

1-1-2006

# Retrospective Evaluation of the Rockall Risk Scoring System in Patients with Nonvariceal Upper Gastrointestinal Hemorrhage at a Community Hospital

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RETROSPECTIVE EVALUATION OF THE  
ROCKALL RISK SCORING SYSTEM IN PATIENTS WITH  
NONVARICEAL UPPER GASTROINTESTINAL HEMORRHAGE  
AT A COMMUNITY HOSPITAL

by

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Thesis

Submitted to the Department of Health Sciences

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE

in

Clinical Research Administration

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October 20, 2006

Ypsilanti, Michigan

## ACKNOWLEDGEMENTS

I would like to thank Dr. Naresh Gunaratnam, Mr. Robert Xeras, Ms. Eileen Robinson, and Ms. Darlene Wahlberg for helping with coordination of this project and guiding me in the right direction.

## ABSTRACT

Despite advances in diagnosis and treatment of patients with upper gastrointestinal hemorrhage (UGIH), the majority of hospitals do not risk-stratify patients with UGIH. One of the major challenges in triaging patients with nonvariceal UGIH is identifying patients' who are at low risk. We retrospectively identified Rockall scores of 160 patients and the proportion of low-risk patients seen in the Emergency Department at Saint Joseph Mercy Hospital (SJMH) over a one-year period. Additionally, we determined adverse outcomes and healthcare resources utilized and evaluated whether certain antiplatelet agents, anticoagulants, and NSAIDS affected the Rockall scores. The Rockall scoring system identified 21% of patients as having low Rockall scores, with no significant differences in length of stay between risk groups. Our study shows that identifying patients with low Rockall scores could improve the management of patients with UGIH and reduce the amount of healthcare resources involved in treating these patients.

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## CHAPTER 1: INTRODUCTION AND BACKGROUND

### *Introduction*

Despite advances in diagnosis and treatment of patients with nonvariceal upper gastrointestinal hemorrhage (UGIH), it remains a commonly encountered medical emergency with an annual incidence of 50 to 150 per 100, 000 of the population (Ferguson & Mitchell, 2005). A contributing cause is the increase in size of the aging population with several concurrent illnesses and an associated increase in use of non-steroidal anti-inflammatory drugs (NSAIDs), anticoagulants, and antiplatelet agents, which has hindered the progress in effectively managing this patient population. It is important to recognize that a clinical pathway to triage patients is necessary to be effective in managing patients with nonvariceal UGIH. One of the major challenges involved in managing patients with nonvariceal UGIH is identifying patients who are at low risk, suitable for early discharge or outpatient care and those who are at high risk of rebleeding and mortality.

Several scoring systems have been developed to help predict the outcome of patients and to improve patient management and promote cost-effective use of hospital resources (Ferguson & Mitchell, 2005). Rockall, Logan, Devlin, and Northfield (1996) developed a risk-scoring system involving clinical and endoscopic criteria to predict the risk of rebleeding and mortality in patients with UGIH. Multiple studies have validated the Rockall score's ability to identify and risk-stratify patients with nonvariceal UGIH. Surprisingly, there has been very slow progress in creating a clinical pathway for effectively managing patients with nonvariceal UGIH using the Rockall risk scoring system, especially at community hospitals.

## *Background for the Study*

Upper gastrointestinal hemorrhage (UGIH) is one of the most common and expensive life-threatening gastrointestinal emergencies, accounting for 300,000 to 350,000 hospital admissions annually. It has been estimated that greater than \$2.5 billion is spent annually in treating these patients (Hay, Maldonado, Weingarten & Ellrodt, 1997). The majority of costs incurred are due to hospital and, particularly, intensive care unit (ICU) stays rather than physician fees, blood products, medications, or diagnostic tests.

UGIH is approximately four times more common than lower GI bleeding, and the majority of cases are due to nonvariceal bleeding. Nonvariceal bleeding is due to arterial hemorrhage such as ulcers and deep mucosal tears, whereas swollen veins due to portal hypertension cause variceal bleeding. The most common causes of UGIH include bleeding ulcers located in the stomach, duodenum, or esophagus; Mallory-Weiss tears; trauma or foreign body; esophagitis; vascular malformations; tumors of the stomach or esophagus; and gastroenteritis. Additionally, the factors that predispose one to increased risk of UGIH include medications, infection of the stomach with *Helicobacter pylori* bacteria, erosion of the protective layer of the stomach lining, age, concurrent illnesses, alcohol, smoking, and gender.

