

**Antibiotic Treatment of Intestinal Bacterial Overgrowth in Infants with Intestinal Failure**  
**East Bay Newborn Specialists Guideline**

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**Background**

Infants with intestinal failure (IF) are at risk to develop pathological small intestinal bacterial overgrowth (SIBO). Risk factors predisposing infants with IF to SIBO include anatomical or functional obstruction, such as strictures, adhesions, gastroschisis, side-to-side or end-to-side anastomoses, blind or dilated intestinal loops, loss of the ileocecal valve, prolonged intestinal transit time, short intestine, Hirschsprung's disease, increased gastric pH with PPI or H2-receptor antagonist therapy, as well as malabsorption with increased intraluminal substrate.

Complications associated with SIBO include epithelial inflammation with subsequent villous atrophy, colitis and ileitis, bacterial deconjugation of bile acids with decreased ability of fat absorption, steatorrhea, Vitamine A, D, E, (? K) deficiency and secretory diarrhea, bacteria-related disaccharidase- and brush-border enzyme deficiency and carbohydrate malabsorption, carbohydrate degradation by enteric bacteria with CO<sub>2</sub> production and bloating and abdominal distension, and disturbed GI motility. SIBO may also increase the risk of bacterial translocation and CLABSIs, contribute to TPN-related liver disease, and prolong the duration of TPN .

Laboratory diagnosis in infants is generally not reliable or practical, and the diagnosis is therefore made clinically by a combination of recognition of the above risk factors and clinical symptoms. Bacterial species identified in duodenal or stool cultures may not necessarily be pathological for an individual host.

Treatment options include surgical repair of obstruction including potential tapering or lengthening procedures for very dilated intestinal segments, limitation of carbohydrate content of feedings to decrease amount of undigested intestinal substrate. The use of pre- or probiotics has also been reported, but not much information is available as yet for this indication in infants, and there is a potential risk for infectious problems.

The use of oral antibiotics has been recommended for treatment and prevention of SIBO, but there are no clearly defined criteria for their indication, the choice of antibiotics, and the duration of treatment. Bacterial overgrowth can recur, and may require prolonged treatment or periodic retreatment. The emergence of resistant bacteria remains a concern.

The goal of antibiotic therapy is not to eliminate the intestinal flora, but to change it. No RCTs evaluating choice of, any combinations of and dosing schedules for antibiotics have been reported for infants, therefore all suggested treatment schemes are empirical.

**Indication for antibiotic treatment of SBO is a combination of:**

- Intestinal failure, defined as inability to tolerate enough enteral feedings to maintain growth without additional PN and the presence of risk factors and/or symptoms.
- Risk factors, including:
  - Poor motility
  - Dilated or blind loops

- Potential risk for obstruction (e.g. gastroschisis, adhesions)
- Short intestine (possible definitions include < 40 cm, < 80 cm, loss of ICV)
- End-side or side-side anastomosis
- History of sepsis/bacteremia
- Symptoms, including:
  - Diarrhea
  - Malabsorption
  - Stool pH, stool reducing substances

#### **Treatment Guidelines:**

- Don't expect rapid improvement
- Start with a cycle of at least 2 weeks and reassess
- Use combination of at least two antibiotics, with at least one to cover anaerobes (*C. diff*)
- Establish "success" criteria:
  - Better feeding tolerance
  - Less diarrhea/bloating
  - Improving liver function
- If no improvement after approximately 2 -3 weeks :
  - Consider different antibiotics combination
  - Consider different diagnosis, for example bile salt associated malabsorption
- If improvement :
  - Treat at least until on full feedings ?
  - Stop treatment earlier and hope for long lasting effects ?
  - Also consider follow up treatment with probiotics

#### **Considerations for the choice of antibiotics include:**

- Absorbable vs non-absorbable
- Anaerobe vs aerobe coverage
- *Clostridial* coverage
- Clinical experience
- Cost

#### **Antibiotic Options:**

- Flagyl - absorbable. Spectrum: GN/GP anaerobes including *C. diff*.  
Dose: 10 mg/kg/dose po q 12
- Gentamycin - nonabsorbable. Spectrum: GN aerobes.  
Dose: 5 mg/kg/dose po q 12
- Augmentin - absorbable. Spectrum: GN/GP aerobes and anaerobes.  
Dose: 15 mg/kg/dose po q 12
- Neomycin - nonabsorbable. Spectrum: GN aerobes.  
Dose: 2.5 mg/kg/dose q 6
- Ciprofloxacin - absorbable. Spectrum: GN aerobes.  
Dose: 10–20 mg/kg/dose q 8

### **Treatment Schedule:**

- Intestinal failure with diarrhea and malabsorption :  
1 week Gentamycin, 1 week Flagyl, 1 week pause, then start cycle again
- Intestinal failure with diarrhea, malabsorption and signs of stasis/hypomotility/obstruction :  
1 week Gentamycin, 1 week Flagyl, then start cycle again
- Intestinal failure with diarrhea, malabsorption and blood stream infections, liver failure :  
1 week Gentamycin, 1 week Flagyl, 1 week Augmentin, then start cycle again

### **References:**

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