

# تقييم مرضى العناية المركزة بمقياس الفشل المعدي المعوي بمفرده وبجمعه مع مقياس فشل وظائف الأعضاء التابعي

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# ABSTRACT

## Introduction

The gut plays a major role in critical illness .Gastrointestinal problems occur frequently and are associated with an adverse outcome in critically ill patients despite that, gastrointestinal (GI) function is not included in any of the widely used scoring systems assessing organ failures in critical illness.

Monitoring of intra-abdominal pressure (IAP) is gaining more and more popularity in everyday clinical practice. Several studies have demonstrated an impact of intra-abdominal hypertension (IAH) on mortality.

With the goal of developing a scoring system for GI failure, Reintam et al combined GI symptoms and IAH into a five-grade scale – the Gastrointestinal Failure Score and tested it among critically ill patients in Estonian intensive care unit.

**Aim of the study:** Our study is to evaluate the GIF score in our Egyptian intensive care units regarding validity and impact on mortality and comparing this with the SOFA score. And to describe the prevalence of food intolerance and intra-abdominal hypertension among ICU patients and their impact on mortality.

**Patients and methods:** We studied 109 mechanically ventilated patients day one admitted to the general ICU of Kasr El Aini Hospital and Theodor Bilharz Research institute in the period from March 2009 to November 2009. The SOFA+GIF score was calculated each day by summarizing the SOFA score and the GIF score of the respective day in each patient

**Results:** FI developed in 35.8%, IAH in 26.9% and both of them together in 14.7% of all patients. Compared to patients with mean GIF=0, patients with mean GIF higher than 0 and lower than or equal 2 and mean GIF higher than 2 show higher ICU mortality (100%, 81.4% vs 48.2% P value 0.0001 respectively. The GIF score integrated into the SOFA score allowed a better prediction of ICU mortality than the SOFA score.

**Keywords:** failure, gastrointestinal, hypertension, intra-abdominal, SOFA



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## **List of Abbreviations**

ΔSOFA.....	difference between SOFA 3 <sup>rd</sup> day and SOFA 1 <sup>st</sup> day
ABI .....	acute bowel injury
ACS .....	abdominal compartment syndrome
ALI.....	acute lung injury
ANOVA .....	Analysis of variance
APACHE .....	Acute Physiology and Chronic Health Evaluation
APP.....	Abdominal Perfusion Pressure
AUROC.....	area under the receiver operator characteristic curve
BMI .....	body mass index
CCK.....	cholecystokinin
Coag.....	coagulation
CPP.....	cerebral perfusion pressure
CPR.....	cardiopulmonary resuscitation
CVP .....	central venous pressure
CVS.....	cardiovascular system
df.....	degree of freedom
EN.....	enteral nutrition
EVLWI .....	extravascular lung water index
FG.....	filtration gradient
FI .....	food intolerance
GALT.....	gut associated lymphoid tissue
GI.....	gastrointestinal
GIC.....	gastrointestinal complications
GIF.....	gastrointestinal failure
GIT.....	gastrointestinal tract
GFP.....	glomerular filtration pressure
ICP .....	intracranial pressure



ICU.....	intensive care unit
IAH.....	intra-abdominal hypertension
IAP .....	intra-abdominal pressure
MAP .....	mean arterial pressure
Max GIF.....	maximum GIF score in the 1 <sup>st</sup> 3days
Max SOFA.....	maximum SOFA score in the 1 <sup>st</sup> 3days
MODS .....	Multiple Organ Dysfunction Score
MOF .....	multiple organ failure
MSOF .....	multisystem organ failure
MPM .....	Mortality Probability Model
Neuro.....	central nervous system
OR.....	Odd ratio
PEEP.....	positive end-expiratory pressure
Pt.....	patients
PTP.....	proximal tubular pressure
PYY .....	pancreatic peptide YY
OBFI .....	organ blood flow/cardiac output
OR.....	odds ratio
PIP .....	peak inspiratory pressure
PN.....	Parenteral nutrition
ROC .....	Receiver Operator Characteristic
SAPS.....	Simplified Acute Physiology Score
SIRS.....	Systemic Inflammatory Response Syndrome
SOFA.....	Sequential Organ Failure Assessment
TBRI .....	Theodor Bilhars Research Institute
WSACS.....	World Society of Abdominal Compartment Syndrome
95% CI .....	95% confidence interval



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## INTRODUCTION


The ability to accurately predict the outcome impacts medical therapy, triaging, end-of-life care, and many other aspects of ICU care [1].

The literature shows that prognosis have constituted an important dimension of critical care, as patients and their families seek predictions about the duration and outcome of illness [2].

