

Patient and Family Guide to

# Chest Wall Reconstruction

for Pectus Carinatum



*Exceptional surgeons. Compassionate care.*



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# The PECTACULAR Team

Our pectus carinatum patients and our chest wall reconstruction team are experiencing spectacular results--that's why we call our patients and our program **PECTACULAR!**

## The PECTACULAR Team includes:

- ☑ YOU\*!!!
- ☑ Your Surgeon
- ☑ Nurse Practitioners
- ☑ Nursing Staff
- ☑ Physical Therapists
- ☑ Occupational Therapists
- ☑ Operating Room Staff
- ☑ Anesthesiologists
- ☑ Pain Management Team
- ☑ Nutritionists
- ☑ Pharmacists



\*You are an integral part of our team! To achieve the best chest wall reconstruction outcome, we need you to complete all of your responsibilities and participate as an engaged team member.

\*You can commit to our team by signing the enclosed patient-physician contract at the conclusion of our meeting



# PECTACULAR Pre-hab

## **PRE-HAB:** rehabilitation that begins before surgery

Pre-hab for Chest Wall Reconstruction:

- improves chest wall flexibility
- stretches and strengthens to improve post-op mobility
- reduces post-op pain
- enables parent to safely assist with post-op mobilization

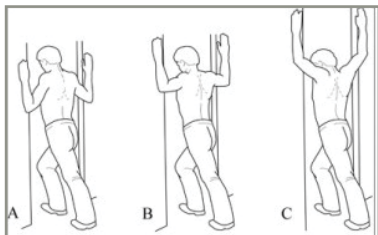
Our pre-hab program includes both home exercises and a formal consultation with a physical therapist. You will need to pick up your pre-hab prescription at the conclusion of our informational meeting.

### **Pre-hab Home Exercises**

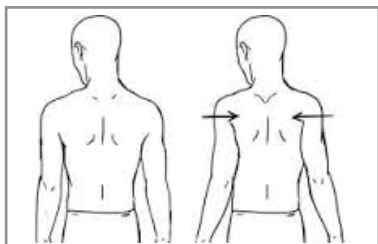
At least daily you should do the following stretches:



**Hamstring Stretches:** your hamstrings are the muscles on the back of the thigh. You can stretch several different ways, there are three pictured above. Hold each stretch for 30-45 secs, repeat 3 times

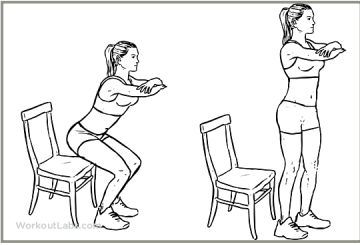


**Anterior Chest Wall Stretch:** Stand in a corner with forearms on wall. Lean chest into the wall. Stretch for 45 secs 3 times. Take slow deep breaths.

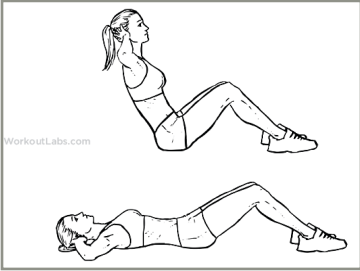


**Upper Back Strengthening:** Squeeze shoulder blades together and hold for count of 3. Do 2 sets of 15.

# PECTACULAR Pre-hab



**Squats:** With feet shoulder width apart, slowly lower until your thigh is horizontal to the floor with your back straight. This needs to be a slow, controlled movement. After surgery, you will not be allowed to use your arms to sit down in a chair.



**Backwards Sit-Up:** Do a sit-up with your knees bent. Then slowly lower back down to the floor.

**Deep breathing:** 10 deep breaths, 5 times a day. See chart on next page.

## List 5 activities that involve:

Trunk Rotation (turn to flush the toilet while you are sitting on it)

Trunk flexion (bending over to tie your shoes)

Lifting arms higher than your shoulders (washing your hair)

# PECTACULAR Pre-hab

## 30-Day Deep Breathing Exercise Chart

Take ten deep breaths, inhaling deeply and holding your breath for three seconds. Do this at least five times daily. Use this chart to keep track of your exercises by placing a check mark in the appropriate box when completed. This exercise helps to stretch the chest wall muscles and reduces post-operative pain.

