Short Bowel Syndrome

Definition of Short Bowel Syndrome

Short bowel compromises of a sequelae of;

- Nutrient
- Fluid
- Weight loss

which occurs subsequent to a significant amount of small bowel resection with greatly reduced functional surface area.

Average length of the small bowel is;

- **Neonatal** 250cm-300cm
- **Adult** 600-800cm

Short bowel syndrome is defined by resection of >50% or more of the small bowel if no colon present and resection of 70-75% if some or all of colon present.

Infants have more favorable long term prognosis outcomes, over adult prognosis outcomes

Aetiology

Can be congenital or acquired

Congenital

- Intestinal atresia
- Gastroschisis
- Omphalocele
- Hirschsprung's disease

Acquired

- Necrotizing Enterocolitis (NEC)
- Mid-Gut volvulus
- Ischemic injury
- Crohn's disease
- Radiation enteritis

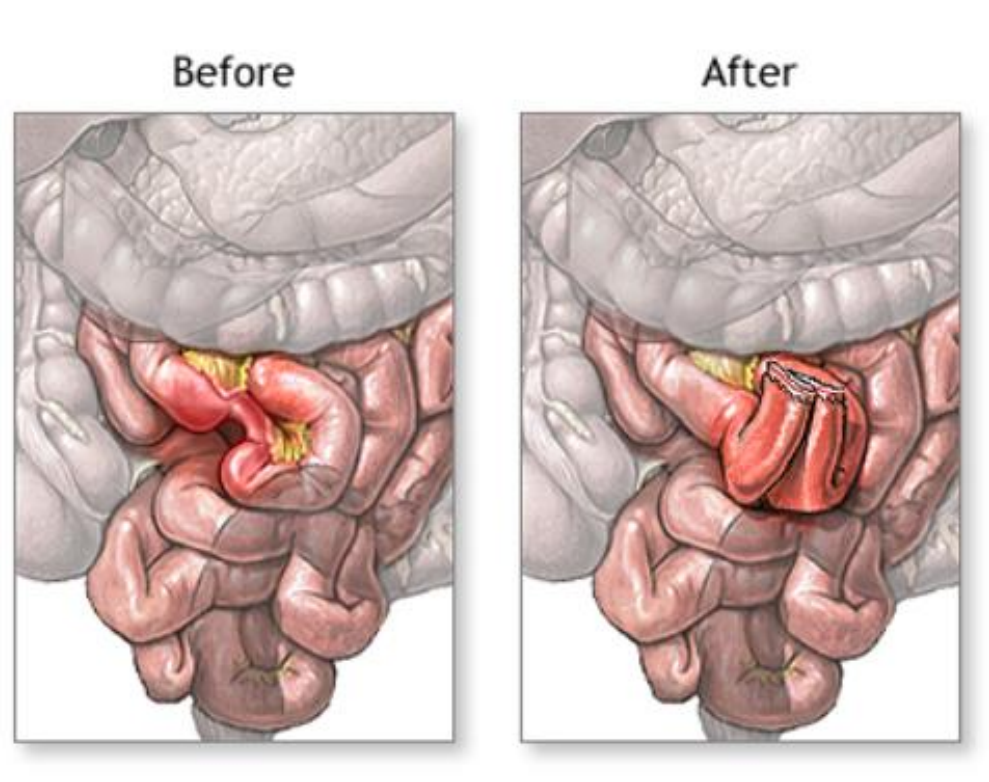
Manifestation

SBS includes a spectrum of metabolic and physiologic disturbances which include

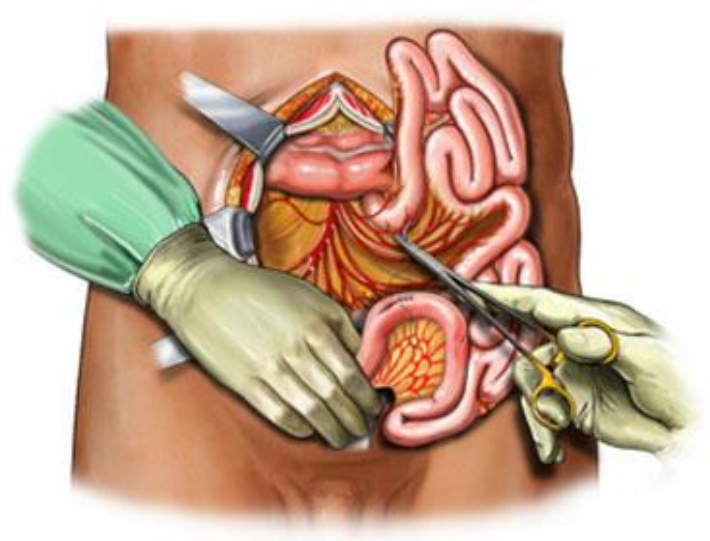
- **Fluid & Electrolyte Imbalance**
- **Malabsorption of macro and micronutrients**
- **Steatorrhea**
- **Weight Loss & Malnutrition**
- **Mineral deficiencies : Ca, Mg, Iron, Zinc**
- **Fat soluble vitamins**
- **Metabolic acidosis**
- **Gastric acid hypersecretion**
- **Cholelithiasis**
- **Liver Disease**
- **Bone Disease**
- **PN dependency initially**
- **PN related complications (Line Infections/Sepsis)**

