

Emergency NG and Rectal Rehydration in the Home Setting

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The techniques describes in this document are intended for use by experienced medical professionals only. If performed improperly they can cause severe injury to the patient including death. Consumers should not attempt these procedures on their own.

Administering fluids to unconscious patients

In hospitalized patients this task is accomplished by using an intravenous catheter to give the patient fluids. This approach won't be available, nor is it required. A low tech and really better way to do this is oral hydration through a small plastic tube placed into the nose through the esophagus and into the stomach. When fluid is given to a patient via a nasogastric tube (NG) it is really much better than by the IV route because it is more natural (physiologic) and does not cause infection (sepsis or phlebitis/cellulitis) and does not require high tech IV catheters and sterile IV fluids and tubing.

Administering fluids by NG tube still requires some skill and equipment. The equipment can be obtained at the drug, hardware store, or auto parts store. The skill level required is not too high, but incorrect insertion of the NG tube can cause the patient pain and even harm if the tube passes into the lungs instead of the stomach.

Another way to rehydrate unconscious patients is through the colon. While this technique is not used commonly in the West, it is used in third world countries and is listed by the WHO as an alternative to use of an IV or NG tube when this option is desirable. It may be easier to pass a rectal tube than an NG tube in some patients due to anatomical considerations. In others with a particularly strong cough

reflex, the PR route may be preferred. In small children, the use of a rectal tube might be easier and less traumatic than the NG route. Since colonic water absorption is governed by vascular sufficiency, in patients with CHF, colonic rehydration is safer because fluid administered in excess of needs will not be absorbed preventing vascular overload. It is not very difficult to pass a rectal tube although there are a few anatomic considerations to bear in mind. The most important differences between NG and colonic fluid resuscitation are the volume of administration, the concentration of the fluid, and the position of the patient during and after administration. All these topics are covered below.

Rehydration via NG tube

Constructing a homemade NG tube

There are two basic parts needed. First is the tube itself which should be a small gauge 1/4 inch OD soft flexible polypropylene tube about 4 feet long. Clear polyethylene tubes used to connect a refrigerator icemaker to the home water supply are a good choice. You can purchase several yards of this tubing at the hardware store for a few dollars.

You also need a way to connect the container that holds the fluid to the tube so it can drain into the patient. There are several good choices here. First is a combination enema/douche administration set. This device, available at drug stores and online, holds 1+ quart of fluid, connects to a small gage tube, and has a flow regulator. At a discount auto parts retailer, a graduated funnel device (FloTool Measu-Funnel®) is commonly available that has an attached on/off 1/2 inch OD polyethylene plastic spout. These are used to assist mechanics add oil or brake fluids to automobiles. They will make excellent tube feeding devices and are very inexpensive.

You need to be able to regulate the flow of fluid from the container or bag into the tube. Both containers come with a flow regulator device. An alternative is a simple round clamp from the hardware store that can be tightened with finger pressure. Finally, you will

need to be able to rig a tube adapter to actually connect the smaller gauge NG tube to the larger gauge container spout. One way to do this by using small sections of progressively larger gauge polyethylene tubing and sliding them over one another until they result in a secure connection with the container tubing.¹

This results in a functional NG tube system that includes a fluid container, a clamp to regulate flow, and a flexible small gauge NG tube. One last suggestion is to round off and smooth the sharp edges on the end of the NG tube with a paring knife and sandpaper. This way it is less likely to scratch the patient's nasopharynx or the esophagus as the tube passes that way.

Using a black permanent marking pen, mark the tube every 3 inches beginning at the rounded end of the tube that you plan to place into the patient. Start measuring at the end of the tube that will go into the patient with 3", 6", 9", 12", 15", 18", 21", 25", ending with 28". Once the tube has been passed, it must be securely taped to the neck and back of the head to prevent it from falling out or being pulled out inadvertently.