[illegible]

# PECTACULAR Nutrition

Optimal nutrition promotes healing and enhances the reconstructive outcome. Be conscientious of having a balanced diet. This includes appropriate protein and calorie intake, plenty of fruits, vegetables, whole grains, and lean meats. Post-operatively, you will need a high calorie, high protein diet for recovery for about 10-14 days. Exact needs will vary, but a general guideline is **2,000 calories** and **150 grams of protein** daily.

While in the hospital, you will have orders for high calorie, high protein diet and Ensure® drinks. We recommend you bring some of your favorite high calorie, high protein snacks to supplement this. Initially, you may have a decreased appetite and will need to consume approximately **200 calories** every two to three hours. Remember, you may resume your usual diet 10-14 days after surgery in order to avoid unnecessary weight gain.

Suggestions include:

- Recovery or Meal Replacement Bars
- Trail Mix
- Greek Yogurt
- Hummus
- Nut Butter
- Jerky



# One Week Before Surgery

## Pack your bags! Plan for a 5 day hospital stay.

We recommend packing:



- Pajama-style button up shirts
- Slip-on shoes
- Sockwell Compression socks (wear these to the hospital)
- Loose shorts or pants with an elastic or drawstring waist
- Boppy pillow (found in infant section in stores)
- U-shaped travel neck pillow
- High protein/calorie snacks
- Lip balm/chapstick

**Reduce post-operative pain.** Continue your home exercise program. Remember, simple deep breathing exercises help stretch chest wall muscles and reduce post-operative pain.

**Prevent surgical site infection** with pre-operative chlorohexidine CHG showers. These will begin 3 days prior to your operation. See page 9 for complete instructions.

**Prevent post-operative constipation.** We recommend all patients take an over-the-counter Dulcolax® (bisacodyl) suppository or Senokot® (senna) orally the morning of **the day before surgery**. This helps prevent post-operative constipation by inducing a pre-operative bowel movement.

**Prevent post-operative nausea** by applying a prescribed Scopolamine patch the night before surgery. Wash your hands after application. Be sure to fill this prescription early as it may require a prior-authorization.

**Purchase** Gatorade/Powerade to consume the night before and the morning of surgery (see page 10.) Purchase snacks to bring for your hospital stay (see page 7.)

**Decrease anxiety by feeling prepared.** Children's surgery will call the business day before your surgery and inform you of times to stop eating and drinking, and of your arrival time.

# Three Days Prior to Surgery: CHG Shower

Preoperative showering with chlorohexidine (CHG) reduces bacterial skin colonization and decreases the risk of surgical site infection. Purchase a **16 ounce 4% CHG preparation**, over the counter at a retail pharmacy. Follow the directions below.



**Begin 3 days prior to surgery and complete the fourth shower the morning of surgery.**

- Wash and rinse your hair, face, and body in your usual shampoo and soap. Rinse thoroughly to remove residue.
- Turn off the shower.
- Pour a quarter size amount of the CHG soap onto a clean, wet washcloth. Apply to your body from the neck down, except genital area.  
*Do NOT apply to your hair, face, or genitals.*
- Wash for 3 minutes. Apply more CHG soap as needed, using  $\frac{1}{4}$  of the bottle for each shower. Avoid scrubbing your skin too hard.
- Wait one minute. Turn the shower on and rinse completely with warm water.
- DO NOT use your usual soap after the CHG soap.
- Air dry as much as possible, then pat dry with a freshly laundered towel.
- Dress in freshly laundered clothes after each shower.
- Sleep on clean bed linens the night before surgery.
- Do NOT apply lotion, deodorant, powder, or perfume.
- Do NOT shave or remove any hair below the neck.

\*If you have acne that affects your back or chest, begin our skin care program immediately. If you do not see improvement after 2 weeks, follow up with Dr. Smith.

Preoperative Shower Checklist

3 days before	
2 days	
1 day	
Day of surgery	



# Night Before and Day of Surgery



**Set your alarm!** Reduce anxiety by allowing plenty of time to prepare and arrive.



Remember your bags packed with loose clothing, pillows, and snacks.



