

# Prognostic Scoring Indicator in Evaluation of Clinical Outcome In Intestinal Perforations

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## ABSTRACT

**Introduction:** Acute generalised peritonitis coming forth due to underlying intestinal perforation is a critical & life-threatening medical condition. It is a common surgical emergency most of the times across the world. Misleading data on crude morbidity and mortality due to the condition usually contaminates substantially the very purpose of medical audit. Thus, early prognostic evaluation is not only desirable but mandate to much extent. High-risk patients require timely & aggressive treatment especially in severe peritonitis & to select them reasonably well, evaluation through prognostic scoring is an approach of choice. Well sought after & reasonably reliable APACHE II scoring system is used for the purpose & scores are correlated well to accentuate & measure the various factors needed for better management of condition.

**Material and Methods:** The study was conducted over the period of 18 months (Jan 2010 to June 2011) on 50 patients with confirmed diagnosis of intestinal perforation. APACHE II score was calculated and correlated with their symptoms &

clinical outcomes regarding morbidity and mortality.

**Results:** APACHE II score correlated well with the outcome of the study, showing score affects of two major aspects in the treatment outcome & management. 1.) APACHE II score of less than 10 included 30 low risk group patients discharged in a satisfactory gratifying manner. Three out of four in high risk group with APACHE II score >20, shown adverse outcomes. 2.) Mean ICU stay of 9.75 days was found in patients with APACHE II score 20 or more compared to those with mean ICU stay of 0.13 days in patients with APACHE II score 10 or less.

**Conclusion:** Acute generalized peritonitis being life-threatening medical emergency requires careful consideration in its management that needs to be economically viable, acceptably feasible and outcome oriented with better allocation & utilization of ICU resources that needs meticulous case analysis & prioritization. This present study helps the clinicians in three major ways: a) To take better decisions on case to case basis; b) To design strategies in order to prevent adverse outcomes; c) Last but not least, to make better use of ICU resources.

## INTRODUCTION

Peritonium inflammation, called peritonitis, presents most commonly due to localized or generalized infection caused from various probable factors. The condition is sometimes also the outcome of induced abortion. It may be categorized into three stages based upon the nature & source of microbial contamination. Primary peritonitis is an infection without any visceral perforation, usually from extra-peritoneal source and monomicrobial in origin. Secondary peritonitis is the most common & follows an intra-peritoneal source usually from perforation of hollow viscera (infectious like typhoid or non-infectious causes like duodenal ulcer perforation, blunt trauma of abdomen etc.). When not treated or treatment fails it usually develops into tertiary stage that is potential fatal affliction although advances are available in diagnosis, surgical techniques, antimicrobial therapy & intensive care support [1].

Secondary peritonitis usually presents as acute general-ized peritonitis which is a potentially life threatening condition. It is a common surgical emergency in most of the general surgical units, across the world. It is often associated with significant morbidity and mortality [2,3]. Grading the severity of acute peritonitis has assisted in decision making and has made therapy ameliorated for the management of severely ill patients [4]. The assessment of risk considering various clinical parameters to evaluate new therapies, monitor resource utilization, quality of care improvement is of immense value at present [5,6]. It is very difficult to evaluate severity, decide treatment options, therapeutic approach for the acute generalized peritonitis caused due to perforation due to its broad overlapping classification. Misleading medical audit is most often the result of crude morbidity and mortality data. Early prognostic evaluation is desirable to be able to select high-risk patients for more aggressive treatment especially in severe peritonitis.

Many scoring systems are available that helps to measure & stratify

**Key words:** Pain abdomen, Peritonitis, Perforation, Fever

the condition of critically ill patients and thus helps the clinicians in better resource allocation as per the needs of the patient and feasibility of outcome expected [7]. Amongst them APACHE II, Simplified Acute Physiology Score (SAPS), Sepsis Severity Score are mostly used. The scores that are specifically used for peritonitis like the Mannheim Peritonitis Index and the Peritonitis Index Altona II are also not less common.

APACHE II prognostic scoring system is one of the sought-after & well-accepted for both surgical and non-surgical case subjects. It is validated using multiple cases over several years in various countries. Its general acceptance to assess the critically ill patients, easy applicability & ability to predict outcome makes it favorable for application. All the parameters measured found to have a strong relationship to the outcome than previous groupings without consideration for systemic effect of the intraabdominal sepsis.

## MATERIAL & METHODS

The prospective study was conducted over the period of 18 months (January 2010 to June 2011) on 50 adult patients (age>16) diagnosed with intestinal perforation, excluding those on steroids, NSAIDS or any immunosuppressants drugs. The studied was done at "Department of Surgery, Dayanand Medical College and Hospital", Ludhiana, India.

