Original Article

Application of AIMS65 Score in the Prediction of Clinical Outcomes of Patients with Upper Gastrointestinal Hemorrhage

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Background: The AIMS65 score has been recognized as an accurate tool in predicting outcomes in patients with upper gastrointestinal hemorrhage (UGIH).

Objective: To determine whether outcomes for patients presenting with UGIH differ depending on low-risk (AIMS65 <2) and high-risk (AIMS65 ≥2) scores.

Materials and Methods: The authors conducted a retrospective comparison of in-hospital mortality, other clinical outcomes, and resource use between low-risk and high-risk UGIH patients in Hatyai Hospital between 2016 and 2017.

Results: There were 322 patients with UGIH included in the present study, of whom 186 patients (57.8%) were low-risk and 136 patients (42.2%) were high-risk. When compared to low-risk patients, high-risk patients had increased risk of in-hospital mortality (11.8% vs. 2.7%, $p = 0.001$; adjusted hazard ratio (HR) 4.04, 95% confidence interval (CI) 1.34 to 12.16), needed blood transfusion (74.3% vs. 39.8%, $p<0.001$; adjusted HR 4.23, 95% CI 2.42 to 7.42), endoscopic intervention (44.1% vs. 24.7%, $p<0.001$; adjusted HR 2.06, 95% CI 1.19 to 3.57) and overall intervention (46.3% vs. 24.7%, $p<0.001$; adjusted HR 2.19, 95% CI 1.24 to 3.86). There was no significant difference in rebleeding between the two groups (3.7% vs. 2.2%, $p = 0.501$; adjusted HR 1.71, 95% CI 0.43 to 6.87). High-risk patients were associated with longer hospitalization (median (IQR) = 5 (4 to 7) days vs. 4 (3 to 5) days, $p<0.001$) and higher hospitalization cost (median (IQR) = 687.4 (450.7 to 1,023.1) vs. 537.1 (388.5 to 819.1) US dollars, $p<0.001$).

Conclusion: The AIMS65 score is simple and accurate in predicting clinical outcomes. High-risk patients (AIMS65 ≥2) had increased risk of in-hospital mortality and needed of blood transfusion, endoscopic intervention, and overall intervention and were associated with greater hospital stay and cost.

Keywords: AIMS65 score, Upper gastrointestinal hemorrhage, Gastrointestinal bleeding, Mortality, Outcome, Resource

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Upper gastrointestinal hemorrhage (UGIH) is one of the most common and urgent gastrointestinal problems, that result in significant morbidity, mortality, and use of health care resources[1]. International guidelines recommend early risk stratification of patients to help designate appropriate management to minimize mortality and morbidity[2-4]. Several risk assessment scores have been developed. The Rockall score (RS) and the Glasgow-Blatchford score (GBS) have shown accuracy in predicting clinical outcomes of patients with UGIH[5,6]. However, the practicality of both scores are limited by weighting and assigning points to variability in the patient's medical history, some of which lack a clear definition. These lead to challenges in the rapid risk stratification assessment process[7].

More recently, the AIMS65 score was introduced[8]. This pre-endoscopic clinically applicable scoring system was composed of age, serum albumin level, systolic blood pressure, international normalized ratio (INR), and mental status. The AIMS65 score is simple for bedside use, and its efficacy is comparable to RS and GBS in predicting in-hospital mortality and other clinical outcomes in UGIH patients[9-12]. Using a cut-off value of 2, the AIMS65 score can classify patients into low- and high-risk mortality[8]. However, comprehensive data of AIMS65 score application in predicting clinical outcomes and resource utilization in UGIH patients are limited, especially in Asian countries.

In the present study, the authors aimed to determine whether outcomes and use of medical resources in patients presenting with UGIH differ between low- and high-risk groups according to the AIMS65 score in a Thai population.