**Prevent surgical site infection** by completing your pre-operative CHG bathing (see previous page.)



**Prevent post-operative nausea** Sports drinks like Gatorade and Powerade contain a complex carbohydrate that keeps your body in a fed rather than fasted state. Please remember, no red, blue or purple colors. We recommend clear or light colors.

The night before surgery drink 16oz of Gatorade at bedtime.

The day of surgery drink 16oz of Gatorade 2 hours prior to scheduled arrival time.



Please, use the free valet service today.

# The Operation



While you are in surgery, your family will be directed to the closest available waiting area. Only 2-4 close family members are allowed in the waiting area. All other guests may wait in the public waiting areas, cafeteria, or medical mall.

After surgery, you will initially recover in the post anesthesia recovery unit (PACU) and then be transferred to pediatric intensive care (PICU).

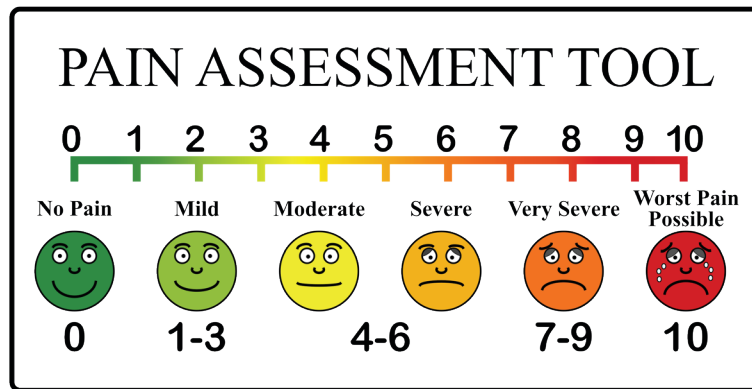
*Please note; we believe your post-operative needs for monitoring and pain control require intensive care nursing. We do NOT anticipate your condition to be critical.*

## **While you are in PICU you will:**

- have several monitors in place
- have catheters in place on your back or sides to deliver medication to help control chest wall pain
- have drains (usually 2) in place to ensure excessive fluid does not accumulate after your reconstruction
- receive pain medications through an IV and by mouth
- have a catheter in place to drain your bladder
- be able to sip clear liquids and eat toast, crackers and hard candy
- lie flat in bed with only a small, flat pillow under your head
- not be allowed to twist your body or bend at the waist

# Recovery in the Hospital

Instantly changing the shape of your chest wall will cause pain. We will need your feedback to adjust our approach and achieve the best pain control for you.



A variety of medications will be used to control your pain (see page 18.)

Once you have recovered from anesthesia and pain control is adequate, our physical therapy team will assist you in getting out of bed to a straight-back chair.

The first time out of bed often causes dizziness and nausea and you may be exhausted after only a few minutes.

Once out of bed, you may eat a regular meal, if desired. You will need a high calorie, high protein diet for your recovery.

You will continue your deep breathing exercises frequently.

When pain control goals are met, you will be converted to oral medications and the catheter draining your bladder will be removed.

You will have chest wall drains in place. Quantity and quality of drain output will be monitored and documented. When output has decreased to an acceptable amount, 1 drain will be removed. You will be discharged home with 1 drain in place. You will learn drain care during your hospital stay.

Physical therapists will continue to work with you and your family each day as you progress to walking several times daily and your family becomes comfortable assisting you and transitioning home. Part of the multidisciplinary team, the physical therapists are integral in your transition from surgery to discharge.

While in the hospital, you will need to have your parking card validated to avoid unnecessary charges.

# Recovery in the Hospital: Physical Therapy Guide

**Activity restrictions** prevent shifting of the Nuss bar(s) which could result in failure of the reconstruction. All family members and friends assisting in your care need to be well informed of your restrictions.

- Lying/sleeping flat with only a small, flat pillow under your head.
- No rotating or twisting the trunk
- No bending at the waist
- No raising the arms beyond a level parallel to the floor
- Sitting in a straight-back chair only
- Sitting, standing and walking with military posture.

## **Operative Day**

This is the day of your surgery. If you are alert enough to stand, your Physical Therapist (PT) will assist with standing at the bedside the day of surgery.

