ORIGINAL RESEARCH PAPER

General Surgery

KEY WORDS: APACHE: Acute Physiology And Chronic Health Evaluation
BMI: Body Mass Index, BP: Blood Pressure, BUN: Blood Urea Nitrogen

A STUDY OF APACHE III PROGNOSTIC SCORING SYSTEM IN ACUTE ABDOMEN

Dr. Janak Patel* (R3)Department Of General surgery, Gujarat Adani Institute Of Medical Sciences, Bhuj. *Corresponding Author

Dr. Lopamudra Bagchi

ABSTRACT

Background:II released in 1991 is measured during first 24 hours of ICU admission. The APACHE III scores consists of several parts including the primary reason for ICU admission, age, sex, pre existing comorbidities and location prior to ICU admission. The range of APACHE III score is from 0 to 299.

Aims & Objectives: To evaluate predictive efficacy of APACHE III SCORE in ACUTE ABDOMEN admitted in tertiary care centre and to calculate prognosis of patient.

Method: The '**acute abdomen**' is defined as a **sudden onset of severe abdominal pain** of less than 24 hours duration. It has a large number of possible causes and so a structured approach is required.

The initial assessment should attempt to determine if the patient has an **acute surgical problem** that requires immediate and prompt surgical intervention, or urgent medical therapy.

The first decision when you first see any patient is "Are they critically unwell?". A 10-second **assessment of their clinical state** can be made by a general look (the "end-of-bed-o-gram"), their observations, and whether they can talk to you.

If they are critically unwell, give oxygen, start suitable initial steps, and call for help early before going into detail on the history and examination.

Conclusion: APACHE III Prognostic scoring system predicts how much and for how long patient require ICU/HDU and hence burden of patients in ICU/HDU and even of hospital too.

INTRODUCTION

Severity scoring systems in the intensive care unit have been developed in response to an increased emphasis on the evaluation and monitoring of health care services.

There are three major purposes of severity-of-illness scoring systems:

1. Scoring systems are used to assess the prognosis of individual patients
2. Scoring systems are used to quantify severity of illness for resource allocation.
3. Scoring systems assess ICU performance and compare the quality of care.

Currently the APACHE III scoring system is widely used. A controversy exists as to which is an ideal scoring system. Limitations of APACHE III are:

1. Failure to compensate for lead time bias.
2. Requirement to choose on disease.
3. Poor inter-observer reliability.

AIMS AND OBJECTIVES

- To evaluate predictive efficacy of APACHE III SCORE in ACUTE ABDOMEN admitted in tertiary care centre and to calculate prognosis of patient.
- To improve statistical power.
- To identify the factors in ICU that influence outcome variations.

MATERIALS AND METHODS

- **APACHE III scores includes:**

1. 17 physiological variables & Total scores (0-299).
2. ACID-BASE disturbances.
3. GCS SCORE.
4. AGE SCORE.
5. COMORBIDITIES (Excluding cardiac, respiratory and renal failures)

- **Method of collection data:**
- Sample size: Patients admitted in acute care unit of department of Surgery during the study period with a minimum of 50 patients.
- **Study Type:** Prospective longitudinal study.
- **Inclusion Criteria:**

1. All patients presenting to emergency department and admitted in the Surgical ICU/HDU with acute abdomen within 24 hr.
2. Patients with SIRS.
3. Age > 16 years.
4. Polytrauma with Acute Abdomen requiring ICU/HDU admission

Exclusion Criteria:

1. Age < 16 years.
2. Patients who leave against medical advice which prevents follow up on outcome.
3. Patients who get admission in ICU/HDU after 24 hr of admission.
4. Patients in whom any of the 17 physiological variables are missing.

METHODOLOGY:

This prospective study was undertaken over two year period includes all the admissions which fit the inclusion criteria.

APACHE III SCORE is calculated at 24 hours of admission to ICU using the worst values of the 17 variables.