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Materials and Methods

Study design and population

This was a retrospective observational study conducted in Hatyai Hospital, which is a regional tertiary care hospital in south of Thailand, between January 2016 and December 2017. The study was reviewed and approved by the Ethics Committee on Human Subjects in Hatyai Hospital (protocol number 27/2563) and was performed in accordance with the Helsinki Declaration. All patients above 18 years of age who presented with evidence of UGIH (including melena, coffee ground vomitus, hematemesis and/or hematochezia) and underwent esophagogastroduodenoscopy were included in the present study. The exclusion criteria were final diagnoses that were not UGIH after the diagnostic workup, history of UGIH within 3 months prior, or inadequate available data for analysis.

In accordance with the general management of acute UGIH patients in Hatyai Hospital, patients were treated as inpatient cases after initial assessment and hemodynamic stabilization. All patients subsequently underwent endoscopy during hospitalization. Clinical managements, including usage of pre-endoscopic medication, blood transfusion, and time of endoscopy, were judged by each gastroenterologist depending on the patient's clinical status. We shifted to empirical therapy with intravenous proton pump inhibitor (PPI) in patients with suspected ulcer bleeding. Intravenous vasopressor and prophylactic antibiotics were prescribed in patients who were at risk for variceal-related hemorrhage and were stopped if cases were found to be non-variceal UGIH (NVUGIH). Intravenous prokinetic agents were not routinely used before endoscopy.

For those with NVUGIH, endoscopic intervention was performed using injection therapy (using diluted adrenaline) together with thermal contact or mechanical clip in patients who had high risk stigmata for recent bleeding of NVUGIH (including spurting or pulsatile bleeding, non-bleeding visible vessel, or adherent clot). There was no policy of injection monotherapy in our institute. Esophageal and gastric variceal bleeding were managed by band ligation and cyanoacrylate injection, respectively[13,14]. After the procedure, high dose intravenous PPIs were given by continuous infusion for 72 h to patients who received endoscopic intervention or who were considered appropriate by clinical judgment of attending gastroenterologists[2-4]. The threshold of hemoglobin lesser than 7 to 8 g/dL was indication for red blood cell (RBC) transfusion[14,15]. However, the decision for transfusion varied case by case, depending on the discretion of the individual caring physician or gastroenterologist. Consultation for embolization or surgery was considered in patients whose bleeding failed to stop by endoscopic intervention or developed rebleeding despite two episodes of adequate endoscopic intervention. In our center, transjugular intrahepatic portosystemic stents or balloon-occluded retrograde transvenous obliteration was not available.

Data collection

Data were retrospectively collected for each patient. Two independent reviewers (AC, KA) reviewed each patient's medical record manually. Discrepancies between data collected by both reviewers were referred to a third reviewer (AR) to resolve disagreements. For each patient, the following data were collected: age, sex, comorbidities, current medication usage, symptoms, and laboratory results on the day of admission. For patients with multiple laboratory tests or vital signs in the emergency department, the most abnormal values were selected. In addition, timing to the endoscopy, type of endoscopic hemostasis, blood transfusion, need of surgical and radiologic intervention, in-hospital rebleeding and mortality, and admission period and cost were recorded. The hospital cost was based on the total cost of universal bill data. *Helicobacter pylori* infection was tested by histology and rapid urease test.

Outcomes and definitions

The primary outcome was in-hospital mortality, defined as any death developed during the admission period. The secondary outcomes were need for RBC transfusion, endoscopic intervention, overall intervention (including endoscopic, surgical, and radiologic intervention), rebleeding, length of stay (LOS), and hospitalization cost.

The AIMS65 scores were calculated by allotting 1 point each for the following components in each patient: albumin level <3 g/dL, INR >1.5, altered mental status, systolic blood pressure ≤90 mmHg, and age >65 years. In this study, we classified patients presenting with UGIH into two groups according to the AIMS65 score. The low-risk group included patients with AIMS65 score of 0 or 1, whereas the high-risk group included patients with AIMS65 score ≥2[8]. The patients were defined to have a change in mental status if the Glasgow Coma Scale score is <14 or if they were described by the attending physician as having "disorientation", "lethargy", "stupor" or "coma". Early endoscopy was defined as an endoscopy performed within 24 h of admission. The presence of hemodynamic instability was considered as calculated mean arterial pressure <65 mmHg. Rebleeding was defined as the presence of UGIH evidence after the initial bleeding was resolved and was associated with hemodynamic instability or decrease of hemoglobin >2 g/dL.