Despite the frequency of UGIH and its tremendous economic impact on the healthcare system, guidelines for providing quality medical treatment in a cost-effective environment are not well established. In most cases, hospital admission has been considered mandatory until risk of further hemorrhage has receded. For this reason, patients with low risk of rehemorrhage may be staying in the hospital longer

than necessary, thereby subjecting them to an increased risk of hospital-acquired infections and decreasing activities of daily living while admitted. It also results in a financial burden, as patients are prevented from working, and increases the overall costs and healthcare resources involved in treating these patients. In published literature, the proportion of patients with nonvariceal UGIH who are considered “low risk” ranges from 20% to 70% (Oei, Dulai, Gralnek, Chang, Kilbourne, & Sale, 2002). The majority of patients with UGIH have a self-limiting illness and uncomplicated hospital stay. Many patients are admitted or remain in the hospital despite this very low risk for a poor outcome. Additionally, the Rockall risk-scoring system has been studied mostly at academic medical centers, and very few studies have been conducted at community hospitals (Oei et al., 2002). Consequently, this low-risk patient group presents an opportunity to improve the quality of care and efficiency of current healthcare delivery for patients with nonvariceal UGIH in the Emergency Department at Saint Joseph Mercy Hospital (SJM), a community hospital.

#### *Specific Objectives*

- To determine the total Rockall score of all patients admitted to the Emergency Department at SJM for nonvariceal UGIH during the period of August 1, 2004, through July 31, 2005.
- To determine the proportion of patients who were low risk (Rockall score < 3) for rehemorrhage and death following their UGIH episodes at SJM.
- To determine the number and types of adverse outcomes (that is, repeat endoscopy before discharge, surgery, transfusion of blood products, readmission within 30 days

due to UGIH, or death) in patients with nonvariceal UGIH during the period of August 1, 2004, through July 31, 2005, at SJMH.

- To evaluate the healthcare resources utilized by patients during their hospital stays for nonvariceal UGIH following Emergency Department admission at SJMH.
- To assess the impact of antiplatelet agents, anticoagulants, and nonsteroidal anti-inflammatory drugs (NSAIDS) on the Rockall scores of patients.

### *Hypotheses*

*Null hypothesis.* Less than twenty percent of patients with nonvariceal UGIH at SJMH during the period of August 1, 2004, through July 31, 2005, had a Rockall score of  $< 3$ .

*Alternate hypothesis.* Twenty percent or more patients with nonvariceal UGIH at SJMH during the period of August 1, 2004, through July 31, 2005, had a Rockall score of  $< 3$ .

## CHAPTER 2: REVIEW OF RECENT LITERATURE

Various scoring systems have been derived to identify patients at greatest risk for UGIH and to risk stratify these patients. One of the most widely recognized scoring systems was developed by Rockall et al. (1996), who conducted the largest epidemiological study in the United Kingdom on behalf of the steering committee of the National Audit for UGIH. Their study involved 4185 adult cases of UGIH from 74 hospitals. Rockall and colleagues (1996) developed a scoring system involving both clinical and endoscopic criteria to predict the risk of rehemorrhage and mortality (see Figure 1 for detailed Rockall score calculation). The Rockall risk score is a simple, validated predictive index that may serve as a useful clinical decision rule for assessing the risk of subsequent adverse outcomes in patients with nonvariceal UGIH (Dulai, Gralnek, Oei, Chang, Alofaituli, Gornbein & Kahn, 2002). An initial Rockall score based on clinical variables (age, shock, and comorbidity) can range from 0 to 7 points. A complete score takes into account the endoscopic findings of hemorrhage lesion categorization and stigmata of hemorrhage and can range from 0 to 11 points. A total Rockall score of less than three is predictive of low risk of adverse outcomes, and a score of greater than eight is predictive of high mortality. For cases with a score of less than three, several studies suggest that rehemorrhage occurred in less than 5% of patients and death occurred in less than 1% of patients (Oei et al., 2002; Dulai et al., 2002; Vreeburg et al., 1999; and Sanders et al., 2002).