- **APACHE III PHYSIOLOGICAL SCORE:**

Table 1a. APACHE III scoring system, comprised of the sum of three components: an acute physiology score, an age score, and a chronic health problems score. Scores range from 0 to 299 (physiology, 0 to 252; chronic health evaluation, 0 to 23; age, 0 to 24), with higher values representing a worse prognosis.

Pulse	8 ≤39	5 40-49	0 50-99	1 100-109	5 110-119	7 120-139	13 140-154	17 ≥155	
Mean BP (mmHg)	23 ≤39	15 40-59	7 60-69	0 70-79	0 80-99	4 100-119	7 120-129	9 130-139	10 ≥140
Temperature (°C)	20 ≤32.9	16 33-33.4	13 33.5-33.9	8 34-34.9	2 35-35.9	0 36-39.9	4 ≥40		
Respiratory Rate	17 ≤5	8 6-11	0 12-13	7 14-24	6 25-34	9 35-39	11 40-49	18 ≥50	
PaO_2,* (mmHg)	15 ≤49	5 50-69	2 70-79	0 ≥80					
$AaDO_2$,** (mmHg)	0 <100	7 100-249	9 250-349	11 350-499	14 ≥500				
Hematocrit (%)	3 ≤40.9	0 41-49	3 ≥50						
WBC Count (ca/mm) x 1000	19 <1.0	5 1.0-2.9	0 3.0-19.9	1 20-24.9	5 ≥25				
Serum Creatinine (mg/dl) without ARF	3 ≤0.4	0 0.5-1.4	4 1.5-1.94	7 ≥1.95					
Serum Creatinine (mg/dl) with ARF	0 0-1.4	10 ≥1.5							
Urine Output (cc/day)	15 ≤399	8 400-599	7 600-899	5 900-1499	4 1500-1999	0 2000-3999	1 ≥4000		
Serum BUN (mg/dl)	0 ≤16.9	2 17-19	7 20-39	11 40-79	12 ≥80				
Serum Na^+ (mEq/L)	3 ≤119	2 120-134	0 135-154	4 ≥155					
Serum Albumin (g/dl)	11 ≤1.9	6 2.0-2.4	0 2.5-4.4	4 ≥4.5					
Serum Bilirubin (mg/dl)	0 <1.9	5 2.0-2.9	6 3.0-4.9	8 5.0-7.9	16 ≥8.0				
Serum Glucose (mg/dl)	5 ≤39	0 40-59	0 60-199	3 200-349	5 ≥350				
Age (years)	0 ≤44	5 45-59	11 60-64	13 65-69	16 70-74	17 75-84	24 ≥85		

*If FIO2 is ≥50%, record $AaDO_2$; **If FIO2 is <50%, record PaO_2.
Acute renal failure (ARF) is defined as creatinine ≥1.5 mg/dl and urine output <410 cc/day and no chronic dialysis.

Comorbid Condition	AIDS	Hepatic Failure	Lymphoma	Metastatic Cancer	Leukemia/ Multiple Myeloma	Immune Compromised	Cirrhosis
Scoring	23	16	13	11	10	10	4

Presentations Requiring Urgent Surgery

Bleeding

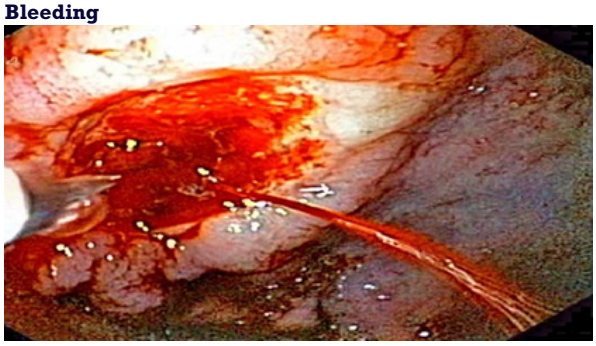

Figure 1 – Endoscopic image of a bleeding gastric ulcer. This requires urgent surgical intervention.

