

## Mortality in patients with intestinal failure at the Hospital Central del Estado, Chihuahua, Mexico

*Mortalidad en pacientes con falla intestinal en el Hospital Central del Estado, Chihuahua, México*

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### Palabras clave:

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### ABSTRACT

Intestinal insufficiency is defined as “a reduction of functional intestinal mass below the minimum amount necessary for adequate digestion and absorption of food”. It is a rare condition, usually secondary to major abdominal surgery. It is characterized by inadequate intestinal function for nutrient and electrolyte absorption that affects nutritional status and survival expectancy if adequate intravenous administration of nutrients and electrolytes are not given. In the last decades the importance of this entity has been considered in publications dealing with its treatment, mortality, life expectancy, and related factors; however, data are still insufficient, even more so in our environment. **Objective:** To describe the rates and causes of mortality among patients with intestinal failure in the Intestinal Failure Unit of the Hospital Central del Estado in Chihuahua, Chihuahua State, Mexico. **Material and methods:** A retrospective cross-sectional study was conducted in the Hospital Central del Estado with a total of 53 patients in a period from March 2016 to March 2018, based on criteria according to the type of intestinal failure. **Results:** 37% of the patients included in the study (20/53) died due to intestinal failure. According to their type of intestinal failure, functional classification type II had the highest percentage of deaths and according to their pathophysiology, higher mortality was observed due to short bowel syndrome, followed by intestinal dysmotility. **Conclusions:** It is important to know the association between the main types of intestinal failure and their main causes of mortality in our setting to administer timely and adequate therapies and thereby reduce mortality.

### RESUMEN

*La insuficiencia intestinal se define como “una reducción de la masa intestinal funcional por debajo de la cantidad mínima necesaria para una adecuada digestión y absorción de los alimentos”. Es una afección rara, generalmente secundaria a una cirugía abdominal mayor. Se caracteriza por una función intestinal inadecuada para la absorción de nutrientes y electrolitos que afectaría el estado nutricional y la expectativa de supervivencia sin la administración intravenosa de nutrientes y electrolitos. En las últimas décadas se ha tomado en cuenta la importancia de esta entidad con publicaciones que tratan sobre su tratamiento, mortalidad, expectativa de vida y factores relacionados; sin embargo, los datos siguen siendo insuficientes, aún más en nuestro medio. **Objetivo:** Describir las tasas y causas de mortalidad entre los pacientes con falla intestinal de la Unidad de Falla Intestinal del Hospital Central del Estado en Chihuahua, Chih. **Material y métodos:** Se realizó un estudio transversal retrospectivo en el Hospital Central del Estado con un total de 53 pacientes en un periodo de marzo de 2016 a marzo de 2018, tomando criterios de acuerdo con el tipo de falla intestinal. **Resultados:** Se encontró que 37% de los pacientes incluidos en el estudio (20/53) fallecieron a causa de falla intestinal. De acuerdo con su tipo de falla intestinal, la clasificación funcional tipo II fue la que obtuvo el mayor porcentaje de fallecimientos y de acuerdo con su fisiopatología se observó mayor mortalidad a causa del síndrome de intestino corto, siguiendo la dismotilidad intestinal. **Conclusiones:** Es importante conocer la asociación entre los principales tipos de falla intestinal y sus principales causas de mortalidad en nuestro entorno para así lograr administrar tratamientos oportunos y adecuados y con ello disminuir la mortalidad.*



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## INTRODUCTION

Intestinal failure (IF) is characterized by a reduction in the amount of functional bowel mass below the required to maintain adequate digestion and absorption of nutrients and fluids to achieve a normal nutritional state.<sup>1,2</sup> The term was first described in 1981 by Fleming and Remington. Usually, intestinal failure can be divided into acute and self-limited, or chronic and progressive.<sup>3</sup>