Several studies have examined the use of the Rockall scoring system in risk stratifying patients with nonvariceal UGIH to predict rehemorrhage and mortality. Among these studies, Sanders, Carter, Goochap, Cross, Path, Gleeson and Lobo

(2002) prospectively studied 325 patients admitted to a specialized hemorrhage unit over a 3-year period. The aim of their study was to assess the validity of the Rockall risk-scoring system in predicting rebleeding and mortality in subgroups of patients with esophageal varices or peptic ulcers. The results of their study were comparable to those of Rockall's initial cohort in predicting rebleeding and death in patients with either ulcers or varices (scores of < 3 accounted for 29.4% of patients, of whom only 4.3% rebled and 0.1% died). Dulai et al. (2002) conducted a retrospective study to accurately risk stratify patients by using the Rockall score. Their findings suggested that a significant number of all patients hospitalized with acute UGIH are at low risk of adverse outcomes related to their hemorrhage episodes. Oei and colleagues (2002) evaluated and compared the incidence of low-risk UGIH admissions, adverse outcomes, and the levels of healthcare resource use in a community hospital and a university hospital. The data from their study confirmed the low rate of morbidity and mortality in both practice settings, suggesting that downgrading the site of initial admission for low-risk patients with early discharge could conserve healthcare resources without compromising patient safety. These studies demonstrate that patients with a low Rockall score can be managed safely as outpatients, or with limited admission and early discharge, without adversely influencing patient outcomes, with considerable resource savings.

## CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

### *Setting*

This study was conducted at St. Joseph Mercy Hospital (SJMH), a nonprofit, community, teaching hospital in southeast Michigan with 529 hospital beds, 37 intensive care beds, 129 monitored beds, and 202 nonmonitored beds. The average cost of an ICU bed is \$2885 per day, a monitored bed is \$2039, and a nonmonitored bed is \$1008. SJMH has a dedicated gastroenterology department with physicians available 24 hours a day for any gastrointestinal emergencies.

### *Study Design*

This was a descriptive, unblinded, retrospective study analyzing existing hospital medical records to extract data of subjects seen at SJMH with nonvariceal UGIH during the period of August 1, 2004, through July 31, 2005. Prior to initiation of this study, approvals were obtained from St. Joseph Mercy Health System Institutional Review Board, the Resident Advisory Committee, the Clinical Scholars Committee, and Eastern Michigan University's Human Subjects Review Committee.

### *Subjects*

The Emergency Department's and the SJMH's computerized records systems were utilized to identify subjects for this study. In addition, we identified subjects, using the *International Classification of Diseases, 9<sup>th</sup> Revision, Clinical Modification (ICD-9-CM)* codes for the following primary discharge diagnoses and procedural codes for common gastrointestinal conditions and endoscopic procedures: 530.10, 530.11 (esophagitis with or without mention of hemorrhage); 530.70 (Mallory-Weiss syndrome); 530.82 (Esophageal hemorrhage); 531.xx (gastric ulcer); 532.xx

(duodenal ulcer); 533.xx (peptic ulcer); 534.xx (gastrojejunal ulcer); 535.xx (gastritis or duodenitis); 537.83 (angiodysplasia of the stomach/duodenum with hemorrhage); 578.00 (hematemesis); 578.10 (melena); and 578.90 (hemorrhage of the GI tract, unspecified). Cooper, Chak, Lloyd, Yurchick, Harper, and Rosenthal previously established the accuracy of these diagnoses and procedural codes in their 2000 study.

#### *Rockall Risk Score Calculation*

An initial Rockall risk score (Clinical Rockall score) was calculated on the basis of points assigned for each of the three clinical variables: age, shock, and comorbidity. For example, a subject with tachycardia with no significant concurrent illnesses who was 55 years of age would have an initial Rockall score of 1: tachycardia would score 1, no significant concurrent illnesses would score 0, and age of 55 would score 0. The Clinical Rockall score can range between 0 and 7 points, and subjects with an initial score equal to zero are at low risk of having adverse outcomes and would be considered for early discharge and/or outpatient management. The complete score takes into account the endoscopic variables: endoscopic diagnosis and stigmata of recent hemorrhage. For example, using the subject described above, if the subject were found to have a Mallory-Weiss tear and no stigmata of recent hemorrhage during endoscopy, the subject would have a total Rockall score of 1: Mallory-Weiss tear would score 0, and stigmata of recent hemorrhage would score 0. The complete Rockall score can range from 0 to 11 points, and a score of < 3 is predictive of low risk of adverse outcomes and is appropriate for early discharge and/or outpatient management (see Figure 1 for a detailed description).

