Research Article

The Role of Sheffield Score as a Predictor of Endoscopy Requirement in Children with Gastrointestinal Bleeding in Dr. Moewardi General Hospital

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ABSTRACT:

Background: Gastrointestinal bleeding cases were increasing. In the last decade, endoscopy is discussed as the gold standard of diagnostic and therapeutic tool for gastrointestinal bleeding. Endoscopy examination in children is an invasive procedure, requires anesthesia, lack of experts, and lack of available equipment in several health facilities in Indonesia, especially in remote areas.

Objective: A guide and assessment system of Sheffield score was conducted to determine whether endoscopy was required during emergency.

Methods: Cross sectional design was used in this study, which was conducted in Melati 2 children ward on children aged 1-18 years old with clinical presentation of upper gastrointestinal bleeding in Dr. Moewardi Surakarta General Hospital from October 2018-March 2019.

Results: Endoscopy examination with Sheffield score system sample on cutoff 8 achieved 90.0% sensitivity, 90.0% specificity, 81.8% PPV, 94.7% NPV, 9 PLR, and 0.111 NLR. The result of chi square was $p = 0.000$, in which there was significant correlation between Sheffield score system with endoscopy. Thus, Sheffield score system appears to be a good predictor of endoscopy requirement.

Conclusion: The Sheffield score system could be used as a predictor of endoscopy requirement in pediatric gastrointestinal bleeding cases, which was statistically significant ($p < 0.001$) with 90.0% sensitivity, 90.0% specificity, 81.8% positive predictive value, 94.7% negative predictive value, 9.000 positive likelihood ratio, and 0.111 negative likelihood ratio.

Keywords: Sheffield, endoscopy, child, gastrointestinal bleeding, score

INTRODUCTION

The use of endoscopy had been increasing in several hospitals. Endoscopy aids in determining the cause of gastrointestinal bleeding, which lead to a more appropriate treatment and expected to reduce morbidity and mortality rate. Endoscopy in adults has been widely used. However, endoscopy, as diagnostic or therapeutic, in children is not a routine examination.[1,2,3,4]

Most endoscopy procedure lacks significance during emergency. Therefore, a guide and an assessment system are developed to determine whether endoscopy is needed during emergency. The assessment system for adult patient has been widely used, such as Rockalland Blatchford assessment system. However, there are insufficient studies regarding the assessment system for children.[4,5,6]

An assessment of pediatric patient with gastrointestinal bleeding cases should be developed as a predictor for endoscopy requirement. There was one study conducted by Thomson in 2015 that discussed the importance of assessment system to predict endoscopy requirement, known as the Sheffield score system. This score was conducted to determine whether endoscopy was required during emergency.[4,7,8,9,10,11]

METHODS

This study used cross sectional design in a diagnostic test in Melati 2 pediatric ward in Dr. Moewardi General Hospital, Surakarta from October 2018-March 2019. The target population of this study was children aged 1-18

years old with clinical presentation of upper gastrointestinal bleeding. The samples were selected using consecutive sampling from all subjects. The inclusion criteria were children aged 1-18 years old, with clinical presentation of upper gastrointestinal bleeding, i.e. hematemesis, melena, hematochezia, history of liver disease, history of transfusion, use of NSAID drugs for > 48 hours, family history of diseases such as coagulation disorder and peptic ulcer disease, and the patient's parents or guardians signed the informed consent to participate in this study. Meanwhile, the exclusion criteria include patients with thrombocytopenia, coagulation disorder, lower gastrointestinal bleeding. This study was approved by the Health Research Ethics Committee of Universitas Sebelas Maret Medical School/Dr. Moewardi Hospital Surakarta.

