

Assessing Severity of Acute Pancreatitis in the Emergency Department



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Introduction

Burden of acute pancreatitis (AP)

- Pancreatitis is common, expensive to manage
- Treatment consists primarily of supportive care
- Pancreatitis is responsible for approximately 275,000 annual hospital visits and it is estimated that AP-related health care costs exceed \$2.6 billion annually¹

Approach to management

- Supportive care is key to early management of AP, with patients often requiring fluid resuscitation, pain control, and nutritional support²
- Mean hospital length of stay (LOS) for AP-related hospitalizations is 4.7 days¹
- Approximately 20% of patients require a prolonged hospitalization with more aggressive treatment.³

Existing research

- Ranson criteria⁴ and Glasgow-Imrie criteria⁵ are two of the first scoring systems that were developed to evaluate pancreatitis severity
 - These scoring systems were derived decades ago and require numerous clinical variables collected over 48 hours, which limits their utility, especially in an emergency department (ED) setting.
- More recently, investigators have proposed a number of newer and simplified scoring systems:
 - Bedside Index of Severity in Acute Pancreatitis (BISAP),⁶ which assesses the risk of in-hospital mortality in the first 24 hours of admission
 - Harmless Acute Pancreatitis (HAPS),⁷ uses three variables to identify non-severe cases of pancreatitis.

AP in the emergency department (ED)

- Patients present to the ED with a spectrum of severity and the emergency physician needs to determine the appropriate disposition (home, observation, floor admission, or intensive care unit admission)
- If clinicians are able to reliably identify low-risk pancreatitis patients and manage them in the ED or in an ED observation unit, hospitals could reduce the amount of resources that they allocate without significant adverse outcomes for patients

Objectives

Because patient management depends on accurately determining pancreatitis severity, our objective was **to validate previously proposed pancreatitis risk stratification scores by assessing their diagnostic accuracy** for identifying higher severity patients (ICU admission) and lower severity patients (LOS < 48 hours).

Methods

- Prospective, observational study of consecutive AP patients at a tertiary-care center.
- We conducted chart reviews of ED patients diagnosed with AP
- Inclusion criteria:
 - Final ED diagnosis of AP, and/or
 - Lipase ≥ 3 times the upper limit of normal.
- Possible outcomes included:
 - “High severity” – defined by an ICU admission
 - “Low severity” – defined by hospital discharge within 48 hours
 - Overall mortality rate was low and thus not used as an outcome.
- Ranson criteria at admission, Glasgow-Imrie (GI) criteria, Bedside Index of Severity in Acute Pancreatitis (BISAP), and Harmless Acute Pancreatitis Score (HAPS) were assessed.
 - Area under receiver operating curve (AUC) with 95% confidence intervals were used to assess diagnostic accuracy of the individual scores.
 - Mean severity scores were compared using a t-test.

Results

Table 1: Patient characteristics

	Overall, n = 656
Patient demographics	
Age, mean (st. dev.)	55 (16.9)
Male, n (%)	316 (48.2%)
Patient outcomes, n (%)	
Admitted	600 (91.5%)
Discharged	53 (8.1%)
ED Observation	3 (0.5%)
AP Severity, n (%)	
High severity (ICU admission)	72 (11.0%)
Low severity (LOS < 48 hours)	142 (21.6%)

Table 2: Area under the curve for high severity and low severity AP cases

AP Scoring System	High Severity AUC (95% CI)	Low Severity AUC (95% CI)
BISAP	0.73 (0.66 – 0.79)	0.60 (0.56 – 0.65)
HAPS	0.57 (0.51 – 0.65)	0.50 (0.46 – 0.56)
Glasgow-Imrie	0.77 (0.71 – 0.82)	0.51 (0.46 – 0.56)
Ranson (Admission)	0.65 (0.59 – 0.72)	0.62 (0.58 – 0.67)

Table 3: Mean pancreatitis severity scores in high severity and non-high severity AP cases

AP Scoring System	High Severity Mean Score +/- St. Dev.	Non-High Severity Mean Score +/- St. Dev.	P-value
BISAP [Severe ≥ 3]	1.6 +/- 1.1	0.7 +/- 0.8	<0.0001
HAPS [Severe ≥ 1]	0.6 +/- 0.7	0.5 +/- 0.8	0.0254
Glasgow-Imrie [Severe ≥ 4]	3.3 +/- 1.3	1.7 +/- 1.2	<0.0001
Ranson (Admission) [Severe ≥ 2]	1.3 +/- 0.9	0.8 +/- 0.8	<0.0001

Table 4: Mean pancreatitis severity scores in low severity and non-low severity AP cases

AP Scoring System	Low Severity Mean Score +/- St. Dev.	Non-Low Severity Mean Score +/- St. Dev.	P-value
BISAP [Severe ≥ 3]	0.5 +/- 0.8	0.9 +/- 0.9	<0.0001
HAPS [Severe ≥ 1]	0.5 +/- 0.6	0.5 +/- 0.6	0.8057
Glasgow-Imrie [Severe ≥ 4]	2 +/- 1.1	2.1 +/- 1.3	0.4333
Ranson (Admission) [Severe ≥ 2]	0.6 +/- 0.6	1.0 +/- 0.8	<0.0001

Conclusions

Predictive accuracy of existing AP scoring systems

- None of the existing AP scoring systems that we evaluated had sufficient predictive accuracy to consistently differentiate between high severity and low severity cases of AP.
- Glasgow-Imrie had the highest AUC (0.77) for high severity cases, which indicates some potential validity in predicting ICU admission in AP patients. This likely would not represent a sufficient level of predictive accuracy to incorporate GI score calculation into routine evaluation of AP patients in the ED.
- Ranson score had the highest AUC (0.62) for low severity cases, which underscores that none of the existing scoring systems we evaluated could be used to confidently identify low severity AP.

Mean pancreatitis severity scores

- High severity AP patients had significantly higher mean severity scores in all four scoring systems that we evaluated.
- In low severity AP patients, only BISAP and Ranson score had significantly lower mean severity scores.
- Though these differences were statistically significant, the mean severity scores are so close that it would be difficult for a clinician to differentiate between high severity and low severity cases of AP using any of these existing scoring systems.

Future research

- While the existing scoring systems are of limited utility to ED clinicians, this does not exclude the possibility that other existing scoring systems or a novel scoring system could accurately predict appropriate ED patient disposition.
- Further efforts to develop a scoring system specific to the ED that identifies high severity and/or low severity AP cases could allow ED physicians to more effectively manage disposition.

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