There are several classifications and definitions regarding intestinal failure. Among the most accepted classifications there is a “functional classification of IF”, which divides IF into types I, II and III. Also, there is a “pathophysiological classification of IF”, which, as its name indicates, classifies IF according to its triggering mechanism into short bowel syndrome, intestinal fistula, intestinal dysmotility, mechanical bowel obstruction, and intestinal malabsorptive disease. And lastly, there is a clinical classification of chronic IF, which divides IF into non-malignant disease or due to active cancer.<sup>4-6</sup>

In our setting it has been observed that the most common cause of intestinal failure is enteric fistula, alike to what has been described by other authors.<sup>7</sup>

Despite the existence of all these classifications in the literature, there is still no common agreement within community of health professionals regarding the IF definition and use of the classifications, which makes it a relevant issue among clinicians for the welfare of patients. Regardless of which classification is used, we may say that all pathologies that cause intestinal failure imply an important protein, energy, and water-electrolyte imbalance, which sometimes, either by itself or in conjunction with other comorbidities, ends in a fatal outcome.<sup>8</sup>

## EPIDEMIOLOGY

In a retrospective study carried out in the United States, 89 patients with intestinal failure were analyzed, with a mortality rate of 5% (3/89) after reconstructive surgery and an overall preoperative and postoperative

mortality rate of 16% (14/89)<sup>9</sup> including deaths due to the underlying disease.

In another group of 68 patients with intestinal failure studied in Italy, it was observed that 22 of them died from causes secondary to the chronic condition of the failure, of which: three died from causes related to administration of total parenteral nutrition (TPN) complications such as sepsis associated with catheter use, failure of venous access and liver failure; three died from failure to comply with TPN as indicated, five from metabolic alterations and 11 from causes not directly related to the intestinal failure itself.<sup>10</sup>

Unfortunately, in our setting there are no statistics on intestinal failure in adults or associated mortality. There are isolated data on the pathologies that condition intestinal failure, but due to the lack of clarity in its definition and classification, it is difficult to find reliable sources that encompass the current classifications.

## DIAGNOSIS AND TREATMENT OF INTESTINAL FAILURE

As mentioned, there is still no consensus on a globally accepted classification for the diagnosis of intestinal failure (*Table 1*):

### Pathophysiological classification:

This classification is based on the main mechanism which, either alone or in association with some other, can determine whether a patient will develop intestinal failure or not. It consists of five main pathophysiological conditions that may originate from various gastrointestinal or systemic diseases:<sup>5</sup>

- Short bowel syndrome
- Intestinal fistula
- Intestinal dysmotility
- Mechanical obstruction
- Intestinal malabsorptive disease

### Functional classification:<sup>4</sup>

Type I: acute, usually self-limited.

Type II: prolonged acute, with metabolically unstable patients requiring intravenous supplementation for weeks to months.

Type III: chronic, in metabolically unstable patients, requiring intravenous supplementation for months to years, that may be reversible or irreversible.

**Clinical classification:**<sup>6</sup>

This is the most recent classification created by an expert panel of the European Society for Clinical Nutrition and Metabolism (ESPEN) that agreed on the need for a “clinical classification” of IF to facilitate communication and cooperation between health professionals. Considering that there were no published data available to use as a starting point, the development of a “clinical classification” was based on the common experience of the expert panel, reaching a consensus to classify chronic IF as a benign disease or with active cancer, based on caloric and intravenous volume requirements. As expected, this classification includes a wide range of patient distribution and variability of pathophysiological causes as well as of energy requirements.

