

Clinical Science

# aLicante sUrgical Community Emergencies New Tool for the enUmeration of Morbidities: a simplified auditing tool for community-acquired gastrointestinal surgical emergencies



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**KEYWORDS:**

POSSUM system;  
Morbidity risk;  
Gastrointestinal  
surgery

**Abstract**

**BACKGROUND:** In a previous study, we found that Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity (POSSUM) overpredicts morbidity risk in emergency gastrointestinal surgery. Our aim was to find a POSSUM equation adjustment.

**METHODS:** A prospective observational study was performed on 2,361 patients presenting with a community-acquired gastrointestinal surgical emergency. The first 1,000 surgeries constituted the development cohort, the second 1,000 events were the first validation intramural cohort, and the remaining 361 cases belonged to a second validation extramural cohort.

**RESULTS:** (1) A modified POSSUM equation was obtained. (2) Logistic regression was used to yield a statistically significant equation that included age, hemoglobin, white cell count, sodium and operative severity. (3) A chi-square automatic interaction detector decision tree analysis yielded a statistically significant equation with 4 variables, namely cardiac failure, sodium, operative severity, and peritoneal soiling.

**CONCLUSIONS:** A modified POSSUM equation and a simplified scoring system (aLicante sUrgical Community Emergencies New Tool for the enUmeration of Morbidities [LUCENTUM]) are described. Both tools significantly improve prediction of surgical morbidity in community-acquired gastrointestinal surgical emergencies.

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In 1991, Copeland<sup>1</sup> described POSSUM as a scoring system for surgical audit that produced assessments of morbidity and mortality for elective and emergency procedures of vascular, gastrointestinal, hepatobiliary, or urologic surgery. The POSSUM system was based on a physiological assessment which included 12 variables (Table 1) and a measure of operative severity which included six variables (Table 2), each one divided into 4 grades with an exponentially increasing score (1, 2, 4, and 8). The POSSUM system of surgical patient stratification was not created to be used by the clinician at the bedside to provide crude predictions that might help in decision-making. It was rather intended to provide risk adjustment and benchmarking among centers, surgical units, or even individual surgeons. According to Copeland, any decrease in score variables resulted in a loss of predictive ability. However, he hypothesized that the smaller the number of variables the easier the scoring system would be.

Recently, we found that the POSSUM system adequately predicted morbidity risk in elective gastrointestinal surgery, but it overpredicted morbidity risk in emergency gastrointestinal surgery.<sup>2</sup> In the previous study, we pooled patients who underwent reoperation for nosocomial gastrointestinal emergencies and those who were brought to the hospital requiring surgery for a gastrointestinal emergency—one of several diseases in which individuals who have not recently been hospitalized develop an acute condition that affects a digestive organ and/or the abdominal cavity. Community-acquired gastrointestinal surgical emergencies can affect people of all ages, occur throughout the world, and are a leading cause of illness and death.

The public health burden of emergency general surgery in the United States is substantial and is increasing. The

annual case rate is higher than the sum of all new cancer diagnoses, yet the public health implications remain largely unstudied.<sup>3</sup> According to the Global Burden of Disease Study, the conditions requiring emergency surgery contribute substantially to mortality, years of life lost, and disability-adjusted life years. Gastrointestinal emergencies such as complicated peptic ulcer disease, bowel obstruction, biliary disease, mesenteric ischemia, and appendicitis are among the most common causes of death globally.<sup>4</sup>

The initial purpose of the present study was to find a POSSUM equation adjustment (modified POSSUM) to better predict morbidity for patients with community-acquired gastrointestinal surgical emergencies. Our secondary goal was to determine whether a decrease in the number of variables could offer similar predictions. As a result, a simplified scoring system (LUCENTUM [aLicante sUrgical Community Emergencies New Tool for the enUmeration of Morbidities]) that applies to adult patients (over 14-year old) is described. LUCENTUM is the name the Romans gave to the city of Alicante in Spain.<sup>5</sup>

## Patients and Methods

### Patients

From January 2009 to June 2013, 2,000 consecutive patients presented to our hospital with a community-acquired gastrointestinal emergency requiring intervention by the on-call team, which included 2 attending surgeons (from a pool of 15) and 1 or 2 surgical residents (from a pool of 16). All patients were managed according to the standard of care at Hospital General Universitario de

**Table 1** POSSUM physiological score

Variables	Score			
	1	2	4	8
Age (y)	≤ 60	61–70	≥ 71	
Cardiac signs	No failure	Diuretic, digoxin, antianginal or hypertensive therapy	Peripheral edema, warfarin therapy, borderline cardiomegaly	Raised jugular venous pressure, cardiomegaly
Respiratory history	No dyspnea	Dyspnea on exertion, mild COAD on chest radiograph	Limiting dyspnea (1 flight) moderate COAD on chest radiograph	Dyspnea at rest (rate ≥ 30/min), fibrosis or consolidation on chest radiograph
Blood pressure, systolic (mm Hg)	110–129	130–170 or 100–109	>170 or 90–99	<90
Pulse (beats/min)	50–80	81–100 or 40–49	101–120	>120 or <40
Glasgow, score	15	12–14	9–11	≤ 8
Urea (mmol/L)	<7.5	7.5–10	10.1–15	>15
Sodium (mmol/L)	≥ 136	131–135	126–130	<126
Potassium (mmol/L)	3.5–5	3.1–3.4 or 5.1–5.3	2.9–3.1 or 5.4–5.9	<2.9 or >5.9
Hemoglobin (g/100 mL)	13–16	11.5–12.9 or 16.1–17	10–11.4 or 17.1–18	<10 or >18
White cell count ( $\times 10^3$ )	4–10	10.1–20 or 3.1–3.9	>20 or <3.01	
Electrocardiography	Normal		Atrial fibrillation (rate 60–90/min)	Any other abnormal rhythm, or ≥ 5 ectopics/min. Q waves or ST/T wave changes

COAD = chronic obstructive airways disease.

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