Statistical analyses

Categorical variables were concluded using frequency statistics and tested for significant differences using Pearson Chi-square test or Fisher's exact test between the two groups. For continuous variables, we summarized data using descriptive statistics and used Student's t-test and Wilcoxon rank-sum test for assessment of significant differences. The logistic regression model with adjustment for participants' demographic factor (including age, body mass index (BMI), cirrhosis status, hemoglobin level, platelet count, serum creatinine level, and variceal related bleeding) was used to examine the association between outcome events and risk classification. All *p*-values represented two-side hypothesis test and the significant level for all tests

was $\alpha = 0.05$. Analyses were performed using the statistical program Stata (version 15.1, StataCrop LLC, College Station, TX).

Results

Patients characteristics

The present study included 322 patients who met the inclusion and exclusion criteria with mean age of 61 years. Of these, 237 (73.3%) were men. Following endoscopy, 256 patients (79.5%) had NVUGIH and 66 patients (20.5%) had VUGIH. The endoscopic findings in patients with NVUGIH included peptic ulcer (58.2%, n = 149), esophagitis/gastritis/duodenitis (27.3%, n = 70), Mallory-Weiss syndrome (10.5%, n = 27), and tumor bleeding (3.9%, n = 10). In patients with VUGIH, causes included esophageal varices (87.9%, n = 58) and gastric varices with or without esophageal varices (12.1%, n = 8). Of the patients included in the present study, 186 (57.8%) patients were defined as low-risk and 136 (42.2%) patients were defined as high-risk according to the AIMS65 score. The patients' characteristics for both groups are summarized in Table 1. There were some significant differences between the two groups. In the high-risk group, patients had history of cirrhosis and higher mean age, warfarin usage, hemoglobin level, INR, serum blood urea nitrogen level, and serum creatinine, and were likely to have syncope and presence of shock at the time of initial assessment. Conversely, the levels of BMI, serum albumin level, and platelet count were greater in the low-risk group. Diagnoses of VUGIH were significantly higher in the high-risk group patients.

Mortality

Twenty-one patients died during hospitalization resulting in an in-hospital mortality rate of 6.5%. Mortality rates increased with higher AIMS65 scores. In patients with AIMS65 score of 0, 1, 2, 3, 4 and 5, the mortality rates were 2.4%, 3.0%, 5.8%, 13.5%, 17.4%, and 42.9%, respectively. The in-hospital mortality rate was significantly higher in the high-risk group when compared to that of the low-risk group (2.7% vs. 11.8%, $p = 0.001$) (Table 2). The high-risk group was associated with increased risk of in-hospital mortality with adjusted hazard ratio (HR) equal to 4.04 (95% CI = 1.34 to 12.16) (Table 3).

Other outcomes

RBC transfusion was required in 175 patients (54.3%; median 1 unit of packed RBC; interquartile range (IQR), 0 to 2). Endoscopic and overall interventions were performed in 106 (32.9%) and 109 (33.9%) patients, respectively. Nine (2.8%) patients developed in-hospital rebleeding, while 4 (1.2%) patients underwent surgical and/or radiologic management. The median LOS was 4 (IQR, 3 to 6) days, and total hospital cost was 687.4 (IQR, 450.7 to 1,023.1) US dollars.

