

PANCREATIC INSUFFICIENCY

Pancreatic insufficiency occurs when the pancreas does not secrete enough digestive enzymes for normal digestion to occur

Severe pancreatic insufficiency can occur with surgery of the GI system in which parts of the stomach and/or pancreas are removed.

When pancreatic insufficiency is severe, malabsorption (impaired absorption of nutrients by the intestines) can result, leading to deficiencies of nutrients and loose stools containing unabsorbed fat (steatorrhea).

Symptoms of malabsorption can include:

Slow or no weight gain and/or growth

Hungry all the time

Frequent gas

Stomach pain or cramps

Feeling bloated or full

BOWEL MOVEMENTS

Indicator	Normal	Mal absorption
Frequency	1-2/daily	3+/daily
Color	brown	very light brown
Shape	solid	loose
Amount	1 flush	many flushes
Smell	mild	strong
Sink/Float	sink	float
Oil/Mucus	no	yes

None if obstructed

Patients with pancreatic insufficiency can have excess oil in the stool (steatorrhea) and have symptoms of pale, foul smelling, bulky stools with abdominal discomfort, gas and bloating.

Patients with pancreatic insufficiency may also have bone pain, muscle cramps, night blindness and easy bruising (not absorbing fat soluble vitamins).

- Testing for pancreatic insufficiency include:

- Fecal Elastase – stool sample

- Results: Adults and children: >200 mcg pancreatic elastase/g stool = pancreatic sufficient.

- 72 Hour Fecal Fat Test – stool sample

- Patient consumes 100gms fat/daily for 3 days prior to start of test and continue throughout test (total 6 days). Collect stool sample for 72 hours.

- Results: 5gm fat/24 hrs = pancreatic sufficient.

Blood testing for fat soluble vitamins A, D, E and K

Normal Result Range:

Vitamin A – 0.18 to 1.20 mg/L

Vitamin D – 30 – 100 ng/ml

Vitamin E – 1.0 – 18 mg/ml

Vitamin K – measured by checking PT (11.7-14.6 secs)

PTT (23-37 secs)

PANCREATIC ENZYMES

Pancreatic enzymes help with weight gain and promote absorption of nutrients

- Pancreatic Enzymes

a). Lipase – digests fats

b). Amylase – digests starch/complex carbs

c). Protease – digests proteins

****Simple sugars do not need enzyme coverage****

Example: dextrose 20 % water

FYI FACTS

- Replacement enzymes are calculated by units of fat/kg/meal. Max – 2,500 u lipase/kg/meal
- Do not accept generic pancreatic enzymes
- Enzymes work for 30 – 60 minutes after taking them
- Usually cut dose of enzymes in half for snacks
- If on max dose of enzymes and still have malabsorption symptoms, can add acid reducers (acid blocks enzymes from dissolving) to promote release of enzymes.

FYI FACTS

- Too little enzymes = pancreatic insufficiency symptoms
- Too many enzymes = fibrosing colonopathy (colonic strictures) Symptoms: obstruction, bloody diarrhea; abdominal pain; poor weight gain.

FAT SOLUBLE VITAMINS

Vitamin A, D, E and K are classified as fat soluble vitamins.

- They are soluble in fat and are absorbed by the body from the intestinal tract.
- They follow the same pathway of absorption as fat and any condition interfering with the absorption of fats would result in poor absorption of these vitamins as well.
- This class of vitamins can be stored in the liver and excessive intake can accumulate and be harmful.

VITAMIN A – essential role in vision (especially night vision), normal bone growth and tooth formation and healthy skin and mucous membranes.

VITAMIN D – important for the absorption and use of calcium and phosphorus. Essential role in formation and health of bones, teeth and cartilage.

VITAMIN E – antioxidant that protects the body against free radicals (protects compounds in the body from combining with oxygen, which could be harmful). Helps make red blood cells and prevents blood from clotting.

VITAMIN K – essential component in the body's blood clotting process. Important role in maintaining bone health.

RECOMMENDED DIETARY ALLOWANCE OF FAT SOLUBLE VITAMINS

- Vitamin A – 1000 – 3000 IU (1500 – 10,000 IU)
- Vitamin D – 200 – 600 IU (400 – 800 IU)
- Vitamin E – 6 – 22 IU (40 – 400 IU)
- Vitamin K – 2 – 120 mcg (300 – 50 mcg)

Based upon pancreatic sufficient (insufficient) and age range

G-TUBE CARE

Skin Care

Wash around the stoma site and surrounding skin with mild soap and water daily, or more often if needed. Be gentle. Scrubbing can slow down healing or cause skin breakdown. Rinse with water and dry well. It is normal to have a little yellow-brown drainage and redness at the opening.

G-TUBE CARE

Skin Care

Look for the following and call your child's doctor/nurse practitioner if you see:

Rash with red dots on the edges

Infection: increased redness, swelling, yellow-green drainage with a bad smell at the stoma

Open areas of skin around the stoma

Bleeding at the stoma site

Bleeding, painful or growing granulation tissue around the stoma

Increased leakage (formula or stomach fluid) at the stoma site

G-TUBE CARE

Tips to Keep the Tube From Moving

Gently tug on the tube. This tugging brings the balloon up against the inside wall of the stomach.

Secure the tube in place at the stoma site by pushing the disc down to the skin level. This keeps the balloon from falling away from the opening and into the stomach. Take note of the number along the tube that should match up with the disc. This way you can make sure the tube has not moved.

Wipe the tube regularly with alcohol to prevent the build up of oil on the tube and prevent movement of the disc.

