Definition & types of intestinal failure

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Intestinal failure: definitions

**Fleming & Remington, 1981**

- Reduction in functioning gut mass below the minimum amount necessary for adequate digestion & absorption of nutrients

**Nightingale, 2001**

- Reduced intestinal absorption so that macronutrient and/or water & electrolyte supplements are needed to maintain health and/or growth

**Pironi et al, 2014**

- The reduction of gut function below the minimum necessary for the absorption of macronutrients and/or water & electrolytes
- Such that intravenous supplementation is required to maintain health and/or growth

Definitions

Intestinal failure

The reduction of gut function to below the minimum necessary for the absorption of macronutrients and/or water and electrolytes such that IV supplementation is required to maintain health and/or growth

Intestinal insufficiency

The reduction of gut absorptive function that does NOT require intravenous supplementation to maintain health and/or growth

Chronic IF requiring HPN

<table>
<thead>
<tr>
<th>Incidence</th>
<th>Prevalence</th>
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<tbody>
<tr>
<td>2–3 cases/million (Europe)</td>
<td>0.4/million (Poland)</td>
</tr>
<tr>
<td>2 cases/million (UK, 2007)</td>
<td>5/million (Spain)</td>
</tr>
<tr>
<td>4 cases/million (UK, 2010)</td>
<td>5–7/million (Australia &amp; NZ)</td>
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<td>8 cases/million (UK, 2013)</td>
<td>10–18/million (UK)</td>
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<td></td>
<td>30/million (Denmark)</td>
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<tr>
<td></td>
<td>34/million (Europe)</td>
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</tbody>
</table>

Chronic IF due to benign disease has been included in the 2014 Orphanet list of rare diseases

5. Gillanders et al, AuSPEN HPN register, 2007

HPN, home parenteral nutrition
IF, intestinal failure
Functional classification

**Type 1**
- **Short-term**
- Self-limiting intestinal failure
- Acute post-operative ileus

**Type 2**
- **Medium-term**
- Significant and prolonged PN support (>28 days)
- GI surgery complicated by EC fistulation

**Type 3**
- **Long-term**
- Chronic IF (long-term PN support)
- Short bowel Motility disorder

EC, enterocutaneous; GI, gastrointestinal; PN, parenteral nutrition
SBS, short bowel syndrome

Intestinal failure
Pathophysiological classification

5 major conditions

- Intestinal fistula
- Intestinal dysmotility
- Mechanical obstruction
- Short bowel
- Extensive small bowel mucosal disease

IF aetiology: new patients (2014/15)

Short bowel

Saford  St Mark's

Crohn's disease  Mesenteric vascular disease  Surgical complications  Motility disorders  Radiation enteritis  Scleroderma  Familial polyposis  Malignancy  Other
<table>
<thead>
<tr>
<th>Group</th>
<th>Common</th>
<th>Uncommon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small intestinal resections</td>
<td>Crohn's disease</td>
<td>Post irradiation enteritis</td>
</tr>
<tr>
<td></td>
<td>Surgical comps</td>
<td></td>
</tr>
<tr>
<td>Massive intestinal resection</td>
<td>SMA or SMV thrombosis</td>
<td>SMA embolus</td>
</tr>
<tr>
<td></td>
<td>Trauma</td>
<td>Massive volvulus</td>
</tr>
<tr>
<td>EC fistula</td>
<td>High output</td>
<td>Desmoid tumour</td>
</tr>
<tr>
<td>Bypass surgery</td>
<td></td>
<td>Gastric bypass (obesity)</td>
</tr>
</tbody>
</table>

SMA, superior mesenteric artery
SMV, superior mesenteric vein

Weinstein et al., eds. Clinical Gastroenterology and Hepatology: The Modern Clinician’s Guide. 2005
Causes of “short bowel”

- Small intestinal resections:
  - Surgical comps
  - Crohn's disease
  - Post irradiation enteritis

- Massive intestinal resection:
  - SMA or SMV thrombosis
  - SMA embolus
  - Massive volvulus
  - Trauma
  - Desmoid tumour

- EC fistula:
  - High output

- Bypass surgery:
  - Gastric bypass (obesity)
### Types of short bowel

<table>
<thead>
<tr>
<th>Jejunostomy or high output fistula</th>
<th>Jejunocolic anastomosis</th>
<th>Mid small bowel resection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type 1 short bowel</strong></td>
<td><strong>Type 2 short bowel</strong></td>
<td><strong>Type 3 short bowel</strong></td>
</tr>
<tr>
<td>Fluid balance</td>
<td>Usually fluid balance maintained</td>
<td>Uncommon</td>
</tr>
<tr>
<td>• Net secretors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Net absorbers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritional issues</td>
<td>Nutritional issues when jejunal length &lt;100 cm</td>
<td>Rarely problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Nutrition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fluid balance</td>
</tr>
</tbody>
</table>

*Nightingale, ed. Intestinal failure. 2001:177–361*
Physiological changes with short bowel

Gastric emptying
• ↑ with jejunostomy

GI hormones
• ↑ gastrin, ↑ CCK,
  ↓ PYY, ↓ GLP-2,
  ↓ GLP-1

Small bowel transit time
• ↓ with jejunostomy

Gastric secretions
• hypergastrinaemia
  • ↑ gastric acid

↑ gastric acid
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