

# Generalized peritonitis secondary to typhoid ileal perforation: Assessment of severity using modified APACHE II score

Abdul Rashid K. Adesunkanmi, Tajudeen A. Badmus, F. O. Fadiora, E. A. Agbakwuru

*Department of Surgery, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria*

For correspondence:

Dr. A. R. K. Adesunkanmi, *Dept of Surgery, College of Health of Sciences, Ile-Ife, Nigeria.* E-mail: adesunkanmi@yahoo.com

## ABSTRACT

**Background:** Generalized peritonitis from typhoid ileal perforation is a common cause of surgical emergency in the developing countries, associated with high morbidity and mortality. The severity assessment of a disease condition is often useful to prioritise treatment and reduce morbidity and mortality. High severity scores are usually associated with high morbidity and mortality; therefore, these patients may require more intensive treatment than those with low severity scores. **Aim:** The purpose of this study was to assess the severity of generalized peritonitis from typhoid ileal perforation using modified APACHE II score. **Setting and Study Design:** A teaching hospital unit serving the rural and semi-urban Nigerian community. It is a prospective study of patients with generalized peritonitis from typhoid ileal perforation. **Materials and Methods:** Over a period of 7 years, patients had severity of illness assessed using modified APACHE II score. Demographic, clinical, preoperative, operative and postoperative data on each patient were entered into a prepared proforma. Each patient had postoperative outcome and severity of illness were compared to determine the significance of the severity of illness on postoperative outcome. **Results:** The mean age was of  $23.6 \pm 15.5$  years, with 4:1 male: female ratio. Morbidity rate ranged from 8.8-71.3% and mortality in 17.5%. Modified APACHE II score ranged from 0-19, with a mean of  $8.2 \pm 4$ ,  $7.6 \pm 4$  for survivors and  $9.4 \pm 2$  in those who died. There was no death among the patients who scored 0-4, whereas mortality was 13% in those who scored 5-9, 41.2% in those who scored 10-14, and 50% in patients who scored 15-19 ( $P < 0.05$ ). The modified APACHE II Score significantly influenced mortality, but did not influence the incidence of other postoperative complications. **Conclusion:** A high APACHE II score was associated with high mortality, but did not predict morbidity rate in the patients studied. More study is needed involving a larger number of patients to further validate our findings.

**Key Words:** Severity grading, typhoid peritonitis, apache II score

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## INTRODUCTION

Acute generalized peritonitis from typhoid ileal perforation is a potentially life-threatening condition. It is a common surgical emergency in many general surgical units in the

developing countries and it is often associated with high morbidity and mortality.<sup>[1,2]</sup> Grading the severity of acute peritonitis has assisted in no small way in decision-making and has improved therapy in the management of severely ill patients.<sup>[3]</sup> The ability to objectively estimate patients' risk for mortality or other important outcome is an important part of managing severely ill patients.<sup>[4]</sup> Empirically based risk assessment for important clinical events has been extremely useful in evaluating new therapies, in

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monitoring resources utilization and improving the quality of care.<sup>[5,6]</sup> Scoring systems had been found useful in predicting the outcome in critically ill patients, thus allowing application of resources for effective use.<sup>[7]</sup> The introduction of Injury Severity Score by Bakers et al in 1974<sup>[8]</sup> and Abbreviated Injury Scale in 1981<sup>[9]</sup> successfully opened avenues for further development of severity grading systems. Many scoring systems have been designed and used successfully to grade the severity of acute peritonitis and intra-abdominal sepsis.<sup>[15,9,10]</sup>

The most widely used index, APACHE II (Acute Physiological and Chronic ill Health Evaluation), was developed from a mixed group of medical and surgical patients.<sup>[5]</sup> Although not specifically designed for general surgical practice it has been successfully used by many authors to assess critically ill general surgical patients.<sup>[11-16]</sup> It has also been compared with other scoring systems with good results.<sup>[12]</sup>

The aim of this study was to grade the severity of acute generalized peritonitis from typhoid ileal perforation using modified APACHE II score. This study was carried out at the Wesley Guild Hospital, Ilesa, a unit of Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria. The hospital, in its about a century of existence, has catered to the health needs of the largely agrarian rural and semi-urban community of Ijesas and Ekitis in the Osun and Ekiti States in Western Nigeria. It is hoped that this study will serve as the basis for further study in the area of severity assessment of generalized peritonitis from typhoid ileal perforation in centres similar to ours.