Scores				
Variable	0	1	2	3
Age (y)	< 60	60-79	> 80	
Shock	No Shock (Systolic BP > 100 mm Hg; pulse < 100 beats/min)	Tachycardia (Systolic BP > 100 mm Hg; pulse > 100 beats/min)	Hypotension (Systolic BP < 100 mm Hg; pulse > 100 beats/min)	
Comorbidity	None	--	Cardiac failure, ischemic heart disease, any major comorbidity*	Renal failure, liver failure, disseminated malignancy
Diagnosis	Mallory-Weiss, no lesion or stigmata of recent hemorrhage	All other diagnoses	Malignancy of upper GI tract	--
SRH	None or dark spot	--	Blood in Upper GI tract, adherent clot, visible or spurting vessel	--

*Note.* \*Any major comorbidity would be defined as any other immediately unstable life-threatening illnesses in addition to cardiac failure, IHD, renal/liver failure, and cancer, etc. For example, Chronic obstructive pulmonary disease, severe respiratory disease, and/or neurological disorders. (Rockall et. al., 1996)

BP – Blood Pressure; SRH – major stigmata of recent hemorrhage

*Figure 1.* The Rockall risk scoring system.

### *Measures of Adverse Outcome and Healthcare Resource Utilization*

Data collected to evaluate adverse outcomes included date and time of endoscopy, transfusion of blood products, repeat endoscopy before hospital discharge, surgery for UGIH, readmission within 30 days due to UGIH, and death during hospital stay for UGIH. The timeframe of interest for subsequent adverse events was defined as 30 days from the day of discharge from the hospital. Adverse outcomes assessed included repeat endoscopy before hospital discharge, transfusion of blood products during UGIH episode, surgery for UGIH, readmission within 30 days of discharge, and death. A *Rebleed* category was created in order to assess outcomes that included repeat endoscopy before hospital discharge, surgery for UGIH, readmission within 30 days of discharge, and death. Data collected to assess the healthcare resources utilized

included the hospital unit the subject was admitted to following Emergency Department admission (ICU, monitored bed, or nonmonitored bed), and use of IV Protonix or IV H2 Blockers. Data were also collected on the following medications at the time of presentation to the emergency department: aspirin, plavix, coumadin, aggrenox, NSAIDS, and COX-2. This was done to assess whether these concomitant treatments had any effect on the Rockall risk scores of subjects. In addition, we collected data on where subjects were discharged to (home, skilled care facility, another hospital, or if patient expired).

#### *Inclusion/Exclusion Criteria*

Subjects were included in the study if they were adult patients ( $\geq 18$  years of age) with nonvariceal UGIH admitted through the Emergency Department who had diagnostic upper endoscopy either during Emergency Department admission or hospital stay for UGIH. Subjects were excluded if they had variceal UGIH, did not have diagnostic endoscopy either during Emergency Department admission or hospital stay for UGIH, developed UGIH while hospitalized for other diagnoses, were transferred from other hospitals or directly admitted to the hospital for UGIH, or if they were prisoners.

#### *Data Analysis*

We utilized SPSS (SPSS Inc. version 13, Chicago, IL) and Microsoft Excel for data management and analysis. The co-investigator collected all data and a manual check was performed after collection of all data. The principal investigator completed a second manual check to review the accuracy of information by evaluating medical records, with information collected on data collection sheets. The statistician

performed a third manual check to ensure all fields on the data collection sheets were completed prior to data entry. An automated check was performed after data entry, and missing and inconsistent data were addressed. A second automated check was completed, and any unresolved queries were addressed prior to data analysis. Means and proportions were compared with chi-square methods and *t tests*. A p-value of less than 0.05 was considered statistically significant.

## CHAPTER 4: RESULTS AND DATA ANALYSIS

### *Study Population*

One hundred eighty-one subjects were identified over a one-year period (August 1, 2004, through July 31, 2005) with nonvariceal UGIH, of which 21 cases were excluded because of not meeting inclusion criteria or having incomplete medical records. Therefore, 160 subjects were included in this study and analyzed.

### *Patient demographics and Rockall Score Variables*

Fifty-nine percent of all cases were female. The mean age (SD) was 68 (16) years old, [median age 71 years old (males = 63 & females = 72); range 22 to 97 years old], 54% presented with no tachycardia and/or hypotension, and 45% had no major comorbidities. The 34 subjects with a Rockall risk score of < 3 (low-risk) had the following characteristics: mean age was 58 years old (S.D. = 16); 70% of low-risk subjects were female subjects, 9% presenting with a comorbid conditions, 24% presented with tachycardia, 24% had either a Mallory-Weiss tear or no lesion, and none of the low-risk subjects had any stigmata of recent hemorrhage (SRH) (see Table 1).