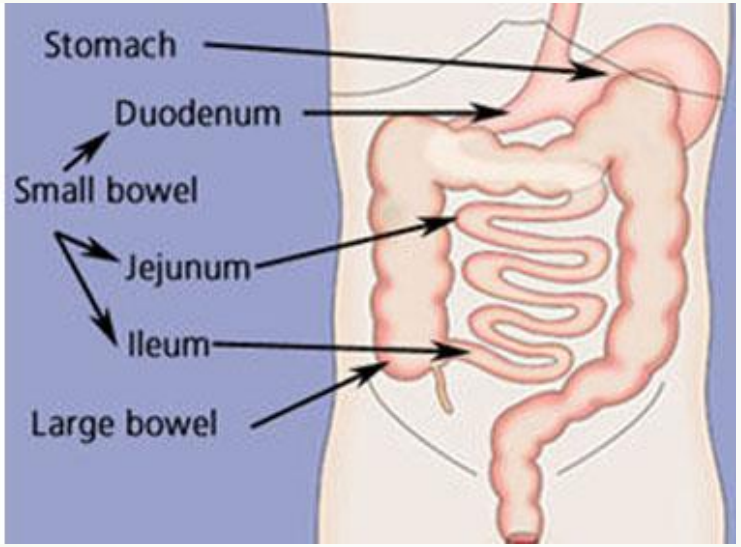
Types of Small Bowel Resections

- **Duodenal Resection**
- **Jejunal Resection**
- **Ileal Resection**
- **Loss of the ileocecal valve**
- **Colon**