## PATIENTS AND METHODS

A prospective survey of patients with acute generalized peritonitis due to typhoid ileal perforation was carried out at the Wesley Guild Hospital, Ilesa, a unit of Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria. The hospital serves the largely agrarian semi-urban and rural population of the Ijesa and Ekiti peoples of Western Nigeria.

The study population consisted of 80 consecutive patients who had laparotomy during a 7-year period (January 1995 to December 2001) for acute peritonitis due to typhoid ileal perforation. All the patients with acute generalized peritonitis from typhoid ileal perforation were included; adults or children, female or male. Clinical evaluation as well as haematological and biochemical investigations were carried out. Patients were resuscitated with intravenous fluid and correction of electrolyte imbalance as indicated by the results of the electrolytes and urea. Urethral catheter was inserted to monitor hourly urinary output and naso-gastric tube inserted to decompress the stomach. Combined Amoxicillin-Clavulanic acid (Augmentin) and metronidazole

or Cefuroxime (Zinacef) and metronidazole were commenced on admission in the Children Emergency Room or in the Adult Accident and Emergency unit in appropriate doses.

The following Acute Physiological parameters of APACHE II were assessed and recorded at the admission points: Temperature (degree Centigrade), Mean arterial blood pressure (mmHg), Heart rate, Respiratory rate (non-ventilated), Serum sodium (mMol/l), potassium (mMol/l), creatinine (mg/100ml), bicarbonate (mMol/l venous blood); haematocrit (%), white blood count (total/cmm<sup>3</sup>). No patients had Arterial pH or Partial pressure of oxygen (Po<sub>2</sub>) due to lack of facility. These were scored in accordance with the APACHE II chart,<sup>[22]</sup> scoring for abnormally high or low levels. The scores ranged from 0 to 4 on each side of normal value. Zero score represents normal values, an increase to 4 indicating the extreme end of high or low abnormal levels. These parameters represent the Acute Physiological Scores (APS).

Included in this study as part of APS was the serum urea. This was scored using the parameter similar to that of serum creatinine as follows: Serum urea 15 mmol/l = 4, 9-14mmol/l = 3, 5-8 mmol/l = 2, 1.4-4 mmol/l = 0, 1-1.39 mmol/l = 1, <1 mmol/l = 2. (Table 1)

Age points are as follows for adult patients: 44= 0, 45-54=2, 55-64=3, 65-74=5, 75=6<sup>[22]</sup>

Age points were modified as follows for children: 15= 0, 10-14=2, 5-9=3, 1-4=5, <1=6; this followed the pattern used for adults.<sup>[21]</sup>

Chronic ill health value<sup>[21]</sup> were added if the patients has history of severe organ system insufficiency or is immunocompromised points are assigned as follows:

- (a) non-operative or emergency postoperative patients- 5
- (b) elective postoperative patients- 2 points.

The Acute Physiological Scores, Age Points and Score for Chronic ill health values, is the total APACHE II SCORE (Table 1).

## Analysis

All these and the demographic data were entered into a personal IBM compatible Computer and analysed using Epi info version 6 (CDC, Atlanta, Georgia, USA). Frequencies, tabulation and means were determined. Groups were compared using the student t-test and proportion using the Chi-square analysis with Yate correction or Fisher Exact test when indicated.