## **Post-Op Goal #1**

The PT assist you with getting out of bed, and help you transfer to a bedside chair. Parents will watch the first transfer. The initial goal is to sit up for 15-30 minutes.

## **Post-Op Goal #2**

Parents will assist the PT with the transfer. We will aim to sit up for 30 minutes - 1 hour.

## **Post-Op Goal #3**

The PT will assist you with walking short distances.

## **Post-Op Goal #4**

We will aim to sit up for 1 hour or longer. Your morning and afternoon PT sessions will include walking, with a goal to progressively increase the distance tolerated. In most cases, your parents will be independent with assisting you in and out of bed by the afternoon session. The PT will be available to offer feedback in order to improve body mechanics and ease of transfer.

## **Post-Op Goal #5**

The PT will assist with ambulation. Your parents will perform all transfers in and out of bed independently. We will aim to sit up most of the day and to walk 200-300 feet. If you will have to climb stairs upon returning home, the PT will assist you with this task before discharge to ensure safety. You should be able to direct anyone to assist you to maintain your activity restrictions.

*\*These are guidelines for your recovery. Please remember that each individual case is unique and progresses accordingly.*



# Pectacular PT Check List

Date & Time	Patient Goal	Parent Goal
	Stand at bedside	Observe transfer
	1st time out of bed (OOB) 15-30 minutes	Observe transfer
	Out of bed 30 minutes	Assist with transfer
	Out of bed 60 minutes	Assist with transfer
	Out of bed 60 minutes Walk 50 feet	Assist with transfer
	OOB more than in bed Walk 100 feet	PT available to assist parent(s)
	OOB more than in bed Walk 200-300 feet Stairs	Parent(s) independent with transfers. PT to assist with stairs.
	Direct others to assist with all needs	Independent with transfer.

# Pectacular Approach to Pain

Medications to prevent, reduce, and alleviate pain:

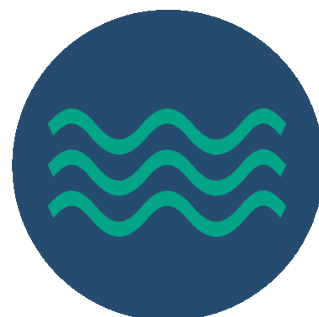
- Local anesthetic
- Regional block
- Narcotic
- Muscle relaxant
- Non-steroidal anti-inflammatory

Non-pharmacologic measures to reduce and alleviate pain:

- Heating pad
- Distraction
- Massage

Medications to address troublesome side effects of pain medications:

- Anti-emetics
- Stomach acid suppression
- Laxative



# Recovery at Home: Activity

Continue your activity restrictions. These restrictions ensure stability and success of the reconstruction outcome. All family members and friends assisting in your care need to be well-informed of your restrictions:

- Lying/sleeping flat with no pillow under your head while in bed, you may use a small pillow under your knees
- No bending at the waist
- No rotating or twisting the trunk
- Sitting in a straight back chair only
- Sitting, standing, walking with military posture

Other activities that will be restricted for at least 3 months include karate, judo, gymnastics, contact sports, and heavy lifting (including backpacks.) You will develop a plan for physical therapy, core strengthening, and resuming physical activities during your follow-up visits.

**Suggested home routine for progressively increasing activity:** Consider this information as the MINIMUM amount of activity you should perform. ALWAYS do more if you feel up for it!

## Home Days 1-3

Wake up each morning for breakfast, and sit up for 2 hours.

Nap if needed before lunch.

Get up for lunch and sit up in straight back chair for another 2 hours.

Nap before dinner.

Get up for dinner, take a shower, and stay up and awake until bedtime.

## Home 1 week

By the end of your first week home from the hospital, you should be limited to 1 nap per day, and aim to walk for at least 10-15 minutes each day.

## Home 10 days

At this time, you will meet with Dr. Smith for your 1st follow-up since your hospital discharge!



Each day, walk within your home for at least 5 minutes. Remember, it is important to have someone with you while you walk in case you lose your balance or become dizzy or nauseous, in order to prevent a fall.