Preventing NG tube associated aspiration

It is important that the patient be kept in the sitting or semi-recumbent "head elevated" position as long as the NG tube remains in place even when you are not actually using it for hydration. If the patient is allowed to lie down with a stomach full of fluid, the NG tube makes it easier for them to aspirate, which can cause pneumonia. They can aspirate more easily even between feedings because the tube maintains an open passage from the stomach, esophagus, and posterior pharynx. This condition increases risk for aspiration especially in an unconscious patient. So, it is very important to keep the patient's head and chest elevated above the waist to avoid aspiration, which is the only real downside of using an NG tube. Use pillows or cushions to prop the patient up in a semi-sitting position, with their head and chest always a foot or so higher than their waist. When not in use, disconnect the NG tube from the

rest of the device. Normally, we close the end of the NG tube. You can do this by tightening a small hardware clamp around the tube or simply bending the end of the tube over on itself and taping it together.

Passing an NG tube

To pass the NG tube, the patient should be in the semi-sitting position with their head extended backward over a pillow. Place a generous gob of petroleum jelly on the rounded end of the NG tube and in the nostril where you are going to pass the tube. For the patient, passage of the tube through the nasopharynx is the most uncomfortable part of the procedure so be gentle but firm here. Sometimes, you will need someone to help restrain the patient while doing this procedure. Now simply slide the tube into the nose using light pressure. It will pass quite easily in most folks. If you cannot get past an obstruction, try the other side. Feed the tube down the throat into the esophagus and into the stomach. When the tube gets into the back of the patient's throat deep in the posterior pharynx, if you meet resistance and the patient is conscious, ask them to swallow. Facilitate this by giving them a small sip of water and as they swallow, gently advance the tube. In the unconscious, proceed with gentle pressure and the tube will advance. For most adults the stomach is reached between the 15 and 20 inch point but can be much less in small adults or children. When the tube reaches this point, stop advancing it. Place your head on the patient's stomach with your ear pressed against it blow into the end of the tube. If the tube is in the stomach you will hear a bubbling sound. This is good. You will also feel the stomach rise up when the breath is blown in which is also a good confirmatory sign that the tube is in the right place.

If these things don't happen, this means that instead of the tube passing into the patient's stomach, it went into their lung or is curled up in their esophagus. In this event, pull the tube back all the way out of the lung and trachea to about the 3-inch mark and try passing it again. The tip of the tube should be visible in the back of the

patient's throat at the 3" point. Repeat the above procedure until you are absolutely certain that the tube is in the stomach and not the lung. Take a 2-inch piece of duct tape and tear it partly in half along its long axis. Wrap the two divided ends of the tape around the tube and place the undivided side of the tape over the bridge and top of the nose. This helps prevent the tube from falling out.

Never begin NG fluids until you are certain that you have the tube in the stomach. If it is in the lung and you administer fluids the patients can get pneumonia. So be careful. Don't let this concern keep you from trying this life saving procedure, just be careful. I have placed the tube into the bronchial tree many times in the past. You can expect it to happen to you too. So when it does, don't beat yourself up since it won't do you or the patient any good. If the patient starts to cough after the fluid begins to flow through the tube, this means that it is probably in the lung and not the stomach. Stop the fluid flow, pull the tube back and try again.

The Adult ORS formula "A" for dehydration

1-quart clean water

1 level tsp table salt

3 tbsp table sugar

The Adult ORS formula "B" for dehydration due to diarrhea

1-quart clean water

1/2 level tsp table salt

1/2 level tsp baking soda

3 tbsp table sugar

Children's ORS "A" formula for dehydration

1.5-quarts clean water

1 level tsp table salt

4 tbsp table sugar

Children's ORS "B" formula for dehydration due to diarrhea

1.5-quarts clean water

½ level tsp table salt

½ level tsp baking soda

4 tbsp table sugar

Giving fluids by NG tube

Tighten the clamp on the NG tube so no fluid can flow through the tube. Connect the tube to the fluid container/bag. The container needs to be placed above the patient's head. It is nice to be able to hang the bag on something stable and secure. I recommend placing a large screw or nail securely into wall above the patient's bed from which to hang the container.