### Method of Data Collection

A meticulous symptomatic history of all those patients presented with acute abdomen & pre-morbid conditions was well-cataloged accurately alongwith their general past history. Complete physical examination was performed during initial assessment, following routine investigations on all patients i.e., complete Haemogram, RFT, LFT, ECG etc.

To confirm diagnosis of intestinal perforation X-ray abdomen, chest X-ray (Erect), serum amylase, USG abdomen & CT abdomen (if required) was performed.

Once the diagnosis of intestinal perforation was confirmed by chest X-ray (erect) and CT abdomen, the patient's APACHE II score was assessed categorically.

Routine management of patients was carefully done as per the standard departmental protocol. All patients were resuscitated with IV fluids along with emendation of electrolyte imbalances. Broad spectrum antibiotics were given to all patients, GI decompression done through Ryle's tube. Those patients who can withstand general anaesthesia were managed for exploratory laparotomy for peritoneal toilet and source control. Bilateral flank drainage or conservative management was done to those unfit for surgery.

Post-operative outcomes were assessed in terms of

- Wound infection & dehiscence
- Localised abdominal abscess
- Multiorgan failure and septic shock
- Ventilatory Support (need for)
- Chest infection like pneumonia and pleural effusion
- Renal failure, fluid and electrolyte imbalance

## Data Analysis

Data obtained from this study was analysed statistically using ANOVA (analysis of variance) test. Multiple variables were studied & analyzed carefully & final outcome compared needfully.

## OBSERVATIONS & ANALYSIS

Numerical observations recorded for all the 50 patients were evaluated and analysis was done accordingly:

[Table/Fig-1] Low risk group of 30 patients identified, including 7 who underwent primary repair and 18 patients who underwent primary repair with ileostomy. All these 30 patients had good hospital course and discharged in a satisfactory condition. Bilateral flank drainage was done in two patients from high risk group (APACHE II score > 20). Finally, both of these patients deceased.

Operative Procedure	No.	APACHE II Score					
		Upto 10		10-20		>20	
1° closure with omental patch	7	3	10.00	4	25.00	0	0.00
1° Repair	9	7	23.33	2	12.50	0	0.00
1° Repair with diversion ileostomy	25	18	60.00	6	37.50	1	25.00
Resection with ileostomy	2	1	3.33	0	0.00	1	25.00
Right hemicolectomy with diversion loop ileostomy	3	1	3.33	2	12.50	0	0.00
Resection anastomosis	2	0	0.00	2	12.50	0	0.00
B/L Flank drainage	2	0	0.00	0	0.00	2	50.00
Total	50	30	100.00	16	100.00	4	100.00

[Table/Fig-1]: Operative procedure in relation to apache II score

## DISCUSSION

This study on patients having perforation peritonitis was evaluated very-well and various factors considered were:

[Table/Fig-2] 50% of patients were in the age group of 21–40 years. Male patients outnumbered the female patients with a male: female of 1.6: 1. Youngest patient was 16-year-old and the oldest was 80 years of age.

Age (years)	Male		Female		Total	
	No.	Percentage	No.	Percentage	No.	Percentage
15-20	5	16.13	1	5.26	6	12.00
21-30	9	29.03	9	47.37	18	36.00
31-40	4	12.90	3	15.79	7	14.00
41-50	3	9.68	2	10.53	5	10.00
>50	10	32.26	4	21.05	14	28.00
Total	31		19		50	100
Mean	39.10		38.00		38.68	

[Table/Fig-2]: Age and sex distribution of subjects

### 1. Age and Sex Incidence

This study considered age range of 16-80 years with predominant population (50%) from age group 21–40 years. Male preponderance found with male to female ratio of 1.6 :1.

Sharma R, Huttunen et al., in their study also reported male preponderance in cases with perforation peritonitis [8,9].

### 2. Clinical Presentation

The patients of perforation peritonitis presented with the most common symptom of abdominal pain(100%) followed by vomiting (70%), Constipation (70%) & fever (50%).

Similar findings were observed in other studies conducted by Gupta SK, Gupta R et al., Dickson & Cole (1964) and Anand P (1972) with 100% incidence of abdominal pain and fever in enteric perforation cases.

### 3. Duration of Perforation

Around 50% of patients presented within 3 days and nearly one third presented after one week of presentation of symptoms. As the duration of symptoms increased, the mortality and morbidity also marked up. Most of them developed complications like wound infection, chest infection, septicaemia in their normal hospital course.