The **most serious cause of intra-abdominal bleeding** is a ruptured abdominal aortic aneurysm, which requires swift referral to the vascular team and immediate surgical intervention. **Other common causes** usually involve a slower rate of bleeding, but with urgent surgery still required, include ruptured ectopic pregnancy, bleeding gastric ulcer, and trauma.

These patients will typically go into **hypovolemic shock.** Clinical features include tachycardia and hypotension, pale and clammy on inspection, and cool to touch with a thread pulse.

Perforated Viscus

Peritonitis is the inflammation of the peritoneum, and a generalised peritonitis is most commonly caused by perforation of an abdominal viscus.

The causes of **perforation** are broad but include peptic ulceration, small or large bowel obstruction, diverticular disease, and inflammatory bowel disease.

Patients with a generalised peritonitis present with some characteristic features:

- Patients often lay **completely still,** not to move their abdomen, and look unwell
  - This is especially important when compared to a renal colic, whereby patients are constantly moving and cannot get comfortable.
- **Tachycardia** and potential hypotension.
- A completely rigid '**washboard**' **abdomen** with percussion tenderness
- **Involuntary guarding** – the patient involuntarily tenses their abdominal muscles when you touch the abdomen
- **Reduced or absent bowel sounds** – suggesting the presence of a paralytic ileus

Ischaemic Bowel

Any patient who has **severe pain out of proportion to the clinical signs** has ischaemic bowel until proven otherwise. They are often acidaemic with a raised lactate and physiologically compromised.

Patients will often complain of a **diffuse and constant pain**, however the **examination can often otherwise be unremarkable**. Definitive diagnosis is via a CT scan with IV contrast, with early surgical involvement.

Presentations That Are Less Acute

Colic

Colic is an abdominal pain that crescendos to become very severe and then goes away completely. This is most typically seen in either ureteric obstruction or bowel obstruction.

Biliary 'colic' is not a true colic as the pain does not go away completely, instead getting periodically better and worse (colloquially termed 'waxes and wanes').

Peritonism

Peritonism (not peritonitis) refers to the localised inflammation of the peritoneum, usually due to inflammation of a viscus that then irritates the visceral (and subsequently, parietal) peritoneum.

This leads to patients stating that their abdominal pain starts in one place (irritation of the visceral peritoneum) before localising to another area or becoming generalised (irritation of the parietal peritoneum). The classic example of this is acute appendicitis.

Management

The definitive management of acute abdomen depends largely on the cause. However, a good initial management plan includes the same key points – regardless of the underlying aetiology.

These include admission, IV access, NBM, analgesics ,antiemetics, imaging (as discussed above), VTE prophylaxis, urine dip, bloods (as discussed above). Consider a urinary catheter and/or nasogastric tube if necessary. Start IV fluids and monitor fluid balance.

RESULTS

- **OBSERVATION AND DISCUSSION**

TABLE 1

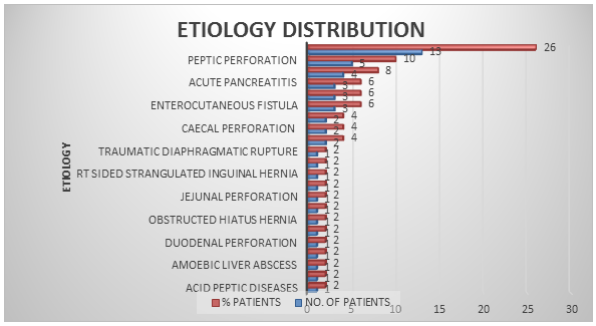

Table 1: Shows Etiological distribution of patients diagnosed with acute abdomen, majority of patients belongs to intestinal obstruction (24%) , next leading cause of acute abdomen is peptic perforation (10%), other leadings causes are rupture liver abscess (8%) , acute pancreatitis (6%) & ileal perforation (6%).