G-TUBE CARE

Tips to Keep the Tube From Moving

Secure the tube by folding a piece of heavy tape around the tube. Push a safety pin through the tape. Attach the pin to your child's shirt.

You may tuck the tube into your child's clothing, but not near his diaper area.

Elastinet, a stretchy elastic net dressing, may also be used to keep the tube close to your child's body.

Leakage (formula or stomach fluid) at the Stoma Site

- Make sure the tube is in the correct position.
- If there is leakage from around the stoma site, check the amount of water in the balloon. You can do this by holding the retention disc down and pulling back on the balloon port with a 10ml luer slip syringe. Add water if there is less than the usual amount. The amount of water in the balloon depends on the size (French) of your child's tube. The size of the tube and the balloon volume are listed on the balloon port.

Follow the guidelines below:

Tube size	Recommended	MAXIMUM
12 to 16 French	3-5 ml	7 ml
18 to 24 French	7-10 ml	10 ml

If there continues to be leakage with the right amount of water in the balloon, add 1ml of water at a time to the balloon.

Do not fill the balloon past its maximum volume (listed in the chart above). If there is still leakage after you reach the maximum amount, call your doctor or nurse practitioner.

- Position your child correctly during feedings, either upright or on his right side. This helps to empty the stomach.
- If leakage continues, you will need to change the tube. If you do not have a replacement tube, call your doctor or nurse practitioner.
- While you are waiting to get instructions from your healthcare provider, you may place a small piece of gauze or other absorbent dressing around the tube. Change it when wet.
- Protect the skin around the stoma with a skin barrier, such as Vaseline, A & D ointment, diaper cream, or No Sting Barrier Film (if your child is over 1 month of age).

Granulation Tissue

This type of tissue (skin) is dark pink or red and grows out from the stoma. The body wants the stoma to close. Because the tube goes through the opening it can't close, so granulation tissue forms around the tube. In some children granulation tissue grows quickly. Other children have no problem with it at all. If your child has a lot of this tissue, there may be leakage and skin irritation. Granulation tissue may bleed or cause pain.

Treating Granulation Tissue

If you see some tissue starting to grow, you can apply a skin barrier to the skin around the stoma.

If the granulation tissue around the tube is bleeding, painful or growing rapidly, call your doctor or nurse practitioner for an appointment. They will treat it in the office with a steroid cream or medicine called Silver Nitrate. These medicines shrink the granulation tissue.

Granulation tissue may return and may need to be treated again.

Unclogging the Tube

Try to prevent the tube from clogging:

- Flush the tube with water or air as directed after each feeding and before and after each medication. If your child is on continuous feedings, the tube needs to be flushed at least once a day.
- If the tube becomes clogged, attach a 5ml oral syringe with warm water to the end of your feeding tube. Try to flush the tube. If you are unable to flush, pull back on the plunger of the syringe. Repeat this push and pull action up to 5 times. If you still cannot flush the tube, try using warm water in a 3ml or 1ml oral syringe and repeat the above steps.
- If this does not work, change the tube.

If the G-Tube Comes Out

No matter how long your child has had a G-tube, the stoma opening can close very quickly.

You can change the tube at home by following the instructions as outlined below.

To replace the tube:

1. Check the balloon of the new (replacement) G-tube by inflating the balloon with the amount of water recommended on the balloon port. Check the balloon for any leaks. The balloon should inflate evenly and completely around the tube. If the balloon leaks or does not fully inflate, get another tube.
2. Deflate the balloon of the new (replacement) tube by withdrawing the water from the balloon. Save the syringe of water.

3. Lubricate the end of the tube with water soluble lubricant.
4. Insert the end of the tube into the stoma. Push it in 2-3 inches. Do not force it.
5. Attach the water-filled syringe to the balloon port. Inflate the balloon with water to the recommended volume.
6. Keep your thumb on the syringe plunger while you remove the syringe from the balloon port. This will keep pressure on the balloon and prevent water from flowing back into your syringe.

7. Gently tug on the tube. This brings the balloon up against the wall of the stomach and holds the tube in place.
8. Clean the stoma site to remove any excess lubricant.
9. Slide the disc down the tube so that it rests against the belly.
10. Check to see if the tube is in the stomach.
 - a) Attach a 60ml catheter tip syringe to the feeding port.
 - b) Pull back on the plunger to check for stomach contents. If nothing comes back into the syringe, change your child's position and try again.
 - c) Push on the plunger to replace the stomach contents and flush the tube with the amount of air or water as you have been taught.

If the tube breaks and you do not have another tube to replace it:

1. Put water soluble lubricant on the end of the “old” tube.
2. Insert the end of the “old” tube into the stoma. Push it in 2-3 inches. Do not force it.
3. Tape the tube to the belly to hold it in place.
4. **Do not feed your child through the broken tube.**
5. Call your home care company for a new tube or call your nurse practitioner for advice.

Daily Activities

Your child's tube should not interfere with his normal activities. He can bathe, swim, play and sleep as usual. You may find that certain clothing such as "onesies" or one-piece or "bib" type outfits help to keep your child from pulling on the tube or having the tube catch on something and pull out.

FOLLOW – UP

- After initial discharge, should be seen by endocrine and surgery within first month.
- After that, depending on situation, clinic visits should be every 6 months with a yearly inpatient admission for evaluation.
- Recommend neuro-developmental screen at age 12 – 18 months and age 5 years.

FOLLOW – UP

- Recommended screening labs:

6 MONTHS

- Comprehensive metabolic panel; Liver function tests; Thyroid function tests

YEARLY

- Growth hormone levels; abdominal ultrasound

AS NEEDED

- Stool for fecal fat (poor growth or suspicion for pancreatic insufficiency)