In the initial approach to the acute phase in a patient with IF, it is essential to control any septic focus, manage volume loss, provide

specific antibiotic therapy, perform adequate wound and stoma management, and achieve an intensive water and electrolyte control, administer TPN, perform multiple surgical procedures for bypass, debridement, and drainage of collections, and, in some cases, even proceed to intestinal transplantation. All this requires a multidisciplinary team that should be composed of intensivists, internists, gastroenterologists, nutritionists, psychologists, psychiatrists, rehabilitation staff, specialized nursing staff, surgeons, radiologists, nephrologists, respiratory therapists, specialists in infectious diseases and in transplants, stoma and wound management experts, anesthesiologists, and others, depending on the specific organ dysfunctions.<sup>11-14</sup>

**ASSOCIATION BETWEEN MORTALITY AND TYPE OF INTESTINAL FAILURE**

There are few studies that describe the association between the type of intestinal failure, regardless the classification used, and mortality. However, it is usually enough to review the bibliography of different medical texts to find the mortality figures associated with each specific conditioning pathology. There are also many articles that describe, according to the personal experience of the authors, the association between different pathologies and their mortality. For example, in Crohn’s disease mortality ranges from 1.1 to 19.9%, in inflammatory bowel disease is 0.9%, in toxic megacolon with intestinal resection and intestinal fistulas is 4%, or in acute mesenteric ischemia is < 58%, among others.<sup>15-19</sup>

The few specific studies in IF describe a patient survival rate around 88-78% at three and five years, respectively. In other centers a mortality of 16% has been published.<sup>9,10</sup>

**MATERIAL AND METHODS**

After approval of the Ethics Committee of the Hospital Central del Estado, a retrospective cross-sectional study was performed. The database of the intestinal failure unit (IFU) was analyzed. During the period from March 2015 through March 2018, a total of 53 patients admitted to the unit and who met the criteria

**Table 1: Intestinal failure classifications.**

Pathophysiological classification	<ul style="list-style-type: none"> <li>• Short bowel syndrome</li> <li>• Intestinal fistula</li> <li>• Intestinal dysmotility</li> <li>• Mechanical obstruction</li> <li>• Intestinal malabsorptive disease</li> </ul>
Functional classification (types)	<ul style="list-style-type: none"> <li>I Acute, usually self-limited</li> <li>II Prolonged acute, metabolically unstable patients requiring intravenous supplementation from weeks to months</li> <li>III Chronic, metabolically unstable, requiring intravenous supplementation from months to years, reversible or irreversible</li> </ul>
Clinical classification	<ul style="list-style-type: none"> <li>• Non-malignant disease</li> <li>• Active cancer</li> </ul>

Own elaboration according to data consulted.

		n (%)	Valid percentage	Cumulative percentage
Valid	Alive	33 (62.3)	62.3	62.3
	Died	20 (37.7)	37.7	100.0
	Total	53 (100.0)	100.0	

Own elaboration according to data consulted.

of being admitted to the intestinal failure unit with complete clinical and electronic records were included in the present study. Data were collected on Microsoft® Excel program and analyzed with SPSS® (IBM Statistical Package for Social Sciences v. 22.0) software (SPSS, Chicago, IL, USA).

## RESULTS

Of the 53 patients admitted to our intestinal failure unit, 33 of them were alive to the time of this writing, corresponding to 62.3% of the total (Table 2).

Of the sample obtained and according to the functional classification, 34% (18/53) of patients corresponded to type I intestinal failure, 58.5% (31/53) of patients to type II IF and 7.5% (4/53) of patients to type III IF were found (Table 3). According to the pathophysiological classification (which includes surgical and non-surgical causes) in our unit, 52.8% (28/53) of patients corresponded to intestinal fistula, 13.2% (7/53) to intestinal obstruction, and only 1.9% (1/53) to short bowel syndrome as surgical causes of intestinal failure. Regarding other entities different than those described above, and which are usually treated by the clinical gastroenterologist, but which are also part of the pathophysiological classification of intestinal failure, 26.4% (14/53) corresponded to intestinal dysmotility and 5.7% (3/53) to malabsorptive syndromes (Table 4).

When separating mortality by type of intestinal failure according to functional classification, we found that 55.6% (10/18) of patients with type I IF died, 25.8% (8/31) of patients with type II IF died and 50% (2/4) of patients with type III IF died.