Table 2:

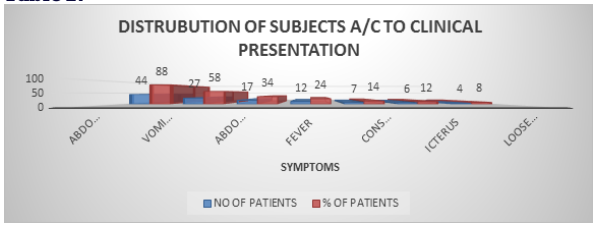

Table:2shows That Patients Of Acute Abdomen Present With Most Common Symptoms Of Abdominal Pain (88%), Then Most Common Symptoms Are Vomiting (58%) & Abdominal Distension (34%).

Table 3:

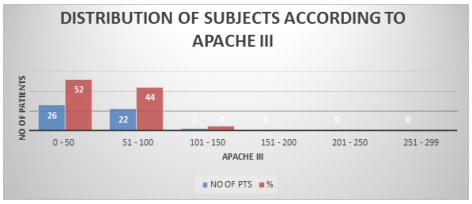

Table 3 : Shows 52% patients of study are in the range of (0-50) APACHE III , 44% of patients in the range of (51-100) APACHE III, only 4% belongs to (101-150) APACHE III & no patients of acute abdomen goes beyond 150 APACHE III score.

Table 4:

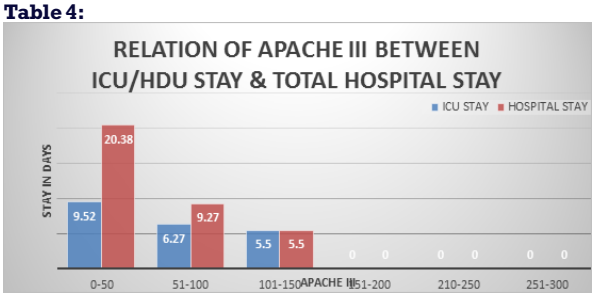

Table 4: Shows relationship between APACHE III & ICU/HDU & Hospital stay.APACHE III between (0-50) has highest mean Hospital stay (20.38 days) & highest mean ICU/HDU stay (9.52 days), while between (51-100) APACHE III has mean Hospital stay (9.27 days) & mean ICU/HDU stay (6.27 days) and between (101-150) APACHE III mean hospital stay & ICU/HDU stay is 5.5 days for both.

Table 5:

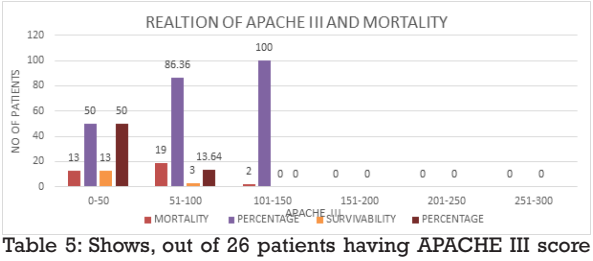

Table 5: Shows, out of 26 patients having APACHE III score between (0-50), 13 patients died & 13 survive that is 50% survive & 50% died. Out of 22 patients having APACHE III between (51-100), 3 survive & 19 died that is 86.36% mortality & 13.64% survive, out of 2 patients having APACHE III between (101-150) 2 died that is 100% mortality rate.

Table 6:

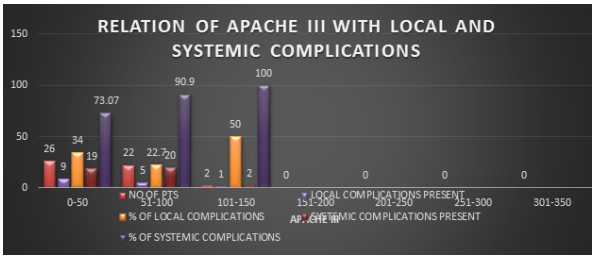

Table 6: Shows, out of 26 patients having APACHE III between (0-50) , 9 patient having local complication & 19 patient having systemic complication, that is 34% having local complication & 73.07% having systemic complication.Similarly, 22 patients having APACHE III between (51-100), 5 have local complication & 20 have systemic complication, that is 22% having local complication & 90.9% have systemic complication.2 patients having APACHE III between (101-150), 1 having local complication & 2 having systemic complication , that is 50% having local complication & 100% having systemic complication.