## RESULTS

### Demography

The age ranged from 6-65 years, mean of 23.6 ± 15.5 years. There were 64 male patients (80%) and 16 females (20%). Over 70% were students while the remaining patients were distributed among the farming, trading and artisan population,

**Table 1: The 1984 apache II severity of disease classification system as documented by Meaking et al<sup>[21]</sup>**

Physiological Variables	+4	+3	+2	+1	0	+1	+2	+3	+4
Temp.	>41	39-40.9		38.5-38.9	36-38.5	34-35	32-33.9	30-31.9	<29.9
Mean arterial BP	>160	130-159	110-129		70-109		50-69		<49
Heart Rate	>180	140-179	11-139		70-109		55-69	40-54	<39
Resp. Rate	>50	35-49		25-34	12-24	10-11	6-9		<5
OxygenationPaO <sub>2</sub> (mmHg)	>500	350-499	200-349		<200				
Arterial pH	>7.7	7.5-7.59		7.5-7.59	7.33-7.49		7.25-7.32	7.15-7.24	<7.15
Serum Na+ mMol/l	>180	160-179	155-159	150-154	130-149		120-129	111-119	<110
Serum K+ mMol/l	>7	6.6-9		5.5-5.9	3.5-5.4	3-3.4	2.5-2.9		<2.5
Serum Creat. mg/100ml	>3.5	2-3.4	1.5-1.9		0.6-1.4		<0.6		
Haemtocrit %	>60		50-59.9	46-49.9	30-45.9		20-29.9		<20
WBC x 1000(total mm <sup>3</sup> )	>40		20-39.9	15-19.9	3-14.9		1-2.9		<1
Serum HCO <sub>3</sub> Venous bloodmMol	>52	41-51.9		32-40.9	22-31.9		18-21.9	15-17.9	<15
**Serum Urea (mMol/l)	>15	9-14	5-9		1-4.9		<1		

\*\*Age points for children: 15 yrs = 0; 10-14 yrs = 2; 5-9 yrs = 3; 1-4 yrs = 5; <1 yr = 6

Age points for adults: <44 = 0; 45-54 = 2; 55-64 = 3; 65-74 = 5; >75 = 6

Chronic ill-health evaluation (severe organ insufficiency) Points: Presence of chronic illness in patient requiring the following:

(a) for non-operative or emergency postoperative patients- 5; (b) for elective postoperative patients-2 points

### Clinical parameters and operative findings

The symptoms and signs were not different from the usual symptoms and signs of acute generalized peritonitis. At operation pus with faeculent materials was drained in all the patients ranging from 100-6000 mls, mean of 1173.5 ± 942.4 mls. There was a single ileal perforation in 68 patients (85%), two perforations in 9 (11.3%) and three perforations in 3(3.7%) patients. The size of perforation ranged from 0.5-4 cm, mean of 1.2 ± 0.7 cm. With distant from ileocaecal junction ranged from 4-60 cm, mean of 28.3 ± 13.3 cm. All the ileal perforations were located in the anti-mesenteric border of the intestine.

### Postoperative outcome

The postoperative complications were wound infection in 57 patients (71.3%), wound dehiscence in 22 (27.6%), residual intra-abdominal abscess in 10 cases (12.5%), postoperative cough in 10 cases (12.5%), residual intra-abdominal sepsis in 9 cases (11.3%), 7 (8.8%) cases of incisional hernia, enterocutaneous fistula in 3 cases (3.8%) and 14 patients (17.5%) died. The duration of hospital stay ranged from 1 day -75 days, mean 21 ± 14 days.

All those who suffered mortality were male accounting for 22% of mortality in male patients, whereas mortality was nil in female patients; this was found to be statistically significant ( $P<0.05$ ). Also, 50% of those who died had multiple perforations and this accounts for 58.3% of the patients with multiple perforations, whereas mortality was 10.3% in patients with single intestinal perforation ( $P<0.05$ ).

Mortality occurred in the first week of admission in 12 patients accounting for 87.5% of the patients who suffered mortality. The hospital stay of those who died ranged from 1-28 days, mean of 6.3 ± 7.2 days, thus, spent shorter period in the hospital ( $P<0.05$ ). Table 2 illustrates the variables with a statistically significant

influence on the postoperative outcome.