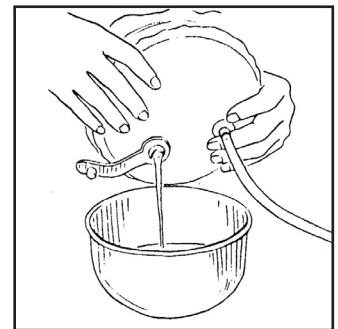
# Recovery at Home: Drain Care



A Hemovac drain is a type of closed drainage system that helps drain excess blood and fluid from under the skin and incision site. It will remain in place until the drainage has slowed or stopped. It is important to properly care for the drain at home to ensure wound healing and prevent infection. The drain should be emptied twice daily and any time the collection chamber is more than 50% filled. After emptying, the drain must be properly closed to maintain negative pressure. The drain will be more secure and more comfortable if it is pinned or secured to your clothing.

## To empty your drain:

- Clean your hands well with soap and water or an alcohol-based cleaner.
- Unpin the Hemovac drain from your clothes.
- Remove the stopper or plug. The Hemovac drain will expand. Do not let the stopper or the top of the drain opening touch anything. If it does, clean the stopper with alcohol.
- Pour all of the liquid from the drain into the measuring cup. You may need to turn it over 2 or 3 times.
- Place the Hemovac drain on a clean, flat surface. Press down on it with 1 hand until the drainage container is flat.
- While holding the container flat with 1 hand, put the stopper back into the spout with the other hand.
- Pin the Hemovac drain back onto your clothes.
- Write down the date, time, and the amount of drainage you poured out of the container. Bring this information with you to your follow-up visit after you are discharged from the hospital.
- Pour the fluid into the toilet and flush.
- Wash your hands



Call Dr. Smith's nurse at (423) 757-0786 when the output is less than or equal to 15mL in 24 hours

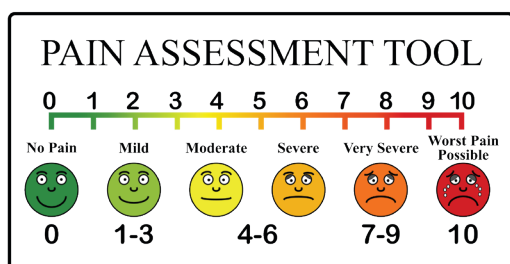
or:

- The stitches that hold the drain to your skin are coming loose or are missing
- The tube falls out
- Your temperature is higher than 101 °F
- Your skin is very red where the tube comes out (a small amount of redness is normal)
- There is drainage from the skin around the tube site
- There is more tenderness and swelling at the drain site
- Your drainage is cloudy or has a bad odor
- Drainage increases for more than 2 days in a row, or if it feels like there is fluid under your skin
- The drainage suddenly stops after there has been constant drainage

# Recovery at Home: Medications

On the next page is a log to record your medications and pain scale. Please bring this to all follow up appointments.

- **Non-Steroidal Anti-Inflammatory** You will be given prescription strength ibuprofen. This should be taken around the clock as prescribed to achieve the desired anti-inflammatory response. It is important to take this with food.
- **Stomach Acid Suppression** Anti-inflammatory medications and the stress of surgery can take a toll on the stomach. To protect the stomach, you will need to take an H2 blocker, such as ranitidine (Zantac®).
- **Narcotic Pain Reliever** You will be given a prescription for oxycodone/acetaminophen (Percocet®). Continue to take one pill every four hours around the clock, as you did in the hospital. You will have a second pill to use as needed. Be aware that this narcotic pain reliever contains acetaminophen (Tylenol®) and do not take over-the-counter acetaminophen within four hours of oxycodone/acetaminophen. Do not exceed four grams of acetaminophen in 24 hours.
- **Muscle Relaxant** You will be given a prescription for diazepam (Valium®.) This relieves muscle tightness and spasm and is therefore very effective for chest wall pain. Depending on your hospital regimen, you may need to take this at regular intervals or you may use on an as needed bases.
- **Laxative** Narcotics and reduced activity slow bowel motility significantly and can lead to problematic constipation and distention of the colon. Polyethylene glycol (MiraLax) is a colorless, odorless, gritless powder that is added to a liquid of your choice and may be titrated to achieve a desired effect of a soft bowel movement every couple of days. Continue your regimen of 1 capful in 16 ounces of liquid daily. Additionally, on your first day home you will take 6 capfuls mixed in a total of 1 liter of Gatorade. If this does not result in a bowel movement, you may then use an over-the-counter bisacodyl (Dulcolax®) suppository.
- **Antibiotic** An oral antibiotic will be prescribed to prevent infection until chest wall drains are removed.