The gut plays a major role in critical illness. Gastrointestinal problems occur frequently and are associated with an adverse outcome in critically ill patients [3,4] despite that, gastrointestinal (GI) function is not included in any of the widely used scoring systems assessing organ failures in critical illness.

The underestimation of the importance of gastrointestinal failure (GIF) in critically ill patients can be seen in its lack of clear definition. Numerous mostly primarily diagnosis-based definitions have been used by different authors, making comparative interpretation of studies upon GI function rather difficult if not impossible [5].

More than ten years ago the summary of round table conference in gut dysfunction in critical illness concluded that intestinal function is an important determinant in the outcome of critically ill patients; there is no objective, clinically relevant definition of intestinal dysfunction in critical illness; and the definition developed in the future should grade the severity of the dysfunction [6]. The scoring system for GI dysfunction is thus warranted, while the continuing lack of systemized approach is restricting the studies assessing epidemiology, time course, risk factors and treatment.



Monitoring of intra-abdominal pressure (IAP) is gaining more and more popularity in everyday clinical practice. It is easily performed and results in a reliable value to interpret. Several studies have demonstrated an impact of intra-abdominal hypertension (IAH) on mortality [7,8]. Still, IAP has not been proven to be an adjuvant measure of GI function.

With the goal of developing a scoring system for GI failure, Reintam et al [9] combined GI symptoms and IAH into a five-grade scale – the Gastrointestinal Failure Score and tested it among critically ill patients in Estonian intensive care unit.

Similar to other organ failure scores, the validation of the score was designed as an assessment of mortality in patients with different scores.

Our study is to evaluate the GIF score in our Egyptian intensive care units regarding validity and impact on mortality, and the prevalence of food intolerance and intra-abdominal hypertension among ICU patients and its impact on mortality. And comparing this with a well known scoring system for predicting mortality.



## **AIM OF THE WORK**

### **The aim of the study is to:**

- ❖ Describe the frequency of gastrointestinal failure in the ICU according to the GIF score.
- ❖ Testing the ability of the GIF score to predict mortality and comparing that with the SOFA score.
- ❖ Testing the ability of the GIF score added to the SOFA score to predict mortality.



# **GASTROINTESTINAL SYSTEM FUNCTION AND DYSFUNCTION**

## **1- GASTROINTESTINAL MOTILITY.**

### **D) Upper Gastrointestinal Motility In Health**

Appreciation of the pathophysiology observed in critical illness requires an understanding of normal gastric and small intestinal motility.

In health, the rate of gastric emptying is regulated via an integration of motor activity [10]. The motor activity of the gut differs between the fasting and fed state.

Fasting motility is divided into three phases which migrate along the upper gut (the migratory motor complex); phase I is characterised by quiescence, phase II by irregular contractile activity and phase III by periods of regular contractions sometimes referred to as the activity front [11].

Ingestion of nutrients results in a postprandial pattern of activity. The proximal stomach acts as a reservoir with the fundus relaxing. Subsequently, the fundus undergoes slow sustained contractions, which may act to distribute contents distally and is believed to have a major role in the control of liquid emptying [12]. The peristaltic wave is dependent on the integration of motor activity in the proximal and distal stomach, as well as the proximal small intestine [13].

Transpyloric flow occurs as a result of both peristaltic and non-peristaltic antro-duodenal gradients [14]. The rate of transpyloric flow

is regulated by feedback from receptors in the small intestine [15]. This results in decreased transpyloric movement of nutrient and limits its delivery into the small intestine to 2-3 kcal/min [10].

## **II) Upper Gastrointestinal Motor Dysfunction In Critical Illness**

Delayed gastric emptying is common in the Intensive Care Unit, occurring in approximately 50% of mechanically ventilated critically ill patients [16,17]. In these patients both fasting and fed motility of the upper GI tract are frequently impaired [18].

There is a virtual absence of gastric phase III motility during the fasting state, although the frequency of phase III activity in the duodenum appears normal [19] perhaps reflecting a loss of integration within the antro-pyloro-duodenal unit.

During feeding, however, a number of additional abnormalities become apparent. These include delayed fundal relaxation, prolonged recovery [20], reduced antral motility [18] and increased isolated pyloric activity. These occur when the small intestine is exposed to even low levels of nutrients and are likely to result in delayed gastric emptying [18].

In contrast to delayed fundal relaxation and impaired antral motility, duodenal activity usually persists [18] (although the organization of duodenal activity is frequently abnormal) [21].

The mechanisms underlying motor dysfunction in critical illness are uncertain. However, concentrations of cholecystokinin (CCK) and pancreatic peptide YY (PYY), which normally increase when nutrient