Place 1 cup (250 ml) of ORS fluid in the bag. Gradually loosen the clamp until you can see fluid flowing through the tube. You can give fluid pretty fast this way if you want to but that does increase the risk of aspiration. As stated earlier, if the patient starts to cough after the fluid begins to flow through the tube, this means that it is probably in the lung and not the stomach. Stop the fluid flow, pull the tube back and try again. ORS is so physiologic in its composition that it does not represent much of a threat to the patient even if it is inadvertently administered into the lung. Of course the same is not true of more substantial tube feeding concoctions. I prefer to give the fluid more slowly at a rate of about 2 cups (500 ml) per hour until you have got in 1.5 quarts (6 cups or 1500 ml). This should get the patient urinating again but more fluids are usually needed to restore the patient's intravascular volume to normal.

If the patient is conscious and cooperative you can give the fluids pretty fast. In fact it is fine to give 2 cups in 30 minutes under these conditions. After you have finished giving the fluids, unplug the NG tube from the container and clamp or close it tight. Then drape the excess tubing under the ear and around the patient's neck and tape it

to the back of their neck and upper back with tape. Also apply some tape to keep the tube against the side of the neck, but the skin here is tender so be careful. If you don't tape the tube down securely, the patient might pull it out unintentionally in their sleep, or intentionally if they are delirious. Repeat the above as often as needed to get the needed fluids in the patient.

Colonic rehydration

Normal colonic fluid absorption

The colon routinely absorbs fluids and electrolytes from the fecal matter that traverses it. On average, the colon removes 1.5 quarts from the stool each day.² While the right colon is better at fluid absorption than is the left, both sides are quite capable at carrying out this function. Using a mildly hypotonic solution compared with standard ORS enhances fluid and electrolyte absorption from the colon. Since glucose is not normally presented to the colon and its presence there would cause gas and acid production by the normal bacterial inhabitants of this organ, sugar has also been deleted from the colonic rehydration solution (CRS) formula compared with the ORS. In dehydrated patients, the colon can absorb considerably more volume than 1.5 quarts but those who have used this technique for rehydration suggest that it is best not to exceed 1.5 quarts of fluid per day.³ The WHO recommends colonic rehydration as an alternative to oral or IV rehydration.

One interesting feature of using this route of fluid replacement is that once the patient's intravascular volume has been replaced, the colon will not absorb additional excess water. This fact could be useful when administering fluids to a patient with congestive heart failure in whom over-replacement must be avoided and in whom therefore this route might be preferred. It might also be a viable option for those unable to tolerate an NG tube, or if you had access to a tube that was too big for NG use but could be effectively used per rectum. This procedure may be very effective for children where placing an NG tube would be too traumatic. Obviously if the patient is having diarrhea, rehydration by this route would not be advisable.

Colonic Rehydration Solution (CRS) Formula for Adults and Children

1.5 quarts clean water

1 level tsp table salt

Rectal tube set and administration container

The same administration sets specified for NG tubes will work well for rectal tube administration. You could also use a larger gauge tube if this was necessary. The small ¼ inch tube is preferred because the tube needs to be inserted high into the rectum or ideally into the first part of the sigmoid colon for the best results. This procedure will be easier and less traumatic with the small soft plastic polyethylene tube than a larger tube but use what you have. Using a permanent black maker pen, mark the end of the tube you plan to place in the rectum every inch up to 12 inches.

Patient positioning is key to successful colonic rehydration

Place the patient on his left side with his left leg outstretched and the right knee bent. This is called the Sims position. The anatomy of the rectum and sigmoid colon requires that the patient be placed in the Sims position when you are administering fluids rectally. Maintain this position for an hour or at most two afterward to provide plenty of time for the fluid to be absorbed from the colon. Some recommend that you place a pillow under the hip of the patient to raise them up a bit taking advantage of the gravity to move the fluid further into the colon. All fluid absorption takes place in the colon with none occurring in the rectum.

For fluid administration to be successful, it must pass through the rectum and drain retrograde into the left side of the colon. A slow administration rate is much more comfortable than a rapid rate. The most comfortable position for the patient to remain in that will result in fluid reaching the colon is the left lateral Sims position. If the patient were in the right lateral Sims position, all the fluid

administered would come right out. The same is true if he lay supine (on his back).