Table 1

*Rockall Score Variables*

Variables	Low risk (< 3)	Medium risk (3 to 5)	High risk (> 5)
N	34 (21%)	81 (51%)	45 (28%)
Age ± S.D.	58 ± 16	68 ± 16	77 ± 12
Female	70%	52%	64%
Comorbidity	9%	54%	91%
Tachycardia	24%	35%	31%
Hypotension	0%	7%	38%
Mallory-Weiss tear, or no lesion	24%	7%	2%
SRH*	0%	28%	60%

Note. \*SRH: Stigmata of recent hemorrhage

*Risk Stratification*

The Clinical Rockall score based on clinical variables alone revealed that 8% (13/160) of subjects had scores of zero, suggesting that they were at low risk of adverse outcomes related to their UGIH episode. The complete Rockall score based on both clinical and endoscopic variables revealed that 21% (34/160) of subjects had scores of less than 3. The average age of subjects with low Rockall scores was 58 years old (S.D. = 16), the average age for medium-risk subjects was 68 years old (S.D. = 16), and the average age for high-risk subjects was 77 years (S.D. = 12). Of the low-risk subjects (score < 3), 37.4% were less than 50 years of age, and of subjects with high-risk scores, 60% were greater than 80 years of age, showing that patients under age 50 had lower Rockall scores ( $p < 0.05$ ). A *t* test for independent

samples determined that there was a statistical difference in Rockall scores between subjects younger than 50 years old and subjects older than 50 years old.

*Adverse Outcomes in Low-Risk Subjects*

Subjects in the low-risk group did not have surgery or death, and only 3% required repeat endoscopy; 3% were readmitted within 30 days of their UGIH episodes. The *Rebleed* rate (surgery, repeat endoscopy, death, or repeat admission within 30 days for UGIH) in the low-risk group was 6%. The average number of units of blood transfused in the low-risk group was 2 units (SD = 1), and 44% of subjects received blood transfusions during their stay.

Table 2

*Adverse Outcomes*

Variables	Low risk (< 3)	Medium risk (3 to 5)	High risk (> 5)
N	34 (21%)	81 (51%)	45 (28%)
PRBC transfusion (%)	44%	56%	76%
Readmission w/in 30 days	3%	13%	19%
Surgery	0%	1%	0%
Repeat endoscopy	3%	10%	16%
Rebleed	6%	21%	24%

*Note.* \*Rebleed: Repeat endoscopy, surgery, readmission w/in 30 days, or death

*Utilization of Health Care Resources by Low-Risk Subjects*

The average length of stay was  $5 \pm 3$  days. There was no statistically significant difference between the risk groups on the length of hospital stay. Seventy percent of the low-risk subjects were admitted to a monitored bed, 30% received IV protonix, and 18% received IV H2 blockers. Concomitant medications included aspirin, plavix,

coumadin, aggrenox, NSAIDS, and COX-2 at the time of initial admission to the emergency department: 44% of subjects were taking one of the above-mentioned medications, 18% were on two medications, 3% were on three medications, and 3% of patients' data was not reported, and 33% were not on any of the medications listed above. Of the subjects on any of the above-mentioned concomitant medications, 35% (56) of subjects were taking aspirin, 23% (37) were taking NSAIDS, and 16% (26) were taking coumadin. The mean Rockall score of subjects taking any of the above-mentioned medications was 4 (S.D. = 2), whereas the score of subjects who were not on any of the medications mentioned was 4 (S.D. = 2). A *t* test for independent samples determined that there was not a significant statistical difference between Rockall scores of subjects taking concomitant medications and Rockall scores of subjects who were not on any of these medications ( $p > 0.05$ ).

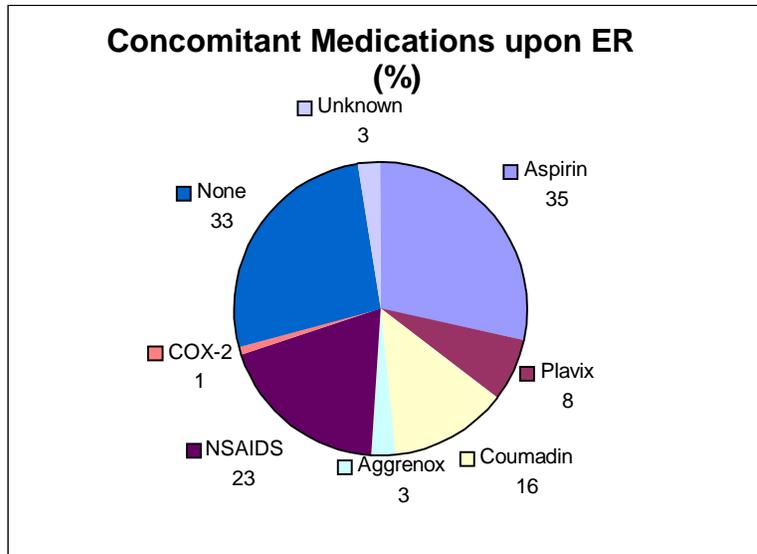


Figure 2. Concomitant medications upon ER.