Duodenal Resection

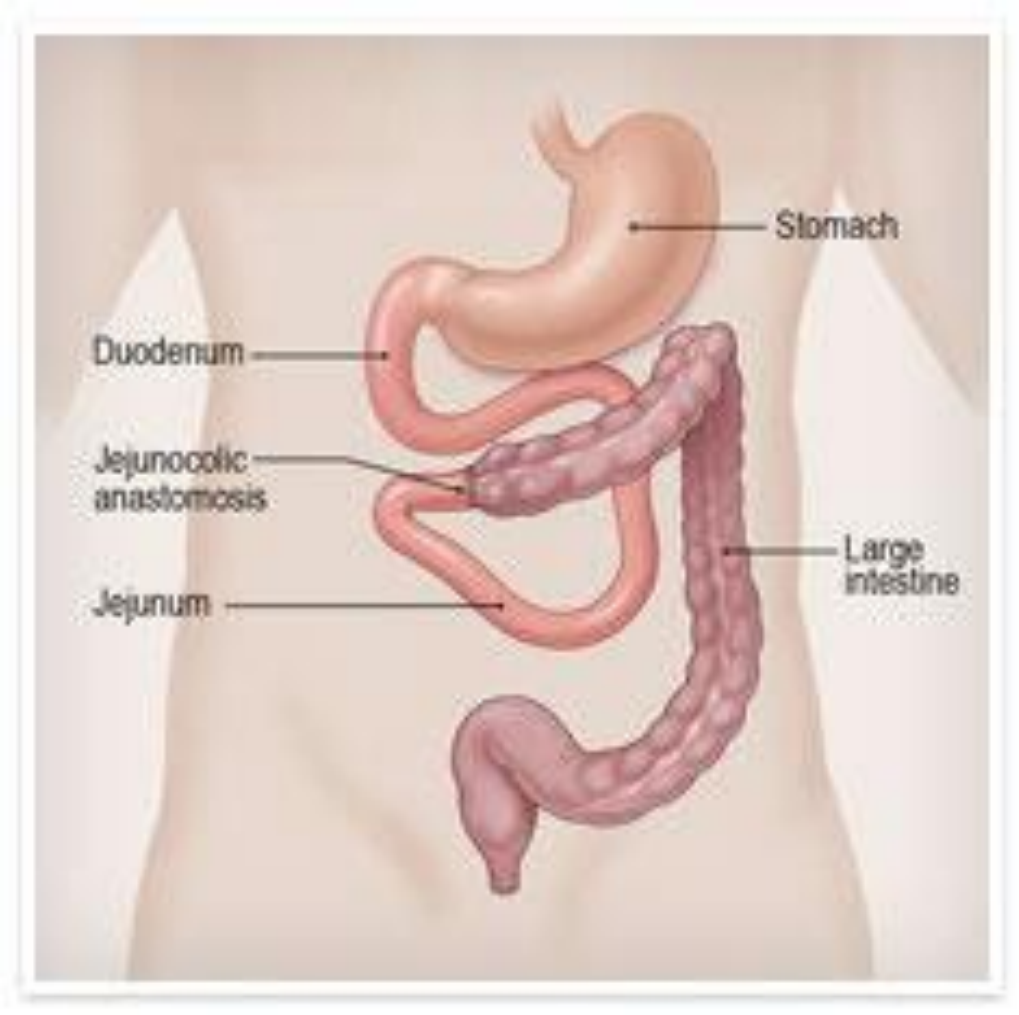




Resection of the Duodenum results in the following deficits:

- Protein, carbohydrates, fat malabsorption
- Calcium, Magnesium, Iron, Folate malabsorption
- Fat soluble vitamin deficiencies