The comparisons of treatment outcomes and medical utilizations are shown in Table 2. There was no significant difference in rebleeding between low-risk and high-risk groups (2.2% vs. 3.7%, $p = 0.501$). However, the need for RBC transfusion (39.8% vs. 74.3%, $p<0.001$), endoscopic intervention (24.7% vs. 44.1%, $p<0.001$), and overall intervention (24.7% vs. 46.3%, $p<0.001$) was significantly higher in the high-risk group (Table 2). After adjustment for potential confounders, the high-risk group was shown to be positively associated with the need for RBC transfusion (adjusted HR = 4.23, 95% CI = 2.42 to 7.42), endoscopic intervention (adjusted HR = 2.06, 95% CI = 1.19 to 3.57), and overall intervention (adjusted HR = 2.19, 95% CI = 1.24 to 3.86) as shown in Table 3. Conversely, there was no statistically significant association between the risk classification according to the AIMS65 score for in-hospital rebleeding.

The high-risk group patients were associated with longer LOS (median (IQR) = 4 (3 to 5) days vs. 5 (4 to 7) days, $p<0.001$) and higher hospitalization cost (median (IQR) = 537.1 (388.5 to 819.1) US dollars vs. 687.4 [450.7 to 1,023.1] US dollars, $p<0.001$).

Discussion

In this retrospective study, we found the utility of AIMS65 score application among UGIH patients in Thailand. According to the AIMS65 score, high-risk patients (AIMS65 score ≥ 2) not only had increased risks of death and other clinical outcomes (except rebleeding) but also were associated with longer hospitalization, as well as greater total hospital cost. Our results suggested that the AIMS65 score might be acceptable in triaging patients into the appropriate levels of care.

Nearly 80% of the 322 UGIH patients were those with NVUGIH, while the remaining 20% were VUGIH. This was consistent with the literatures in Asia, including Thailand. The prevalence of variceal bleeding in Asian countries is higher than those in Western countries (20 to 40% vs. 7 to 15%)[16,17].

It is known that the patients' characteristic and treatment outcomes can vary depending on the geography due to multiple factors (e.g., prevalence of *H. pylori* infection, CYP2C19 polymorphism, regional culture background)[18,19]. The mortality rate (6.5%) observed among UGIH patients in the present study was comparable to those in previous studies in both Eastern and Western countries[10,17,20]. This might be explained, in part, by prompt resuscitation, appropriate administration of pre-endoscopic medication (depending on the suspected etiology of bleeding), and effective endoscopic interventions, all of which could reduce the risk of rebleeding and death[3]. However, the outcome of this study focused on in-hospital mortality; liable deaths after discharge were not evaluated and could result in an underestimation of death cases.

International consensus and American College of Gastroenterology guidelines recommend early risk stratification in patients to assist management decision[2-4]. The AIMS65 score, a newly proposed scoring system, is simple, acronym-based (which makes it easy for clinicians to remember), and required only non-weighted elements (bedside clinical and laboratory data). The predictive accuracies of the AIMS65 score for mortality have been proven[8-10,21]. Our

Table 1. Baseline demographic data and clinical characteristics of low-risk and high-risk upper gastrointestinal bleeding patients