Table 3

*Utilization of Healthcare Resources*

Variables	Low risk (< 3)	Medium risk (3 to 5)	High risk (> 5)	All subjects
N	34 (21%)	81 (51%)	45 (28%)	160 (100%)
Hospital LOS	4 + 3	5 + 3	5 + 3	5 + 3
Admitted to ICU	0 (0%)	5 (6%)	9 (20%)	14 (9%)
Admitted to monitored bed	23 (70%)	51 (63%)	25 (56%)	99 (62%)
IV Protonix use	10 (30%)	37 (46%)	26 (58%)	73 (46%)
IV H2 blockers use	6 (18%)	25 (31%)	7 (16%)	38 (24%)
Discharged home	29 (88%)	70 (86%)	36 (80%)	135 (85%)
Discharged to skilled nursing	4 (12%)	10 (12%)	8 (18%)	22 (14%)

*Time and Place of Endoscopy*

Endoscopy was performed within less than 24 hours of bleeding episode in 73 (46%) subjects, and 86 (54%) subjects had endoscopy after 24 hours or more. The mean time in hours was 37.8 hours (S.D. = 35.8) for all subjects, and the low-risk group had a mean of 41.5 hours (S.D. = 39.2). One hundred thirty-six (85%) subjects were discharged home, and 22 (14%) were discharged to a skilled-care facility; and 19 (12%) subjects were readmitted within 30 days of their initial bleeding episode. Of the 34 subjects with low Rockall scores, 29 (89%) were discharged home and 4 (12%) were discharged to a skilled-care facility.

## CHAPTER 5: DISCUSSION

Upper gastrointestinal hemorrhage (UGIH) is one of the most common and expensive life-threatening GI emergencies, accounting for 300,000 to 350,000 hospital admissions annually. Despite the frequency of UGIH and its tremendous economic impact on the healthcare system, guidelines for providing quality medical treatment in a cost-effective environment are not well established. In most cases, hospital admission has usually been considered mandatory until risk of further hemorrhage has receded. For this reason, patients with low risk of rehemorrhage may be staying in the hospital longer than necessary, thereby subjecting them to an increased risk of hospital-acquired infections and decreasing activities of daily living while admitted. It also results in a financial burden, as patients are prevented from working and increases the overall costs and healthcare resources involved in treating these patients.

The Rockall scoring system has been validated, in several studies, for predicting rebleeding and mortality (Dulai et al., 2002; Vreeburg et al., 1999; Sanders et al., 2002; Oei et al., 2002; Gralnek & Dulai, 2004). In this study we analyzed patient medical records to determine the Rockall risk scores, and to observe the proportion of subjects with Rockall scores  $< 3$ . The study population represents a consecutive adult patient population at a community hospital, with a greater proportion of female subjects (59%), as opposed to other published studies that had more male subjects in their studies. In published literature, the proportion of patients with nonvariceal UGIH who are considered *low-risk* ranges from 20% to 70% (Oei et al., 2002). The findings in this study are consistent with those of previous studies in the use of the

Rockall score to determine low-risk patients. At our institution, 21% (34) of subjects had Rockall scores  $< 3$ ; 6% had adverse outcomes with no surgeries and/or deaths. There was no statistical difference between Rockall scores of subjects taking concomitant medications and subjects not on any of the mentioned concomitant medications upon emergency room admission.

Oei and colleagues (2002) demonstrated in their study that a significantly higher proportion of low-risk, community hospital cases were admitted to an ICU or monitored bed, utilizing greater healthcare resources than at an academic hospital setting. The cost of an ICU bed at our hospital was \$2885 per day, and a monitored bed was \$2039 versus a nonmonitored bed, which cost \$1008 per day. Our data showed that 70% of subjects with low-risk scores were admitted to a monitored bed, with an average length of stay of  $4 \pm 3$  days. The low-risk patients had no surgeries, and there were no deaths; 6% had adverse outcomes. Cipoletta, Bianco, Rotondano, Marmo, and Piscopo (2002) demonstrated in their study that outpatient care of patients at low risk for recurrent nonvariceal UGIH was safe and could lead to significant savings in hospital costs. Triaging low-risk patients, admitting them to a nonmonitored bed, and/or potentially treating these low-risk patients as outpatients would save considerably on healthcare costs in treating these patients without compromising patient safety. Furthermore, low-risk patients could be appropriately admitted to a monitored bed if concurrent illnesses, such as underlying coronary disease, warrant more aggressive cardiovascular monitoring.

