HAS-BLED Score is Strongly Associated with a Rebleed in Patients with an Initial Episode of Gastrointestinal Bleeding Following Coronary Stenting

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BACKGROUND

- The HAS-BLED score is a decision tool for starting anticoagulation for patients with atrial fibrillation.
- It has not been validated in patients following coronary stenting to assess bleeding risks.

OBJECTIVE & HYPOTHESIS

- We aimed to determine whether the HAS-BLED score was associated with a rebleed after an index gastrointestinal bleed (GIB) following coronary stenting.
- We hypothesized as the HAS-BLED score increases, so does the risk of a rebleed.

METHODS

- Retrospective study across Mayo Clinic Florida between January 2015 and December 2021.
- Inclusion criteria: 1) successful coronary stenting, 2) initiation of DAPT, 3) index GIB after coronary stenting 4) age 18 years or older.
- Exclusion criteria: if any of the above not met or lost to follow up at 365 days.
- The primary outcome was a rebleed at 365 days.
- Univariable analysis performed using Wilcoxon Rank Sum Test or Fisher Exact Test.
- Multivariable Logistic Regression Analysis with Bootstrap Resampling and Kaplan-Meier Estimates were performed.

CONCLUSIONS

- In this single-center retrospective cohort study, we found the HAS-BLED score was strongly associated with a rebleed at 365 days in patients who had an index GIB after coronary stenting.
- The strongest predictors of a rebleed included having an index GIB within 180 days of coronary stenting, having a pre-catheterization endoscopy performed, a labile INR, and a STEMI.
- A simplified scoring system with these 4 variables may be constructed to predict a rebleed at 365 days for this patient population.

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Every 1-point increase in the HAS-BLED score is associated with a 39% increased odds of a rebleed at 365 days after coronary stenting.

Table 1: Baseline Characteristics of All Patients.