SUMMARY:

1.Majority of patients of acute abdomen in the study belongs to age group 51-70years then 31-50 years.

2.Majority of patients in this study are male 62% & only 38% case of acute abdomen are female

3.Most common cause of acute abdomen in our study is intestinal obstruction (26%) then peptic perforation (10%) & then ruptured liver abscess (8%). Pancreatitis and ileal perforation shows 6% both.

4.Most common clinical presentation of patients is abdominal pain 88% , vomiting (58%) , abdominal distension (34%) And fever (24%).

5.Most of patients in our study is with duration of illness between 4 to 6 days(42%) then with in 1 to 3 days that is 30% & 28% patients present after 7 days.

6.In patients having APACHE III score between 0-50, 46.15% of duration of illness between 4 to 6 days, 30.76% having duration of illness ≥7 days & 23.06% patients having duration of illness 1 to 3 days.

Similarly in patients having APACHE III score between 51 to 100 , 40.9 % patients having duration of illness between 4 to 6 days , 36.3% between 1to 3 days and 22.7% is ≥7 days.

In APACHE III score >100 50% patient present with in duration of illness 1to 3 days and 50% ≥7days And no patients present between4 to 6 days

7.Most patients of acute abdomen in our study belongs to APACHE III score between (0-50) that is 52% & between (51-100) it is 44%, only 4% belongs to APACHE III between (101-150), no patients of acute abdomen goes beyond 150 APACHEIII score.

8. Mean duration of stay in ICU as well as Hospital is highest between (0-50) APACHE III score. i.e. 9.52 &20.38 days respectively & then in between (51-100) APACHE III that is 6.27 & 9.27 days respectively.

9. Patients having APACHE III between (0-50) has 50% mortality & 50% survivors. Patients having APACHE III BETWEEN (51-100) HAS 86.36% MORATILY & 13.64% SURVIVED. PATIENTS HAVING APACHE III beyond 100 has 100% mortality.

10. 34% patients having APACHE III between (0-50) have local complications and 73.04% have systemic complications

While 22.7% patients having APACHE III between (51-100) had local complications. While 22.7% patients having APACHE III between (51-100) had local complications and 90.9% had systemic complications

While between (101-150) 50% has local complications and 50% has systemic complications.

11. Various factors influence survival ability of patient such as age, more is the age, more is the mortality Higher is the APACHE III score , higher is the mortality More is the duration of the illness at the presentation more is the mortality More is the duration of stay in ICU and Hospital more is the chance of survival.

CONCLUSION:

Every day clinicians and physicians engaged in clinical research make complex decisions regarding the scope and intensity of treatment or the potential value of new therapies that might be supported or enhanced by an accurate and objective measurement of patient risk. Indeed, many of the most important questions concerning the quality and appropriateness of advanced medical care cannot be fully addressed until patient risk is accurately assessed and reliably recorded. The completion of the APACHE III prognostic system is an attempt to provide objective probability estimates for critically ill hospitalized patients treated in ICUs.

As resources are limited in tertiary care centres in developing countries like ours APACHE III prognostic system helps us to identify the right candidate to deserve place in ICU/HDU.

APACHE III Prognostic scoring system predicts how much and for how long patient require ICU/HDU and hence burden of patients in ICU/HDU and even of hospital too.

It helps us to identify the severity of illness and able to predict the prognosis of patient.

Overall APACHE III prognostic scoring system correlated well with the outcome in current study and also correlated well with duration of ICU and HDU stay.

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