RESULTS

Table 1. Baseline Data

Variable	Result (n = 30)
Gender	
Female	12 (40.0%)
Male	18 (60.0%)
Age	11.03+4.04
Weight	36.33+18.54
Hemoglobin	12.65+1.92
Complaint	
Vomiting blood	24 (80.0%)
Black stool	5 (16.7%)
Vomiting blood and black stool	1 (3.3%)
Resuscitation	
Negative	29 (96.7%)
Positive	1 (3.3%)
Blood transfusion	
Negative	27 (90.0%)
Positive	3 (10.0%)
Sheffield	
Score > 8	11 (36.7%)
Score < 8	19 (63.3 %)
Endoscopy	
Varices bleeding	10 (33.3 %)
Non-varices bleeding	20 (66.7 %)

Table 1 explained that most pediatric patients with upper gastrointestinal bleeding were male with 18 patients (60.0%), with mean age was 11.03 ± 4.04 years old, mean weight was 36.33 ± 18.54 kg, mean Hb level was 12.65 ± 1.92, and most complaint was vomiting blood with 24 patients (80.0%), most resuscitation was negative with 29 patients (96.7%).

Out of 30 patients, 3 of them (10.0%) underwent blood transfusion, most Sheffield score was < 8, with 19 patients (63.3%). Ten patients had varices bleeding (33.3%), and 20 patients with non-varices bleeding (66.7%).

Table 2. Characteristics of Pediatric Patients with Clinical Presentation of Gastrointestinal Bleeding Based on Endoscopy Result

Variable	Varices bleeding (n = 10)	Non-varices bleeding (n = 20)	p-value
Gender[1]			0.694
Female	3 (30.0%)	9 (45.0%)	
Male	7 (70.0%)	11 (55.0%)	
Age[2]	9.40+4.12	11.85+3.84	0.119
Weight[3]	28.70+14.64	40.15+19.42	0.082
Hb level[2]	11.75+2.65	13.10+1.29	0.157
Complaint[1]			0.319
Vomiting blood	7 (70.0%)	17 (85.0%)	
Black stool	2 (20.0%)	3 (15.0%)	
Vomiting blood and black stool	1 (10.0%)	0 (0.0%)	
Resuscitation[1]			0.333
Negative	9 (90.0%)	20 (100.0%)	
Positive	1 (10.0%)	0 (0.0%)	
Blood transfusion[1]			0.030*
Negative	7 (70.0%)	20 (100,0%)	
Positive	3 (30.0%)	0 (0.0%)	

[1]Chi square/fisher's exact test, [2]independent t-test, [3]Mann-Whitney test (*significant at $\alpha = 5\%$)

According to Table 2, most female patients had non-varices bleeding (45.0%), while most male patients had varices bleeding (40.0%). Statistical test result showed p = 0.694 (p > 0.05), which means that there was insignificant difference of gender based on endoscopy results, or gender had no association with endoscopy result.

The mean age of patients with varices bleeding was 9.40 ± 4.12 years old, while non-varices bleeding was 11.85 ± 3.84. The statistical test result showed p = 0.119 (p > 0.05, which means that there was insignificant difference of age based on endoscopy result, or age had no association with endoscopy result.

Mean patient weight with varices bleeding was 28.70 ± 14.64 kg, while patients with non-varices bleeding had mean weight of 40.15 ± 19.42 kg. Statistical test result showed p = 0.082 (p > 0.05), which means that there was insignificant difference of weight based on endoscopy test result, or weight had no association with endoscopy result.

Mean Hb level of patients with varices bleeding was 11.75 ± 2.65, while patients with non-varices bleeding had mean Hb level of 13.10 ± 1.29. Statistical test result showed p = 0.157 (p > 0.05), which means that there was insignificant difference of Hb level based on endoscopy result, or Hb level had no association with endoscopy result.

Vomiting blood had the most proportion in non-varices bleeding (85.0%), while black stool had the most proportion in varices bleeding (20.0%), and patients with blood vomiting and black stool had the largest proportion in varices bleeding endoscopy result (10.0%) with statistical result of p = 0.319 (p > 0.05), which means that there was insignificant difference of patient's complaint based on endoscopy result, or patient's complaint had no association with endoscopy result.