Pfau et al. (2004) suggested in their study that the length of stay was the single greatest factor contributing to healthcare costs in patients admitted for acute UGIH.

The average length of stay at our hospital was  $5 \pm 3$  days, with no statistical differences between the low-risk, medium-risk, and high-risk groups. This reveals that low-risk patients may be staying longer than necessary, utilizing excess healthcare resources. Hay and colleagues (1997) indicated in their study that implementation of a clinical practice guideline safely reduced length of hospital stay for selected low-risk patients with acute UGIH. Therefore, implementation of the Rockall scoring system at SJMH in the future could reduce healthcare costs.

Longstreth (1999) suggested that early endoscopy is the most important factor in shortening length of hospital stay, identifying suitable patients for outpatient care, and reducing costs in patients with acute upper gastrointestinal bleeding. We found that although 46% of patients had endoscopy performed within less than 24 hours of their emergency room admission, the majority of patients had endoscopy more than 24 hours after time of admission. Lee (2004) stated that early endoscopy was the most accurate method of determining the cause of bleeding and that endoscopic therapy significantly reduced transfusion requirements, the need for urgent surgery, the length of hospital stay, and probably mortality from nonvariceal UGIH. In our study, we found that 44% of low-risk patients received blood transfusions that were determined to be due to initial low hemoglobin levels at the time of admission and during hospital stay. Early endoscopy could decrease the need for blood transfusions and facilitate suitable triage of patients. For this reason, we would have to perform endoscopy within 24 hours of Emergency Department admission, and this is something we would need to address further in prospective studies.

Parente, Anderloni, Bargiggia, Imbesi, Trabucchi, Baratti, Gallus, and Porro (2005) demonstrated in their study that outcomes were better when patients were managed by experienced gastroenterologists, resulting in significantly fewer recurrent bleeding rates and transfusion requirements. Our hospital, SJMH, has a dedicated gastrointestinal service that is available around the clock and would contribute positively to the management of patients with UGIH.

## CHAPTER 6: LIMITATIONS OF THE STUDY

Limitations of this study included the following: (a) incomplete medical records excluded some subjects from contributing to this study; (b) some subjects were identified as UGIH patients because of a primary diagnosis other than UGIH; (c) data on postdischarge outcomes of interest (recurrent hemorrhage and death) may be incomplete if subject did not return for treatment at SJMH; (d) the actual time of initial admission into the Emergency Department may be somewhat ambiguous because the actual time of admission did not account for the amount of time subject waited in the Emergency Department waiting room; (e) the possibility of selection bias due to decisions to transfer some subjects to a specified hospital unit may not be entirely related to the subjects' diagnoses of UGIH; (f) the possibility of observer bias during data abstraction due to the unblinded nature of the study although Rockall scores were calculated by a statistician after data collection; and (g) findings in this study may not be generalizable to other community hospitals that do not have a dedicated GI department.

The Rockall score was designed to identify the risk score that a patient has and to predict rebleeding and mortality. It was not designed to evaluate the patient's needs for hospitalization or intensive monitoring or to evaluate other medical conditions that may need further attention when UGIH is not the primary reason for admission. For a comprehensive clinical pathway to be successful, each patient would need to be assessed by a physician and evaluated further after history, physical, and laboratory assessment, together with his/her Rockall score, to give an accurate description of the

patient's needs. Utilizing the Rockall score alone would not be appropriate for giving a full clinical description of the patient.

## CHAPTER 7: SUMMARY AND CONCLUSIONS

In conclusion, patients with UGIH at SJMH, a community hospital, are usually hospitalized regardless of clinical status or endoscopic findings. The results of an increasing number of studies suggest that early endoscopy (within 24 hours of admission to the Emergency Department) with limited hospital stays and/or outpatient care is a safe alternative to a costly hospitalization. The findings in our study suggest the possibility of excess use of healthcare resources and suggest that the use of the Rockall score may reduce costs in treating this patient population. This could also improve the quality of life for patients, as they would not be subjected to extended hospital stays. Our study demonstrated that there may well be a beneficial impact on healthcare resources utilized because the average length of stay at our hospital for low-risk patients was longer than may have been necessary. Our study demonstrated that the Rockall scoring system is useful in identifying patients with nonvariceal UGIH who have low-risk scores in order to triage appropriately, without affecting patient outcomes.