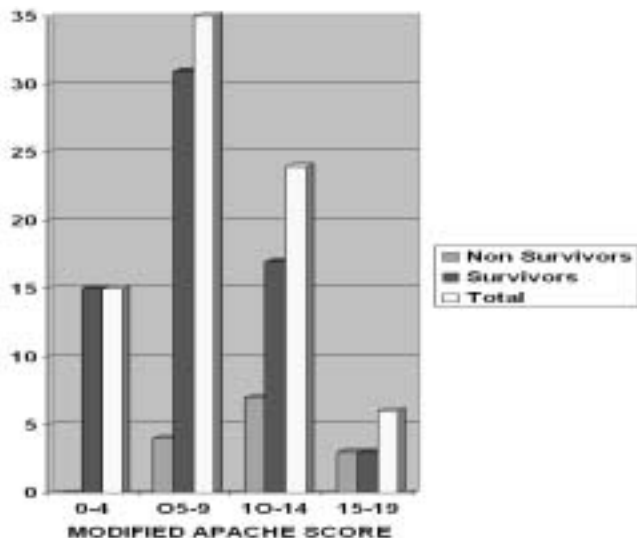
Modified APACHE II score ranged from 0-19, mean of 8.2 ± 4, the mean APACHE II score for survivors was 7.6 ± 4, and it was 9.4 ± 2 in those who died. There was no death among the patients who scored 0-4, whereas mortality was 13% in those who scored 5-9, 41.2% in those who scored 10-14, and 50% in patients who scored 15-19 ( $P<0.05$ ) (Figure 1). The modified APACHE II Score only predicted mortality ( $P<0.05$ ), but did not predict the incidence of other postoperative complications. See Table 3.

## DISCUSSION

Mortality following typhoid ileal perforation ranges from 9-43%, with many survivors having to face with severe wound infection and dehiscence. Mortality of 17% was recorded in this study and morbidity from other postoperative complications was about 8.8%-71.3%.<sup>[1,2]</sup> Prognosis depends on the size and number of perforations and this can further be worsened by late presentation, especially in a rural and semi-urban community like ours. These factors have been found to have a significant effect on the morbidity and

**Table 2: Variables influencing the some postoperative outcome in patients with typhoid ileal perforation**

Variables	Outcome variables	Chi-Square	P-value
Sex	Death	4.19	0.04
Number of perforations	Death	14.6	0.001
	Hospital Stay	7.12	0.028
Volume of pus drained from peritoneal cavity	Enterocutaneous fistula	4.52	0.033
	Death	10.39	0.001
	Hospital Stay	6.95	0.030
Enterocutaneous fistula	Death	5.06	0.024
Hospital stay	Death	19.86	0.001
Modified apache score	Death	7.73	0.001



**Figure 1:** Distribution of non-survivors, survivors in various modified apache score II groupings

**Table 3: Statistical influence of modified apache score on the postoperative outcome factors**

Modified apache II score	Outcome variables	Chi-Square	P-value
	Wound infection	0.34	0.55
	Wound dehiscence	0.00	0.96
	Residual intra-abdominal abscess	1.24	0.26
	Residual intra-abdominal sepsis	2.15	0.30
	Postoperative cough	1.12	0.30
	Enterocutaneous fistula	1.10	0.30
	Incisional hernia	0.31	0.5
	Death	7.73	0.005
	Hospital Stay	1.59	0.45

mortality as demonstrated in this study in accordance with the findings of previous study in Nigeria.<sup>[1,2]</sup>

The objective evaluation of severity, therapeutic approach and effectiveness of treatment of acute generalized peritonitis from typhoid ileal perforation is hampered by the lack of precise classification in this environment. Crude morbidity and mortality data for the purpose of medical audit is often misleading. Early prognostic evaluation is desirable to be able to select high-risk patients for more aggressive treatment especially in severe peritonitis such as seen in typhoid ileal perforation.

APACHE II parameters have been shown to have a stronger relationship to the outcome than previous groupings such as anatomy, causes, abnormality, age and chronic ill health without consideration for systemic effect of the intra-abdominal sepsis, thus its use in this study. APACHE II score is very popular and has been used in both surgical and non-surgical patients, it has also been validated using many patients

over several years in many centres in the developed countries.<sup>[11-16]</sup> Of the present prognostic scoring systems, APACHE II appeared to be the most widely used and had a general acceptance in assessing the critically ill patients, for its easy applicability and ability to predict outcome. Many of these studies<sup>[11-16]</sup> have associated high APACHE II scores with poor outcome as previously documented and confirmed by this study, however, only able to predict mortality but not morbidity rates in this study.