Similar results were accentuated by Petrosillo N et al., in a national multicentre surveillance study conducted in 48 Italian hospitals & concluded that presentation for more than one week was significantly associated with morbidity and mortality [10]. Archampong & Karmasker et al., (1965) also observed a similar correlation between duration of perforation and morbidity-mortality [11].

### 4. Air under Diaphragm

In present study, air under diaphragm was noticed in 84% cases. Comparatively, study done by Jhobta RS, Attri AK et al., showed 67% of such cases [12]. Similar result have been found by Shahida, Malik et al., where the incidence was 70% [13]. showing concordance to large extent.

### 5. Site and Number of Perforations

The study found that most common site of perforation found during laparotomy was ileum. Highest cases after GIT surgery cited by Petrosillo N et al., also involved ileum as the most common site of perforation [10].

According to recent literature, one of the major prognostic factors is the number of perforations which further gets worsened by their late presentation. These factors have been found to have significant effect on mortality and morbidity as demonstrated in the study done by Adesunkanmi et al. In our study 43 patients were having single perforation.

### 6. Apache Score and Operative Procedure

We contribute in agreement with Archampong EQ, Olurin et al., Mulligan and Kaul, that operative management is the safest method of treating ileal perforation peritonitis [14,11,15,16]. A policy of active, adequate resuscitation should however, in our opinion, be regarded as essential pre-operative measure and should be continued correspondingly post-operatively.

In present study, 18 out of 30 patients in the low risk group underwent primary repair with diversion ileostomy and 7 patients underwent only primary repair. In general, ileostomy was performed in patients presented with shock at the time of admission and had more gut friability with impending perforation and gross peritoneal contamination, while primary closure was done in patients who had a healthier small gut, with no impending perforation and less peritoneal contamination.

Sahu et al., conducted study on 50 patients which concludes that the most common procedure is primary closure in low risk groups. This difference might be institutional variation [1].

### 7. Post-operative Complications

Those patients having APACHE II score more than 20, at the time of admission, had significantly higher incidence of post-op complications as compared to those with APACHE II scores less than 10. The most common complication of wound infection was

found in 56% cases.

Similar result were found in Sahu SK, Gupta A et al., study, where APACHE II score was measured before the treatment of secondary peritonitis correlated significantly with the disease outcome w.r.t mortality and morbidity [1].

#### 8. Apache Score and Hospital and ICU Stay:

The mean ICU stay of 9.75 days was found in patients with APACHE II score more than 20 compared to patients having APACHE II score less than 10, where ICU stay was just 0.13 days. The mean length of hospital stay following treatment in survivors founded to be 12 days as compared to 18 days in a study done by Bohnen et al., [3]. In another study of colonic perforation, Kamatsu et al., found that APACHE II score 19 or more was significantly related to poor prognosis as seen in present study.

#### 9. Apache II Score and Outcome:

In present study, low risk group of 30% patients (APACHE II score less than 10) were discharged in a well-gratifying manner.

Comparatively, in study conducted by Bohnen et al., Adesunkanmi et al., Agarwal S et al., the mean APACHE II score among survivors was 8 (low risk group) and among non-survivors was 22.4 (high risk group). Thus conclusive of the fact that mortality is directly linked with higher scores [2,3].

This study confirmed steadfastness of APACHE II score to predict the mortality and morbidity rates in secondary peritonitis patients.

Evaluation of severity, therapeutic approach and treatment effectiveness of acute generalized peritonitis from perforation is found to be obstructed due to gross & overlapping classification criteria. To justify corrects, timely & aggressive treatment to selected high risk patients of severe peritonitis, early prognostic evaluation is highly desirable.

APACHE II score was utilized in selecting the definitive procedure for this study. The study concluded that simple perforation closure is preferred in young patients with single perforation and early presentation found with minimal peritoneal contamination. Resection and anastomosis suggested for multiple perforations in short segment (6 inches) or more than half of bowel wall circumference involved, with minimal peritoneal contamination. Ileostomy with mucus fistula was suitable for elderly patients irrespective of number of perforation or in patients with delayed presentation, with gross peritoneal contamination. For patients in established septicaemia, vigorous resuscitative measures needed and flank drainage was proposed to remove toxins and faecal contamination.