Negative blood transfusion had the largest proportion in non-varices bleeding (100.0%), while positive blood transfusion had the largest proportion in varices bleeding (30.0%). Statistical result showed p = 0.030 (p < 0.05), which means that there was significant difference of blood transfusion based on endoscopy result, or blood transfusion was associated with endoscopy result.

Table 3. The Ability of Sheffield Score System as a Predictor of Endoscopy Requirement

Sheffield	Endoscopy		Total
	Varices bleeding	Non-varices bleeding	
>8	9	2	11
<8	1	18	19
Total	10	20	30
Sensitivity	90.0%		
Specificity	90.0%		
PPV	81.8%		
NPV	94.7%		
PLR	9.000		
NLR	0.111		

($X2 = 18.373$; p value = 0.000)

Table 3 showed that the sensitivity of Sheffield score system on cutoff 8 was 90.0%, which means that 90.0% of children with varices bleeding can be detected with Sheffield score system of > 8, and the specificity of this system was 90.0%, which means that the possibility of diagnosis of non-varices bleeding that can be ruled out was 90.0% in patients with Sheffield score of > 8. The positive predictive value of Sheffield score system was 81.8%, in which there was 81.8% chance that the endoscopy result showed varices bleeding at score > 8. While the negative predictive value was 94.7%, which means there was 94.7% chance that the result proved to be non-varices bleeding. The positive likelihood ratio was 9, which means the probability of children with Sheffield score > 8 will resulted in varices bleeding diagnosis was 9 times higher than children with Sheffield score < 8. The negative likelihood ratio was 0.111, which means the probability of children with Sheffield score < 8 will resulted in varices bleeding was 0.111 times lower than Sheffield> 8.

Table 4. Sheffield Score System

Sheffield Scoring System	Score
Anamnesis	
Previous condition (liver disease, history of transfusion, history of NSAID consumption > 48 hours, family history of diseases such as coagulation disorder, gastritis)	1
Melena	1
Massive hematemesis	1
Physical examination	
HR > 20x/min from mean HR according to age	1
CRT > 2"	4
Laboratory	
Decreased Hb > 2.0 g/L	3
Treatment and resuscitation	
Requirement of resuscitation liquid	3
Requirement of blood transfusion (Hb < 8.0 g/L)	6
Requirement of other blood product	4
Total score 24: cutoff 8	

There were 10 patients diagnosed with varices bleeding, 9 of them had Sheffieldscore > 8 and 1 had Sheffield score < 8. Out of 9 patients, only 2 of them received embolization and endovascular occlusion, while the other 7 did not receive any invasive.

DISCUSSION

There were many cases of upper gastrointestinal bleeding. For diagnosis and therapeutic purposes, endoscopy was very helpful. However, not all healthcare facilities have the necessary equipment. Other than relatively expensive, endoscopy was an invasive procedure and required experienced operator. There was an assessment score which can be used to predict the requirement of immediate endoscopy, known as the Sheffield score. This score can be used for children in Indonesia, especially in Dr. Moewardi General Hospital. The scoring result with cutoff value of 8 could be a predictor of endoscopy requirement. This scoring could be applied in peripheral healthcare facilities. A Sheffield score of > 8 could be an indication of immediate referral to a more complete facility. In Dr. Moewardi General Hospital, a score of < 8 means that endoscopy examination could be delayed, considering that endoscopy was an invasive procedure and requiredmore money.Unfortunately, this study could not be conducted in children under 1 year old due to unavailable equipment and could not be performed under emergency condition due to lack of emergency kit and lack of experts, especially in pediatric endoscopy.[12,13,14,15]

CONCLUSION

The Sheffield score system could be used as a predictor of endoscopy requirement in gastrointestinal bleeding cases in children, which was statistically significant ($p < 0.001$) with 90.0% sensitivity, 90.0% specificity, 81.8% positive predictive value, 94.7% negative predictive value, 9.000 positive likelihood ratio, and 0.111 negative likelihood ratio.

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CONFLICTS OF INTEREST
None declared

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