Regarding the pathophysiological classification, the only patient classified as short bowel syndrome died. Of the patients with intestinal fistula 21.4% (6/28) died. When reviewing the literature, a mortality of 19.1% was found in other centers in patients with intestinal fistula. However, it is not specified if these patients met the definition of intestinal failure.<sup>20</sup> The mortality in cases of intestinal obstruction was 14.3% (1/7). Of the causes attended by the gastroenterologist colleague, it was found that 71.4% (10/14) of patients with exclusive intestinal dysmotility died. And lastly 66.6% (2/3) died associated to an intestinal malabsorptive disease. In the literature review, no similar studies were found that described the mortality rate according to the different classifications of intestinal failure.

Among the main causes of death, septic shock was seen in 50% (10/20) of the deaths, mostly secondary to diffuse abdominal sepsis caused by intestinal perforation, bacterial peritonitis, severe pancreatitis, or intraabdominal abscesses. The second cause with 30% (6/20) of the deaths was acute respiratory failure, mainly secondary to

Type	n	Deaths, n (%)
I	18	10 (55.6)
II	31	8 (25.8)
III	4	2 (50.0)

Own elaboration according to data consulted.

**Table 4: Mortality according to pathophysiological classification.**

	n	Deaths, n (%)
Intestinal fistula	28	6 (21.4)
Functional dysmotility	14	10 (71.4)
Bowel obstruction	7	1 (14.3)
Malabsorptive syndromes	3	2 (66.6)
Short bowel syndromes	1	1 (100.0)

Own elaboration according to data consulted.

**Table 5: Causes of general mortality.**

	n
Septic shock	10
Acute respiratory failure	6
Mesenteric thrombosis	2
Atrial fibrillation	1
Hepatorenal syndrome	1

Own elaboration according to data consulted.

pneumonia. Other causes included mesenteric thrombosis in 10% (2/20), atrial fibrillation in 5% (1/20), and hepatorenal syndrome secondary to chronic liver disease also in 5% (1/20) (*Table 5*). In studies like ours, it has been concluded that the main cause of death was a malignant tumor of different types followed by failure in the hydro-electrolytic management.<sup>10</sup>

## DISCUSSION

Interest in acute intestinal failure has increased in recent decades and several publications<sup>3-13</sup> have reported their most relevant aspects, including treatments and mortality. This retrospective cohort study of patients with intestinal failure admitted to our unit reports the results of 53 patients, where a mortality of 37.7% (20/53) was detected for different causes. The main mortality cause was diffuse abdominal sepsis despite being managed with strict fluid control, specific antibiotic therapy

according to culture results, and abdominal cleansing procedures every 24 to 48 hours. This contrasts with a 16% mortality rate reported by Atema et al.<sup>9</sup>

All patients in the present study developed intestinal failure in the context of an intraabdominal catastrophic event. In 52.8% (28/53) of the cases the intestinal failure occurred after a loss of functional bowel length associated with the presence of one or more postoperative enteric fistulas, whose treatment merited home-made vacuum systems, early parenteral nutrition (usually with Kabiven® brand solution bags or customized solution bags prepared in the mixing center of the Autonomous University of Chihuahua), which corresponds with the reports of other authors as the main cause of intestinal failure.<sup>7,9</sup>

Of the deaths, 10% were due to disorders other than intestinal failure and its pathophysiological processes including: atrial fibrillation in 5% (1/20), and hepatorenal syndrome secondary to chronic liver disease also in 5% (1/20).

## CONCLUSIONS

In our environment, the prevalence of the causes of intestinal failure is like the one published in the world literature; however, mortality related to abdominal sepsis is high, so we found an area of opportunity to reduce the mortality rate in our patients.

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Data privacy. In accordance with the protocols established at the authors' work center, the authors declare that they have followed the protocols on patient data privacy while preserving their anonymity.

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