Characteristics	Low risk (n = 186)	High risk (n = 136)	*p*-value
Male	137 (73.7)	99 (72.8)	0.863
Age (years), mean (SD)	58.1 (17.8)	64.9 (14.3)	<0.001
BMI (kg/m^2), mean (SD)	23.6 (4.5)	22.5 (4.6)	0.030
Hemodynamic instability	3 (1.6)	41 (30.1)	<0.001
Syncope	16 (8.6)	90 (66.2)	<0.001
Previous upper gastrointestinal hemorrhage	3 (1.6)	1 (0.7)	0.641
Mental status change	2 (1.1)	6 (4.4)	0.074
Comorbidities			
None	97 (52.2)	72 (52.9)	0.888
Hypertension	58 (31.2)	43 (31.6)	0.934
Dyslipidemia	20 (10.8)	8 (5.9)	0.126
Ischemic heart disease	4 (2.2)	3 (2.2)	1.000
Chronic kidney disease	10 (5.4)	15 (11.0)	0.061
Cerebrovascular disease	14 (7.5)	9 (6.6)	0.754
Malignancies	12 (6.5)	14 (10.3)	0.211
Cirrhosis	27 (14.5)	36 (26.5)	0.008
Diabetic mellitus	40 (21.5)	27 (19.8)	0.892
Chronic obstructive pulmonary disease	6 (3.2)	3 (2.2)	0.738
Medications			
Aspirin and/or clopidogrel	13 (7.0)	8 (5.9)	0.691
Warfarin	0 (0.0)	7 (5.1)	0.002
Non-steroidal anti-inflammatory drug	19 (10.2)	16 (11.8)	0.659
Corticosteroid	1 (0.5)	1 (0.7)	1.000
Proton pump inhibitor	9 (4.8)	5 (3.7)	0.613
Laboratory			
Hemoglobin (g/dL), mean (SD)	10.5 (3.1)	6.8 (2.2)	<0.001
Platelet count (x10^3/mL), median (IQR)	219.5 (155, 287)	161.5 (83, 259)	<0.001
Albumin (g/dL), mean (SD)	3.6 (0.6)	2.6 (0.6)	<0.001
INR, median (IQR)	1.14 (1.04, 1.24)	1.38 (1.14, 1.71)	<0.001
BUN (mg/dL), median (IQR)	24 (14, 43)	35 (23, 54.5)	<0.001
Serum creatinine (mg/dL), median (IQR)	0.94 (0.77, 1.25)	1.13 (0.80, 1.69)	0.005
Variceal bleeding	25 (13.4)	41 (30.1)	<0.001
Helicobacter pylori infection	61 (32.8)	37 (27.2)	0.282
Early endoscopy	70 (37.6)	52 (38.2)	0.913
Time for endoscopy (h), median (IQR)	20 (13, 38)	20 (13, 44.5)	0.664

Data were expressed as number (%) unless specified.
BMI = body mass index; BUN = blood urea nitrogen; INR = international normalized ratio; IQR = interquartile range; SD = standard deviation

study supported the idea that the AIMS65 score is precise in predicting mortality and the risk of in-hospital death is increased in high-risk patients (adjusted HR = 4.4, 95% CI = 1.34 to 12.16). The mortality of patients was higher when increasing the score. This finding was consistent with the study of Saltzman[8], which revealed patients without any risk factor had 0.3% mortality rate, and those with all five factors had it at 24.5%. The study concluded that mortality

Table 2. Clinical outcomes and medical resource use between the low-risk and high-risk group

Variables	Low risk (n = 186)	High risk (n = 136)	*p*-value
In-hospital mortality	5 (2.7)	16 (11.8)	0.001
Need of blood transfusion	74 (39.8)	101 (74.3)	<0.001
Number of blood transfusion (unit), median (IQR)	0 (0 to 1)	2 (0 to 4)	<0.001
Endoscopic intervention	46 (24.7)	60 (44.1)	<0.001
Overall intervention	46 (24.7)	63 (46.3)	<0.001
Rebleeding	4 (2.2)	5 (3.7)	0.501
Length of hospitalization (days), median (IQR)	4 (3 to 5)	5 (4 to 7)	<0.001
In-hospital cost (Thai Baht), median (IQR)	16,651 (12,043 to 25,392)	21,309 (13,972 to 31,717)	<0.001
In-hospital cost (US dollar), median (IQR)	537.1 (388.5 to 819.1)	687.4 (450.7 to 1,023.1)	<0.001

Data are expressed as number (%) unless specified

Table 3. Adjusted clinical outcomes of high-risk vs. low-risk patients

	Hazard ratio	95% confidence interval	*p*-value
Rebleeding	1.71	0.43 to 6.87	0.447
Need of blood transfusion	4.23	2.42 to 7.42	0.001
Endoscopic intervention	2.06	1.19 to 3.57	0.010
Overall intervention	2.19	1.24 to 3.86	0.007
In-hospital mortality	4.04	1.34 to 12.16	0.013

Adjusted for age, body mass index, cirrhosis, variceal related bleeding, hemoglobin, platelet count and serum creatinine.