[Table/Fig-3] In previous studies, APACHE II score showed

Outcome	No.	Apache II Score					
		Upto 10		10-20		>20	
Discharged	40	30	100.00	9	56.25	1	25.00
Expired	5	0	0.00	3	18.75	2	50.00
LAMA	5	0	0.00	4	25.00	1	25.00
Total	50	30		16		4	

[Table/Fig-3]: Outcome vs. Apache II score

correlation with the outcome. In present study, 30 patients were in low risk group with APACHE II Score less than 10. All these patients were discharged in satisfactorily. Out of 4 high risk group patients, 3 had adverse outcome (2 expired and 1 left against medical advice).

## CONCLUSION

Detailed evaluation of 50 cases of perforation peritonitis & correlating their APACHE II scores presents consequentially, two major conclusions:

**APACHE II score Vs. discharge & final outcome:** APACHE II score of less than 10 included 30 low risk group patients discharged in a satisfactory gratifying manner. Three out of four with APACHE II score >20, shown adverse outcomes.

**APACHE II score Vs. Hospital/ICU length-of-stay:** Mean ICU stay of 9.75 days was found in patients with APACHE II score 20 or more, compared to those with mean ICU stay of 0.13 days in patients with APACHE II score 10 or less.

Concomitantly, with the above findings, acute generalized peritonitis being critical & life-threatening medical emergency especially if it results from peritoneal perforation requires careful consideration in its management, which needs to be economically viable, acceptably feasible and outcome oriented effective process. Also, along with its management, justifiably better allocation & utilization of various high-tech medical resources especially in ICU, is a need of an hour. This requires meticulous case analysis & prioritization that varies from subject to subject.

This present study helps the clinicians in all the above mentioned parameters in three major ways: a) To take better decisions on case to case basis; b) To design strategies to prevent adverse outcomes; c) Last but not least, to make better use of ICU resources in a hospital.

## REFERENCES

- [1] Sahu SK, Gupta A, Sachan PK and Bahl DV. Outcome of secondary peritonitis based on Apache II Score. *The Internet Journal of Surgery*. 2008; 14:2.
- [2] Adesunkanmi ARK, Ajao OG. The prognostic factors in Typhoid ileal perforation. A prospective study of 50 patients. *IO J Roy Coll Surg Edinb*. 1997;42:395-9
- [3] Bohnen J, Boulanger, Meakins JL, McLean PH. Prognosis in generalized peritonitis: Relation to cause and risk factors. *Arch Surg*. 1983;118:285-90.
- [4] Ponling GA, Sim AJW, Dudley HAF. Comparison of local and systemic of sepsis in predicting survival. *Br J Surg*. 1987;74:750-2.
- [5] Kanus WA, Dropper EA, Wagner DR, Zimmerman JE. APACHE severity of disease classification system. *Crit Care Med*. 1985;13: 818-29
- [6] Civelta JM, Hudson-Civeua JA, Nelson LD. Evaluation of APACHE II for cost containment and quality assurance. *Ann Surg*. 1990;212:266-76.
- [7] Baker SP, O'Neil 'B, Haddon WQ, Long WB. The injury severity score. A method for describing pattern of patients with multiple injuries and evaluating emergency cases. *J Trauma*. 1974; 14:187.
- [8] Mathur GM, Sharma R. A study of typhoid fever in Jaipur, India. *Trop Geog Med*. 1971; 23:329-34.
- [9] Huttunen R, Kairaluoma MI, Mokka RE, Larmi TK. Non-traumatic perforations of the small intestine. *Surgery*. 1977;81(2):184-8.
- [10] Petrosillo N, Drapeau CM, Nicastrì E, Martini L, Ippolito G, Morro MI et al. Surgical site infection in Italian hospital: a prospective multicentre study. *BMC Infect Dis*. 2008; 8:34.
- [11] Archaompong EQ. Operative treatment of typhoid perforation of the bowel. *Br med journal*. 1969; 3:173-276.
- [12] Jhobta RS, Attari AK, Kaushik R, Sharma R, Jhobta A. Spectrum of perforation peritonitis in India – review of 504 consecutive cases. *World J Emerg Surg*. 2006; 1:26.
- [13] Shahida PA, Faiza M, Shafiq UR, Shahid S, Khursheed AS. *World J Emerg Surg*. 2008; 3:31.
- [14] Olurin EO, Ajay OO, Bohier JP. Typhoid perforations. *J R Coll Surg Edin*. 1972; 17:353-5.
- [15] Kaul BK. Operative management of typhoid perforation in children, *Int Surg*. 1975; 60:407-10.
- [16] Mulligan TO. The treatment of the typhoid perforation of the ileum. *J R Coll Surg Edin*. 1972; 17:364-8.

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