
Gastric polyps	1
Pyloric stenosis	1
Duodenitis	3
Duodenal ulcer	9
Hiatus hernia	6
Anastomotic ulcer	1
Mallory-Weiss tear	2
Normal	6

**TABLE 2**  
Diagnoses of phase two patients

Diagnosis	n
Esophagitis	11
Gastritis	16
Duodenitis	6
Esophageal ulcer	6
Gastric ulcer	12
Duodenal ulcer	8
Esophageal malignancy	2
Gastric malignancy	2
Duodenal malignancy	1
Esophageal varices	6
Gastric varices	1
Hemobilia	1
Mallory-Weiss tear	1
Erosions	1
Stomal ulcer	1
Bleeding disorder	2
Polyp	4
Normal	7

mortality. The system has also been proven to predict outcome in patients presenting with upper GI hemorrhage (5,6). Blatchford et al (7) recently developed a risk scoring system to predict and identify patients' need for treatment in upper GI hemorrhage, though the system requires external validation.

Twenty-two patients during the first phase of the study and 27 patients during the second phase were found to have peptic ulcer disease (Tables 1 and 2). These findings show that bleeding from a peptic ulcer is still the most common cause of upper GI hemorrhage despite the widespread availability of effective antiulcer drugs. Peptic ulcer disease is responsible for nearly 50% of cases of severe upper GI hemorrhage (8).

In the majority of the patients with an upper GI hemorrhage, the bleeding stops spontaneously. Patients with contin-

ued or recurrent bleeding remain a therapeutic challenge. Therapeutic endoscopy constitutes the cornerstone of modern therapy of these patients. Over half of these patients will respond to endoscopic treatment with injection, thermocoagulation or laser (9). Twenty of 57 patients in the first phase and 13 of 53 patients in the second phase of the study had an injection of adrenaline at endoscopy. This high incidence of injection therapy may explain the very small number of patients requiring surgery. The incidence of surgical intervention was much lower than that in the National upper GI hemorrhage audit. A total of 181 of 2332 (7.8%) in the first phase and 111 of 1625 (6.8%) in the second phase of the national audit of acute upper GI hemorrhage had surgical intervention (2). Liberal use of endoscopic injection therapy is known to be associated with a low operation rate (10).

Additional therapeutic options in upper GI hemorrhage are based on in vitro experiments showing the pH dependence of the coagulation mechanism. The lower the pH, the worse the platelet aggregation and the plasma coagulation, and at a pH below four the fibrin in the clot is dissolved by the proteolytic action of pepsin. Stabilization of the clot consequent on increasing the gastric pH, in theory, therefore, could reduce bleeding or prevent its recurrence. The role of various agents reducing gastric acidity has been explored to achieve such a goal. Trials with H<sub>2</sub> receptor antagonists have failed to demonstrate a consistent significant therapeutic benefit. Although they are effective in healing peptic ulcer disease, they have not been shown consistently to reduce the incidence of continued or recurrent bleeding or the need for surgical interventions in patients with acute upper GI hemorrhage. However, available data on proton pump inhibitors, which profoundly suppress acid production and secretion, are suggestive but not conclusive that they may decrease the overall incidence of rebleed and the need of surgery in select patients with acute upper GI hemorrhage (9).

High dependency care and close monitoring with central venous pressure recording appears to have been used sparingly during the first phase of the study. No patient was admitted to the HDU/ITU after initial assessment and, overall, only 10% of the patients had achieved monitoring of central venous pressure during this phase. Twenty-four patients (42%) had been monitored by urinary output measurement. During the second phase two patients were admitted to the HDU/ITU and 6% of the patients had central venous pressure monitoring. However, 46 patients (87%) had documented urinary monitoring during this phase of the study.

The impact of management of patients with upper GI bleeding, in the HDU with agreed management protocol and close monitoring, on mortality appears to be somewhat contradictory. Masson et al (11) reports a significantly low mortality rate when patients are cared for in dedicated units with specialized staff and close monitoring. Kapur et al (10), on the other hand, failed to demonstrate any reduction in mortality from upper GI hemorrhage following the introduction of HDU care and agreed protocol.

In the first phase of this study eight (14%) patients, all over the age of 79 years, died. Their average age was 87.5 years with a range of 79 to 95 years. Advanced age is a well known signif-

icant risk factor in upper GI hemorrhage for rebleeding and death. Mortality from upper GI hemorrhage increases from less than 10% in those patients below the age of 60 years to 35% in patients over the age of 80 years (12,13). When a study involves an elderly population with severe concurrent disease, reduction in mortality is difficult to achieve (11).

Mortality was reduced from 14% in the first phase to 7.5% in the second phase of the study. Though this reduction is not statistically significant, this study has demonstrated a trend in reduction in mortality. The reduction in mortality achieved may have been due to the introduction of agreed protocol and closer patient monitoring and early endoscopic intervention.

## CONCLUSIONS

Our prospective audit has demonstrated that a reduction of mortality may be achieved following the introduction of an agreed protocol on the management of patients with upper GI hemorrhage and that evidence-based guidelines should be considered necessary in the management of these patients.

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