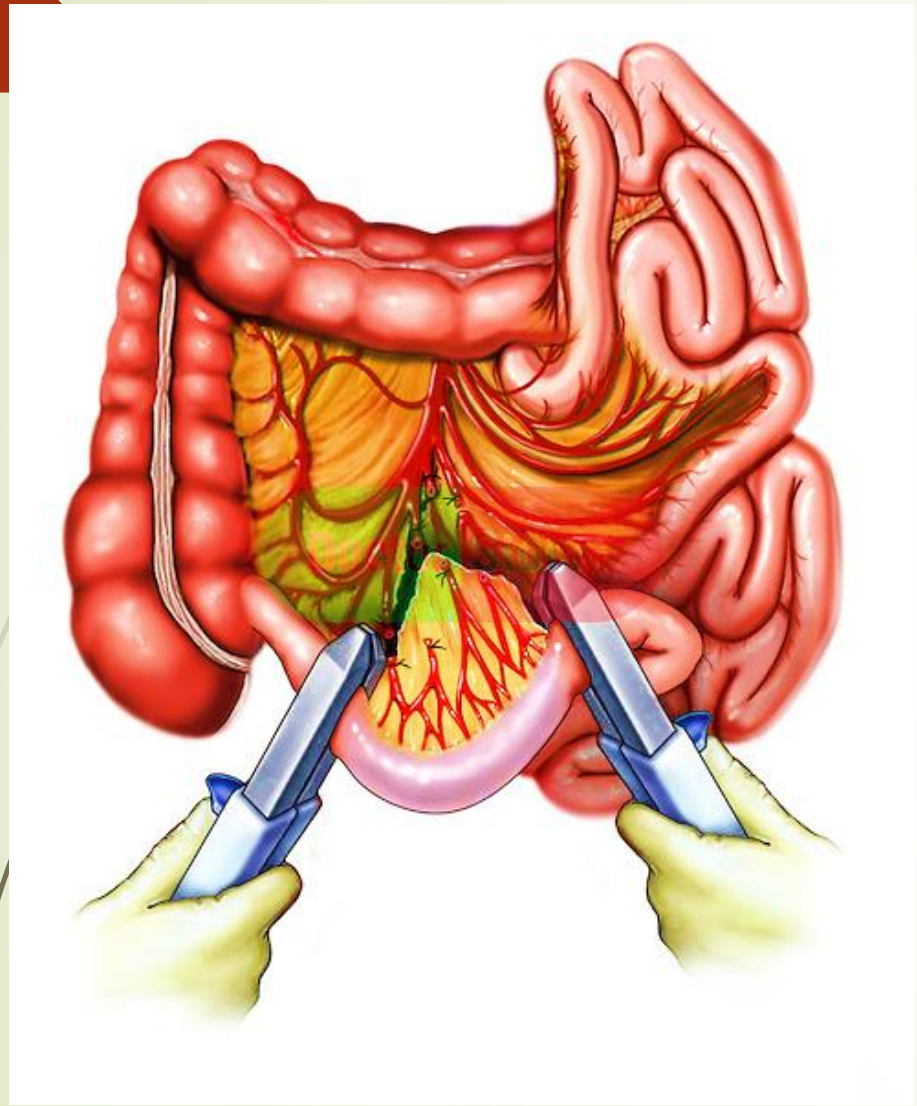
Jejunal Resection



- Resection of the jejunum results in the following deficits:
- Carbohydrate malabsorption
- Water soluble vitamin deficiencies

Ileal adaptation

- Malabsorption becomes transient



Ileal Resection

Results in

- Steatorrhea as bile salts not absorbed
- Cholesterol stones are a secondary, due to loss of bile acids
- Fat soluble vitamin deficiencies
- B12 deficiencies
- Loss of Ileocecal valve + decrease transit time = chronic diarrhea

Loss of Ileocecal Valve

The Ileocecal Valve or ICV is the sphincter muscle valve between the small and large bowel, located at the end of the ileum. Its critical function is to limit the reflux of colonic contents into the ileum.

Patients without an ICV are more at risk of:

Bacterial Overgrowth or Small Bowel Bacterial Overgrowth (SIBO)

- Allows bacteria to reflux from the colon back into the ileum, which can result in infection, acidosis, or behavioral changes until resolved or medicated.

Rapid transit time that exacerbates malabsorption

- Absence of ICV results in rapid transit from the small intestine to large intestine, limiting the opportunity for adequate absorption in the small bowel.
- Rapid transit results in chronic diarrhoea, which at times is watery or non-formed. For patients without an ICV, chronic diarrhea is their normal cycle.

Colon

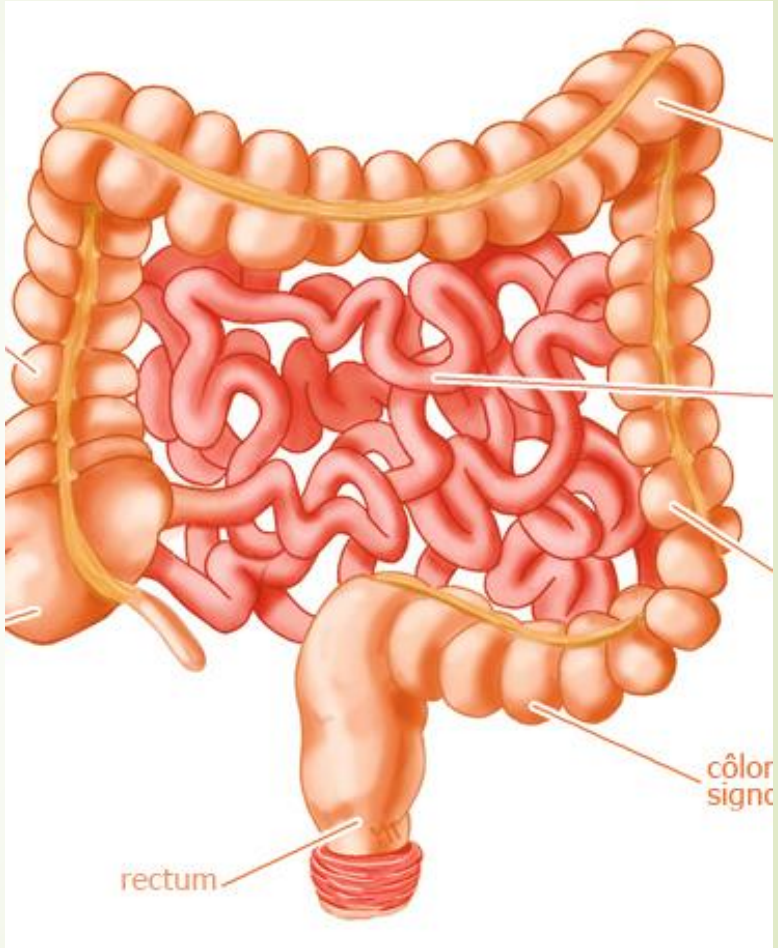
What is it for:

- Water absorption
- Gives additional length, slows down transit time; slows gastric empting

Although…

- Lactic acidosis can occur:
  - A conversion of carbohydrate by lactobacillus present in the colon to D-lactic acid which can lead to metabolic acidosis

This is how SIBO begins



Severity of Short Bowel Syndrome

Affected by

- Time elapsed since surgery
- Extent of the resection
- Prior or concomitant resection of the stomach or colon
- Resection of the ileocaecal valve
- Disease in the remaining small bowel
- Capacity of the remaining small bowel to adapt

Intestinal Adaptation

Intestinal adaptation starts 24-48 hours post-op

- Enteral and parenteral feeds are started as early as possible for nutrition

Adaptation lasts up to 11-12 years

The intestine changes in morphology, width and functional capacity.