**Instructions for medication chart:** Document pain using pain scale with scheduled and as needed pain medications

# Home Medication Chart

[illegible]

# Recovery at Home: Follow Up

Monday - Friday 8am-5pm, Call (423)267-0466 and ask for Dr. Lisa Smith's nurse for:

- fever greater than 101°F
- continual cough
- redness, drainage or swelling at the incision sites or under the arms
- any difficulty breathing
- problems with chest wall drain (see page 17)

If these problems occur after hours or on weekends, please use Dr. Smith's cell phone.

It is important to the team that these issues are addressed right away—we want your recovery to go well!

At discharge, you will be given a prescription form for the x-ray that must be taken with you. You may need to remind the x-ray technician of your activity restrictions.

You will follow up with Dr. Lisa Smith in approximately one week. Prior to (the day of) your appointment with Dr. Smith, you will have a chest x-ray in Children's radiology department. You will need to register in the lobby by Children's Emergency Department.

Depending on your day of discharge, you may need to refill your narcotic pain reliever prior to your scheduled appointment. We will make arrangements to meet this need; however, this cannot be "called in."

# Post-Reconstruction Pectacular Milestones

Shower at **72 hours** or when the catheters are removed; must be done before discharge

**2 weeks:** Steri-strips off

**4 weeks:** Sleep on side or chest, twist at waist

**6 weeks:** May drive, begin light cardiovascular training (activities without risk of chest trauma)

**8 weeks:** Light upper body training (no more than 2-5 lbs)

**3 months:** Carry a backpack, non-contact sports, gradually increase weight lifting

**6 months:** Restriction free, may ride rollercoaster and play contact sports



# Helpful Lists and Links

## 1 week before surgery:

- ☐ Fill Scopolamine prescription
- ☐ Buy 4% CHG solution
- ☐ Begin CHG showers 3 days prior to your surgery
- ☐ Continue your Home Exercise Program
- ☐ Anticipate a phone call from Children's Surgery regarding arrival times and times to stop eating and drinking the business day before your scheduled surgery
- ☐ Purchase Gatorade, snacks, boppy pillow, neck pillow
- ☐ Pack bag
- ☐ Remember, recliners are not appropriate--make sure you have a straight back chair that supports the head.



## Packing List:

- ☐ PJ style button up shirts
- ☐ Elastic or drawstring waist pants
- ☐ Slip-on shoes
- ☐ Sockwell compression socks
- ☐ Boppy pillow
- ☐ U-shaped neck pillow with micro-beads
- ☐ High protein snacks of choice

## 1 day before surgery:

- ☐ Morning: Dulcolax or Senna
- ☐ Bedtime: Drink 16oz of Gatorade/Powerade
- ☐ Continue daily CHG shower
- ☐ Evening: Apply Scopolamine patch
- ☐ Follow directions regarding eating and drinking provided in the phone call from Children's Surgery

## The day of surgery:

- ☐ Complete your 4th CHG shower
- ☐ Drink 16oz of Gatorade/Powerade 2 hours prior to scheduled arrival time

# Helpful Lists and Links



[universitysurgical.com](http://universitysurgical.com)



[pectacular@universitysurgical.com](mailto:pectacular@universitysurgical.com)



[Facebook.com/universitysurgical](https://www.facebook.com/universitysurgical)



[univsurg](https://www.pinterest.com/univsurg)

Notes:





We are glad you are part of our Pectacular team!  
We can't wait to see your physiological, psychological, and cosmetic reconstructive  
results after your chest wall reconstruction!

Lisa A. Smith, MD, FACS  
Pediatric Surgeon  
University Surgical Associates

Erin Peters, MSN, FNP-BC  
Pediatric General Surgery Nurse Practitioner  
Children's Hospital at Erlanger

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