risk can be characterized as low and high using cutoff point level of 2. Thandassery et al[22] demonstrated that the mortality was significantly higher in patients with score ≥2 compared to those with score <2 (30.9% vs. 4.5%, $p<0.001$). Furthermore, a retrospective study conducted by Nakamura et al. evaluated the role of the AIMS65 score and GBS in gastrointestinal bleeding, including 109 and 83 of upper and lower gastrointestinal bleeding, respectively. Only the AIMS65 score, but not GBS, was found to be an independent prognostic factor for overall survival in multivariate logistic regression analysis[12]. Our result generally agrees with these findings.

Besides mortality, the risk for the need of RBC transfusion, endoscopic intervention, and overall intervention (including endoscopic, radiologic, and surgical interventions) was also higher for high-risk patients in our study. Markers of medical resource use and clinical outcome in UGIH patients included LOS and cost[23,24]. Our study found that high-risk patients were associated with increased hospitalization and cost of. Beyond risk stratification, these findings added value to clinical application of the AIMS65 score for prognostication and resource preparation.

Some limitations of this study should be noted. First, this study was conducted in a single tertiary care center consisting of only Thai patients. As such, results may not apply in general. Second, this was a retrospective study. Score calculation, data collection, and clinical outcomes ascertainment were based on exiting records resulting. For this reason, some information which might explain the reason for difference in outcomes (including cause of in-hospital death and data regarding time-to-endoscopy) could not be obtained. However, errors that may come from resulting bias were minimized by using two independent reviewers, and a third reviewer gave the final decision when discrepancies were found. Third, the LOS in this study was less than 7 days, and the evaluation of re-bleeding during the period of hospitalization might be too short for the interpretation of the difference in re-bleeding rate between the two groups. Finally, only patients who underwent endoscopy were included in this study. Patients who refused endoscopy or who managed as outpatients were not enrolled in this study. Outcomes may not be representative of all UGIH patients.

Conclusion

The AIMS65 score is simple and accurate in predicting mortality and treatment outcomes. Patients with

AIMS65 score ≥2 had increased risk of in-hospital mortality and need of blood transfusion, endoscopic intervention, and overall intervention and were associated with longer hospitalization and greater cost.

What is already known in this topic?

International consensus guidelines suggest early risk stratification of patients with upper gastrointestinal hemorrhage to provide appropriate management. The AIMS65 score is a simple scoring system that has been validated as having accurate efficacy in predicting clinical outcomes. However, data comparing the clinical outcomes between low- and high-risk patients according to the AIMS65 score (using cutoff point level of 2) were limited.

What this study adds?

This is the first study in Thailand to evaluate the clinical application of the AIMS65 score in gastrointestinal hemorrhage patients. According to the AIMS65 score, high-risk patients (AIMS65 score ≥2) had increased risk of death and other clinical outcomes (except rebleeding) and were associated with longer hospitalization and greater total hospital cost. This study suggested that this simple scoring system might be acceptable in helping triage patients into appropriate levels of care.

Conflicts of interest

The authors declare no conflict of interest.

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การใช้ระบบ AIMS65 ในการทำนายผลลัพธ์ของผู้ป่วยเลือดออกจากทางเดินอาหารส่วนบน

อรุณชัย แซ่ฉั่ง, กีรติ อัครปฏิมา, อรรถพล รัตนสุภา, วรายุ ปรัชญกุล

ภูมิหลัง: ระบบ AIMS65 เป็นระบบที่แม่นยำในการทำนายผลลัพธ์ในผู้ป่วยเลือดออกจากทางเดินอาหารส่วนบน การศึกษานี้เป็นไปเพื่อประเมินว่าจำแนกความเสี่ยงของผู้ป่วยโดยใช้ระบบ AIMS65 โดยแบ่งเป็นผู้ป่วยความเสี่ยงต่ำ (AIMS65 <2) และผู้ป่วยความเสี่ยงสูง (AIMS65 ≥2) มีผลต่อผลลัพธ์ทางซลินิกของผู้ป่วยหรือไม่