Phases of Short Bowel Syndrome

- Active Phase
- Adaptation Phase
- Maintenance Phase

Active Phase

- Starts immediately after bowel resection and lasts 1-3 months
- Output is greater than 5 litres per day
  - This includes ostomy output if patient has an ostomy
- Life threatening dehydration and electrolyte imbalances
- Extremely poor absorption of all nutrients
- Reliant solely on parenteral and enteral nutritional feeds for adequate nutrition

Adaptation Phase

- Begins 12-24 hours after resection and lasts up to 1-2 years
- 90% adaptation occurs during this phase
- Villus hyperplasia and increased crypt depth occur, resulting in increased absorptive area
- Enteral nutrition is essential for adaptation and should be started as soon as possible
- Parenteral Nutrition is essential throughout this period

Maintenance phase

- Absorptive capacity is at a maximum at this phase

- Nutritional metabolic homeostasis can be achieved with oral feeding in some cases but with most adult patients will need some supplemental nutrition support with EN or PN or IV fluids

Patients start to become more educated about their condition

- They will want to start playing a bigger role in their healthcare.

Intestinal Rehab is a **TEAM** effort

In order to achieve best results the clinical team needs to work together.

Nutritional Therapy

3 main goals to achieve with nutritional therapy

1. Maintain adequate nutrition
2. Promote Intestinal Adaptation
3. Avoid Complications

Parenteral Nutrition

- Most patients are on TPN for 7/7, 12-18 hours of the day
- Volume and Rate of PN determined on patient condition
- High risk for Septic Infection
- Multiple line infections and line replacements over the course of years

Enteral Nutrition

- When hemodynamic stable and fluid management is stable
- Continuous feeds to prevent osmotic diarrhoea
- Bolus feeds less well tolerated
- Formula osmolality should be <310 mosmol/kg

Nutritional care plans need to be individualized according to patient needs

Surgical Care

- Small Bowel Resections
- Line Placement/Replacements
- Gastrostomy Tube Placement/Replacements
- Non-Transplant Procedures (in NZ only in paediatrics)
  - Serial Transverse Enteroplasty (S.T.E.P.)
  - Bianchi Procedure
- Small Intestinal Transplantation (not available in NZ)
  - Isolated Small Bowel Transplant
  - Multivisceral Transplant (Stomach, Small, Large, Colon, Liver)

Complications

Early Complications

- Dehydration
- Electrolyte imbalance
- Central Line related complication

Micronutrient deficiencies

- B12 deficiencies
- Bacterial Overgrowth
- High Oxalate levels

Chronic Complications

- Metabolic Complications
- Liver & Biliary Disease
- D-Lactic Acidosis
- Bacterial Overgrowth
- Nutritional Deficiencies
- Psychological Issues

TPN Related Problems

- Liver dysfunction
- Catheter related problems
- Sepsis events

Look for high fever, rigors, acidosis, lethargic….and trust and listen to your patient….chances are they might know something you don't! We can all learn something new from time to time.

Support for patients with SBS

Nursing

- Key contact with patient and clinical team
- CVL management and stoma management
- Access to other key health professionals

Dietitian

- Nutritional support and assessment of nutritional status and requirements
- Regular reviews and updating of PN prescriptions, oral intake and supplements

Medical Team

- Regular medical and surgical reviews
- Replacement of CVL as required
- Provide referrals to other specialties as indicated

Psychologist

- Patient support for dealing with chronic situation
- Coping strategies
- Family, carers support

Pharmacist

- Medication advice and recommendations

Key points

- Short bowel syndrome is complex with significant medical, surgical, nutritional, psychological and social problems
- Patients need to be managed by experts in the field
- Patients have multiple nutritional issues which need input from dietitians with expertise in this area
- Nursing support as case managers for the patient is pivotal for a team focused input with patient management.
- All patients need access to psychological input and good social support
- Each patient needs to be treated as an individual as no two cases are identical