## REFERENCES

- Cipolletta, L., Bianco, M. A., Rotondano, G., Marmo, R., & Piscopo, R. (2002). Outpatient management for low-risk nonvariceal UGIH: A randomized controlled trial. *Gastrointest. Endosc.*, *55*(1), 131-134.
- Cooper, G. S., Chak, A., Lloyd, L. E., Yurchick, P. J., Harper, D. L., & Rosenthal, G. E. (2000). The accuracy of diagnosis and procedural codes for patients with upper GI hemorrhage. *Gastrointestinal Endoscopy*, *51*(4), 423-426.
- Dulai, G. S., Gralnek, I. M., Oei, T. T., Chang, D., Alofaituli, G., Gornbein, J., & Kahn, K. (2002). Utilization of health care resources for low-risk patients with acute, nonvariceal UGIH: An historical cohort study. *Gastrointest. Endosc.*, *55*(3), 321-327.
- Ferguson, C. B., & Mitchell, R. M. (2005). Nonvariceal upper gastrointestinal bleeding: Standard and new treatment. *Gastroenterol. Clin. N. Am.*, *34*, 607-621.
- Gralnek, I. M., & Dulai, G. S. (2004). Incremental value of upper endoscopy for triage of patients with acute nonvariceal upper GI hemorrhage. *Gastrointest. Endosc.*, *60*(1), 9-14.
- Hay, J. A., Maldonado, L., Weingarten, S. R., & Ellrodt, A. G. (1997) Prospective evaluation of a clinical guideline recommending hospital length of stay in upper gastrointestinal tract hemorrhage. *JAMA*, *278*(24), 2151-2156.
- Lee, J. G. (2004). Editorial: Urgent endoscopy: Does it matter if they don't listen to us? *Gastrointestinal Endoscopy*, *60*(1), 94-95.
- Longstreth, G. F. (1999). Acute upper gastrointestinal hemorrhage: Clinical practice guidelines that reduce costs. *Clin. Pers. Gastroentrol.*, *2*, 67-72.

- Oei, T. T., Dulai, G. S., Gralnek, I. M., Chang, D., Kilbourne, A., & Sale, G. A. (2002). Hospital care for low-risk patients with acute, nonvariceal upper GI hemorrhage: A comparison of neighboring community and tertiary care centers. *Am. J. Gastroenterol.*, *97*(9), 2271-2278.
- Parente, F., Anderloni, A., Bargiggia, S., Imbesi, V., Trabucchi, E., Baratti, C., Gallus, S., & Porro, G. B. (2005). Outcome of non-variceal acute upper gastrointestinal bleeding in relation to the time of endoscopy and the experience of the endoscopist: A two-year survey. *World J. Gastroenterol.*, *11*(45), 7122-7130.
- Pfau, P. R., Cooper, G. S., Carlson, M. D., Chak, A., Sivak, M. V., Gonet, J. A., Boyd, K. K., & Wong, R. C. (2004). Success and shortcomings of a clinical care pathway in the management of acute nonvariceal upper gastrointestinal bleeding. *American J. of Gastroenterol.*, *99*(3), 425-431.
- Rockall, T. A., Logan, R. F. A., Devlin, H. B., & Northfield, T. C. (1996). Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage. *Lancet*, *347*, 1138-1140.
- Sanders, D. S., Carter, M. J., Goodchap, R. J., Cross, S. S., Path, M. R. C., Gleeson, D. C., & Lobo, A. J. (2002). Prospective validation of the Rockall risk scoring system for Upper GI hemorrhage in subgroups of patients with varices and peptic ulcers. *Am. J. Gastroenterol.*, *97*(3), 630-635.
- Vreeburg, E. M., Terwee, C. B., Snel, P., Rauws, E. A. J., Bartelsman, J. F. W. M., Meulen, J. H. P., & Tytgat, G. N. (1999). Validation of the Rockall risk scoring system in upper gastrointestinal hemorrhage. *Gut*, *44*, 331-335.

## APPENDICES



Appendix B: Sample Data Collection Tool 2

**Retrospective Rockall Score of Patients with Nonvariceal UGIH at SJMH  
Additional Data Sheet**

1. Study #: \_\_\_\_\_
2. Drugs patient was taking when admitted in ER: (Check all that apply)
  - 1 Aspirin
  - 2 Plavix
  - 3 Coumadin (warfarin)
  - 4 Aggrenox (aspirin plus dipyridamole)
  - 5 NSAIDS (aleve, ibuprofen, etc)
  - 6 COX-2 (Vioxx, Celebrex, Bextra, etc)
  - 7 None
  - 8 Unknown