วัสดุและวิธีการ: เราทำการศึกษาย้อนหลังเปรียบเทียบการเสียชีวิตในโรงพยาบาล ผลการรักษาต่างๆ และการใช้ทรัพยากรทางการแพทย์ ระหว่างในผู้ป่วยเลือดออกจากทางเดินอาหารส่วนบนที่มีความเสี่ยงต่ำกับผู้ป่วยความเสี่ยงสูงในโรงพยาบาลหาดใหญ่ระหว่างปี พ.ศ. 2559 ถึง พ.ศ. 2560

ผลการศึกษา: ผู้ป่วยเลือดออกจากทางเดินอาหารส่วนบนทั้งหมด 322 ราย เป็นผู้ป่วยความเสี่ยงต่ำ 186 ราย (ร้อยละ 57.8) และผู้ป่วยความเสี่ยงสูง 136 ราย (ร้อยละ 42.2) โดยผู้ป่วยความเสี่ยงสูงเพิ่มความเสี่ยงต่อการเสียชีวิตในโรงพยาบาล (ร้อยละ 11.8 เทียบกับ 2.7, ค่าพีเท่ากับ 0.001; ความเสี่ยง 4.04 เท่า, 95% CI = 1.34 ถึง 12.16) ความต้องการการถ่ายเลือด (ร้อยละ 74.3 เทียบกับ 39.8, ค่าพีน้อยกว่า 0.001; ความเสี่ยง 4.23 เท่า, ช่วงความเชื่อมั่นร้อยละ 95 เท่ากับ 2.42 ถึง 7.42), การรักษาห้ามเลือดผ่านการส่องกล้อง (ร้อยละ 44.1 เทียบกับ 24.7, ค่าพี น้อยกว่า 0.001; ความเสี่ยง 2.06 เท่า, ช่วงความเชื่อมั่นร้อยละ 95 = 1.19 ถึง 3.57) และการรักษาห้ามเลือดโดยวิธีต่าง ๆ (ทั้งผ่านการส่องกล้อง รังสีรักษา และการผ่าตัด) (ร้อยละ 46.3 เทียบกับ 24.7, ค่าพีน้อยกว่า 0.001; ความเสี่ยง 2.19 เท่า, ช่วงความเชื่อมั่นร้อยละ 95 เท่ากับ 1.24 ถึง 3.86) แต่ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติในด้านการเกิดเลือดออกซ้ำ (ร้อยละ 3.7 เทียบกับ 2.2, ค่าพีเท่ากับ 0.501; ความเสี่ยง 1.71 เท่า, ช่วง ความเชื่อมั่นร้อยละ 95 เท่ากับ 0.43 ถึง 6.87) นอกจากนั้นผู้ป่วยความเสี่ยงสูงมีความสัมพันธ์การการนอนโรงพยาบาลที่นานขึ้น (5 วัน เทียบกับ 4 วัน, ค่าพีน้อยกว่า 0.001) และค่าใช้จ่ายระหว่างนอนโรงพยาบาลที่สูงขึ้น (21,309 บาท เทียบกับ 16,651 บาท, ค่าพีน้อยกว่า 0.001)

สรุป: ระบบ AIMS65 เป็นระบบที่ง่ายและแม่นยำในการทำนายผลลัพธ์ทางคลินิก โดยผู้ป่วยที่มีความเสี่ยงสูง (AIMS65 ≥2) เพิ่มความเสี่ยงต่อการเสียชีวิตในโรงพยาบาล ความต้องการการถ่ายเลือด การรักษาห้ามเลือดผ่านการส่องกล้องและและการรักษาห้ามเลือดโดยวิธีต่าง ๆ (ทั้งผ่านการส่องกล้อง รังสีรักษา และการผ่าตัด) และยังสัมพันธ์กับระยะเวลานอนโรงพยาบาลและค่าใช้จ่ายระหว่างนอนโรงพยาบาลที่มากขึ้น