Median (IQR) or Fraction (%)	All Patients N=183	No Rebleed N=119	Rebleed N=64	p-value
Age at Coronary Stent Placement	72.5 (66.7-79.8)	73.1 (67.0-80.5)	71.7 (65.5-78.6)	0.245
Male gender	120 (65.6%)	83 (69.7%)	37 (57.8%)	0.142
Never Smoker	67 (36.6%)	49 (41.2%)	18 (28.1%)	0.107
Body Mass Index, kg/m^2	29.3 (26.0-33.6)	29.1 (25.7-33.4)	29.9 (26.1-33.6)	0.576
Obesity	82 (44.8%)	51 (42.9%)	31 (48.4%)	0.534
Comorbidities – defined as per HAS-BLED				
Hypertension	164 (89.6%)	107 (89.9%)	57 (89.1%)	1.00
Chronic Kidney Disease	42 (23.0%)	21 (17.6%)	21 (32.8%)	**0.027**
Liver Disease	27 (14.8%)	15 (12.6%)	12 (18.8%)	0.280
History of stroke	37 (20.2%)	25 (21.0%)	12 (18.8%)	0.847
Prior Major Bleeding	68 (37.2%)	36 (30.3%)	32 (50.0%)	**0.010**
Labile INR	64 (35.0%)	28 (23.5%)	36 (56.2%)	**<0.001**
Age > 65	143 (78.1%)	95 (79.8%)	48 (75.0%)	0.459
Medication predisposing to bleeding	183 (100%)	119 (100%)	64 (100%)	NA
Alcohol use	38 (20.8%)	22 (18.5%)	16 (25.0%)	0.341
HAS-BLED score	4 (3-5)	4 (3-5)	5 (4-6)	**<0.001**
• HAS-BLED > 3	120 (65.6%)	70 (58.8%)	50 (78.1%)	**0.009**
Coronary Catheterization Data				
Pre-catheterization Endoscopy Performed	22 (12.0%)	7 (5.9%)	15 (23.4%)	**0.001**
Acute Coronary Syndrome	100 (54.6%)	64 (53.8%)	36 (56.2%)	0.758
○ NSTEMI	72 (39.3%)	50 (42.0%)	22 (34.4%)	0.344
○ STEMI	28 (15.3%)	14 (11.8%)	14 (21.9%)	0.086
Stable CAD	83 (45.4%)	55 (46.2%)	28 (43.8%)	0.758
Hemoglobin prior to catheterization	12.7 (10.6-14.3)	13.2 (11.5-14.6)	11.5 (10.0-13.6)	**<0.001**
Medications After Catheterization				
Proton pump inhibitor	72 (39.3%)	41 (34.5%)	31 (48.4%)	0.081
SSRI	23 (12.6%)	17 (14.3%)	6 (9.4%)	0.484
Anticoagulation	62 (33.9%)	34 (28.6%)	28 (43.8%)	**0.049**
Index Gastrointestinal Bleed				
Time to Index GIB from Catheterization, days	75 (20-225)	113 (25-267)	36 (14-127)	**0.003**
Hemoglobin, g/dL	8.2 (6.9-9.9)	8.8 (7.3-10.3)	7.7 (6.6-8.7)	**0.003**
Change in Hemoglobin, g/dL	3.7 (2.4-5.5)	3.8 (2.4-5.5)	3.4 (2.6-5.4)	0.549
Platelets, x 10^9/L	210 (155-265)	202 (153-254)	223 (167-294)	0.180
INR	1.2 (1.1-1.7)	1.2 (1.0-1.3)	1.4 (1.2-3.2)	**<0.001**
Endoscopy Performed	144 (78.7%)	98 (82.4%)	46 (71.9%)	0.129
• Intervention Performed	61 (42.4%)	42 (42.9%)	19 (41.3%)	1.000
• Unknown Source of Bleeding	69 (47.9%)	46 (46.9%)	23 (50.0%)	0.858
Severe GIB	54 (29.5%)	33 (27.7%)	21 (32.8%)	0.500
• Admitted to ICU	35 (19.1%)	20 (16.8%)	15 (23.4%)	0.325
• Length of Hospital Stay, days	2 (1-4)	2 (1-4)	3 (1-4)	0.453
• pRBCs transfused	1 (0-2)	1 (0-2)	1 (0-3)	**0.025**
On P2Y12 Inhibitor at Admission	178 (97.3%)	117 (98.3%)	61 (95.3%)	0.345
• P2Y12 Inhibitor Continued at Discharge	154 (86.5%)	97 (82.9%)	57 (93.4%)	0.064

Table 2: Multivariable Logistic Regression Models for Rebleed After Coronary Stenting at 365 days.