If you are having trouble obtaining good tube placement in the Sims position, try placing the patient in the Knee/Chest position. To place the patient in the Knee/Chest position, have them lie on their stomach and come up on all fours. Then ask the patient to bend down so their chest is resting on their knees and their buttock is elevated above the plane of the body. With the patient in the Knee/Chest position, place the rectal tube using the techniques suggested below. After the tube is in place and taped down to the patient's leg, the patient can be placed back in the Sims position to administer the fluids or you can place two pillows under the patient's lower abdomen and pelvis and have the lay prone upon them. In this position, the patient's buttock and thighs are elevated somewhat over the remaining body. The knees will be bent, and a pillow may be placed under the patient's head for comfort if desired. This is a very effective position from which to administer the fluids but it is not a very comfortable one for the patient to maintain for long.

Placement of the rectal tube

Using latex gloved hand and a liberal finger full of petroleum jelly, examine the rectum digitally for the presence of stool. If there is stool in the rectum, administer soapsuds enemas until clear. The presence of stool in the rectum will make passage of the rectal tube difficult and could cause the tube to become blocked with stool during passage. If stool is in the rectum, there is probably stool in the colon too. The presence of stool in the colon will interfere with the absorption of fluid and electrolytes from the CRS.

When the enema return has cleared, place the patient in the left lateral Sims position or the prone knee-chest position. Lubricate the sides of the rectal tube with petroleum jelly and gently introduce the tube into the anus. First, ask the patient to relax their anal tone as if they were having a BM. Place your lubricated index finger into the anus and then press down anteriorly with firm but gentle pressure.

This will open the rectum causing a gap between the dorsum of the finger and the posterior anal verge. Slide the tube into the rectum moving it through the gap between the anal verge and the finger. Once the tube is a couple of inches into the rectum, remove your finger. Try to keep the tube against the posterior rectal wall to avoid getting the tip hung up on one of the rectal valves. Advance the tube slowly until you reach resistance. Your goal is to pass through the rectum and get the end of the tube a couple of inches into the distal end of the sigmoid colon. In adults, this is about at about the 9-inch mark on the tube and for children the 4-inch mark. It is not likely that you will be able to get past the sigmoid sphincter, which tends to close tightly when the rectum is instrumented. Don't force the tube. If you meet with resistance, withdraw it an inch or two, wait a bit, and slowly advance it. Try twisting the tube radially with your fingers while advancing it if you meet a resistance. This can sometimes help you slip around a rectal valve or get past the sigmoid sphincter. The sphincter opens and closes regularly in accord with the colonic waves. If you reach a point where you cannot advance beyond, it is possible that you are up against the sphincter. Maintain gentle pressure on the tube against the obstruction for a few minutes. If it is the sphincter, it will open during that time, and you will feel the tube slide through. Advance it another couple of inches but no further. You are where you want to be.

Colonic rehydration procedure

Slowly administer the CRS fluid at a rate of about 250 cc (1 cup) over 1 hour. Faster administration that distends the colon will cause the patient to feel very uncomfortable. Then unplug the tube from the bag and clamp the end. Tape this to the patient's leg. Wait 4 hours and then repeat. The adult colon can easily absorb about 1.5 quarts of CRS every 24 hours. For children, the amount of fluid to instill would range from 2 oz (60cc) for infants over 1 hour and repeated every 4 hours; increase quantities for children of higher weight, up to a full 1.5 quarts over 24 hours for children weighing 145 lbs. Keep the patient in the modified Knee/Chest or left lateral Sims position or alternate between the two for about 2 hours before

letting them get into another position, or up out of bed to use the bathroom. If during or after the procedure, they feel the need to have a BM and are unable to hold it, by all means accommodate them. Use of an anti-spasmodic drug might help lessen the patient's discomfort (promethazine, diphenhydramine, hydrocodone). A bedside commode, bedpan, urinal, or chamber pot would be a convenient item to have on hand when using this technique. Obviously, if the patient passes a large volume of fluid per rectum after you administered the fluids then very little was absorbed. Try again but use a slower administration rate of a smaller volume.

References and Endnotes

¹ Duct tape might be useful here as well.

² Sandle G I., Salt And Water Absorption In The Human Colon: A Modern Appraisal. Gut 1998;43:294-299

³ Austere Medicine Guide