The present study confirmed the ability of APACHE II to predict mortality in acute peritonitis sepsis due to typhoid ileal perforation. The study also showed that it could be easily applied to grade severity of acute peritonitis in centres like ours, despite inadequate facilities, with some degree of effectiveness as previously documented.<sup>[14,15]</sup> There was no death among the patients that scored 0-4, whereas mortality was 13% in those who scored 5-8, 41.2% in those who scored 9-13 and 50% in patients who scored 14-18. The limitation of this study is the inability to assess all the physiological parameters in APACHE II, especially arterial pH and partial pressures of oxygen (Po<sub>2</sub>). These and other unavailable parameters were scored zero in accordance with the recommendation of Meakins et al.<sup>[13]</sup>

In conclusion, APACHE II score predicted postoperative mortality in the patients studied, however, its ability to predict postoperative morbidity could not be confirmed in this study. To validate our finding, there is a need for further study involving larger number of patients with acute peritonitis from typhoid ileal perforation. It would appear that in patients with acute peritonitis from typhoid ileal perforation, APACHE II score would be an easy grading for the evaluation of disease severity.

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## Forthcoming Events

EVENT DATE, VENUE CONTACT	<p><b>9th Basic Instructional Course in Colo - Proctology</b>  <i>April 5th - 9th, 2005, Pune, Maharashtra</i>                      Dr. Pradeep Sharma, Organizing Secretary, B. J. Medical College and Sassoon General Hospital, Pune, Maharashtra, India. Mobile: 9422030510. E-mail: geetanjali-ip@eth.net</p>
EVENT DATE, VENUE CONTACT	<p><b>FACRSI Examination</b>  <i>April 10th - 12th, 2005, B. J. Medical College, Pune</i>                      Dr. Parvez Sheikh, Hon. Sec. ACRSI, 12, Rogay Apartments, 285, B. Jaykar Marg, Mumbai - 400002, Tel: 022-22064002(R) / 23888877 (C). E-mail: sheikh@vsnl.com</p>
EVENT DATE, VENUE CONTACT	<p><b>Second Indo-Us Workshop on Diabetic Foot Complications</b>  <i>April 22nd / 23rd, 2005, Chennai, India</i>                      Dr. Vijay Viswanathan, The Organizing Secretary, Joint Director, Diabetes Research Centre, #4, Main Road, Royapuram, Chennai - 600 013, Fax: 91-44-25954919.                      E-Mail: dr_vijay@vsnl.com</p>
EVENT DATE, VENUE CONTACT	<p><b>10th CSEP &amp; Operative Workshop on Surgery</b>  <i>July 23rd / 24th, 2005, GGH, Pondicherry</i>                      Dr. K. P. Singh, 33, HIG House, Ashok Nagar, Pondicherry - 605 008, India.                      Tel.: 0413 2251966, 2250667-R, 2338105.                      E-mail: doc-singh@eth.net / drsinghkp@yahoo.com</p>
EVENT DATE, VENUE CONTACT	<p><b>ACRSICON - 2005</b>  <i>October 4th - 9th, 2005, Lucknow, India</i>                      Ashok Kumar, The Organising Secretary, Department of Surgical Gastroenterology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow - 226014, India. Ph.: +91-522-2668700, 2668800, Ext. 2401, 2423 (Office) Mobile: 9415403373, 9415578278                      Fax: +91-522-2668017, E-mail: acrsi2005@yahoo.co.in / ak Gupta@sgpgi.ac.in</p>
EVENT DATE, VENUE EVENT DATE, VENUE CONTACT	<p><b>9th Advanced Instructional Course</b>  <i>October 4th - 9th, 2005, SGPGI, Lucknow</i>  <b>28th National Conference of ACRSI</b>  <i>October 7th - 9th, 2005, SGPGI, Lucknow</i>                      Dr. Ashok Kumar. Tel: 0522-2668700-800-900. Ext: 2423 (o) 2424(r).                      E-mail: ak Gupta@sgpgi.ac.in, ashokak Gupta@yahoo.co.in. Dr. R. B. Singh. Tel: 0522-2781817, M-094154-03373. E-mail: rbsingh@surgeon-gastro.com / rbsingh@hotmail.com</p>