Multivariable Logistic Regression Models With Bootstrap Resampling of 2,000 samples	Model 1: 6 variables, AIC: 211.1234, AUROCC (95% CI): 0.756 (0.682-0.830)			Model 2: 6 variables, AIC: 214.0093, AUROCC (95% CI): 0.766 (0.692-0.840)			Model 3: 6 variables, AIC: 202.9425, AUROCC (95% CI): 0.792 (0.720-0.864)			Model 4: 6 variables, AIC: 199.0650, AUROCC (95% CI): 0.798 (0.729-0.866)		
Variable	**OR (95% CI)**	**P**	**Coefficient (95% CI)**	**OR (95% CI)**	**P**	**Coefficient (95% CI)**	**OR (95% CI)**	**P**	**Coefficient (95% CI)**	**OR (95% CI)**	**P**	**Coefficient (95% CI)**
(Intercept)	0.098 (0.005-1.841)	0.128	- 2.318 (-7.294-0.870)	0.278 (0.017-4.040)	0.357	- 1.282 (-5.426-1.670)	0.230 (0.014-3.37)	0.293	- 1.469 (-5.292-1.381)	0.442 (0.035-5.22)	0.520	- 0.817 (-3.526-1.766)
HAS-BLED per 1 point	**1.394 (1.071-1.815)**	**0.013**	**+ 0.332 (0.055-0.651)**	NA	NA	NA	NA	NA	NA	NA	NA	NA
pRBCs Transfused per 1 unit	1.194 (1.015-1.406)	**0.033**	+ 0.178 (-0.37-0.352)	1.199 (1.019-1.409)	**0.028**	+ 0.181 (0.000-0.357)	1.190 (1.004-1.409)	**0.045**	+ 0.174 (-0.029-0.359)	1.144 (0.964-1.358)	0.124	+ 0.135 (-0.069-0.310)
Hemoglobin at Stenting per 1 g/dL	0.869 (0.736-1.028)	0.101	- 0.140 (-0.326-0.043)	0.861 (0.729-1.017)	0.079	- 0.149 (-0.337-0.015)	0.875 (0.737-1.038)	0.126	- 0.134 (-0.330-0.044)	0.864 (0.727-1.029)	0.100	- 0.146 (-0.342-0.027)
GIB Within 180 Days of Stenting	2.098 (0.908-4.851)	0.083	+ 0.741 (-0.092-1.811)	2.106 (0.915-4.848)	0.080	+ 0.745 (-0.043-1.820)	2.505 (1.042-6.025)	**0.040**	+ 0.918 (0.065-2.139)	2.892 (1.235-6.769)	0.014	+ 1.062 (0.213-2.305)
Pre-Catheterization Endoscopy Performed	3.761 (1.285-11.00)	**0.016**	+ 1.325 (0.349-2.710)	3.697 (1.272-10.746)	**0.016**	+ 1.308 (0.242-2.693)	4.351 (1.439-13.149)	**0.009**	+ 1.470 (0.506-2.774)	4.950 (1.642-14.924)	0.004	+ 1.599 (0.610-2.886)
P2Y12 Inhibitor Continued	3.027 (0.824-11.12)	0.095	+ 1.107 (-0.094-3.033)	3.082 (0.844-11.256)	0.089	+ 1.126 (-0.124-3.200)	2.457 (0.633-9.536)	0.1937	+ 0.899 (-0.390-2.780)	NA	NA	NA
HAS-BLED > 3	NA	NA	NA	2.029 (0.948-4.343)	0.068	+ 0.708 (-0.030-1.623)	NA	NA	NA	NA	NA	NA
Labile INR	NA	NA	NA	NA	NA	NA	3.974 (1.922-8.219)	**<0.001**	+ 1.380 (0.712-2.318)	4.510 (2.142-9.493)	<0.001	+ 1.506 (0.792-2.435)
STEMI	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.262 (1.236-8.605)	0.017	+ 1.182 (0.128-2.357)

RESULTS

- A total of 64/183 patients (35.0%) had a rebleed after the index GIB following coronary stenting at 365 days.
- Of the 183 patients included, 178 (97.3%) were still on DAPT at the time of GIB. Of these 178 patients, 154 patients (86.5%) had their P2Y12 inhibitor continued at discharge from the hospital.
- On univariable analysis, labile INR, HAS-BLED score, hemoglobin prior to catheterization, time to index GIB, hemoglobin and INR at GIB were strongly associated with a rebleed at 365 days . **Table 1.**
- On multivariable logistic regression analysis, every 1-point increase in the HAS-BLED score was associated with a 39% increased odds of a rebleed. Amongst the individual parts of the HAS-BLED score, labile INR was the strongest predictor of a rebleed, OR 4.5, 95% CI: 2.14-9.49, p <0.001. **Table 2.**
- As the HAS-BLED score increased, so did the incidence of rebleed at 365 days: incidence 21.1% at score 2 vs 53.9% at score 6 or 66.7% at score 7, RR: 2.56, p=0.0266 and RR: 3.17 p=0.0368, respectively [HAS-BLED score 2 as reference]. **Figure 1.**

Figure 1: Cumulative Incidence of Rebleed After Index GIB Following Coronary Stenting by HAS-BLED Score