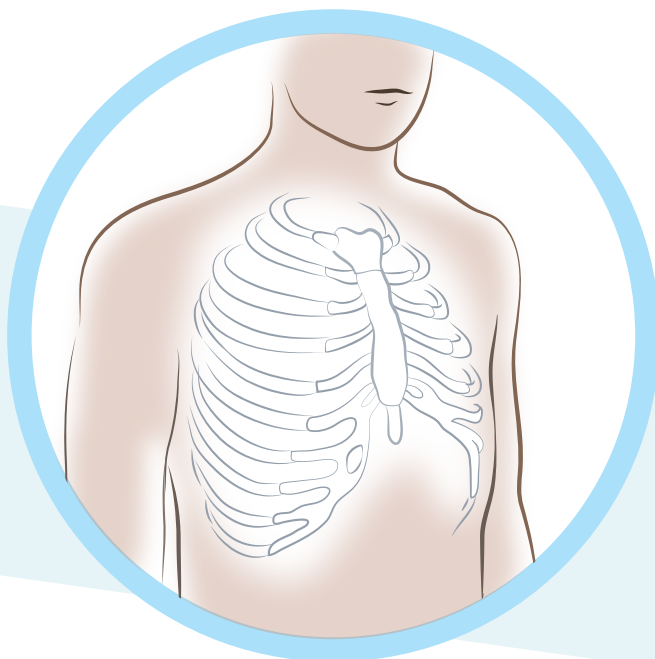
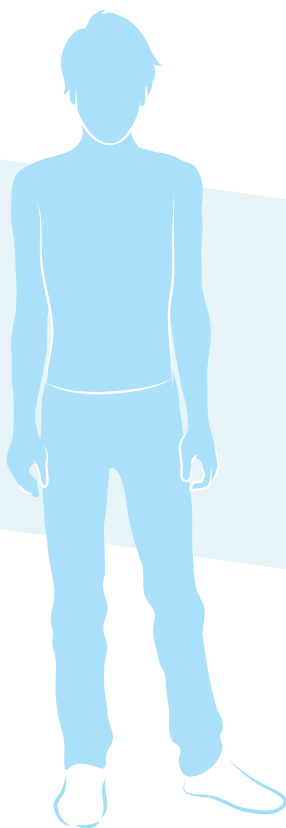


A GUIDE TO PECTUS EXCAVATUM & CARINATUM



**This booklet will help you understand your surgical options
if you have pectus excavatum or pectus carinatum.**

Hôpital de Montréal
pour enfants
Centre universitaire
de santé McGill



Montreal Children's
Hospital
McGill University
Health Centre



**Hôpitaux Shriners
pour enfants®
Shriners Hospitals
for Children®**

Chest Wall Anomaly Centre - The Shriners Hospitals for Children Canada and the Montreal Children's Hospital.

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1st Edition



IMPORTANT

This booklet is for information only. It does not replace the advice of your doctor nor substitute for medical care. Always follow your doctor's advice.

This material is also available on the MUHC Health Education Collection (<http://infotheque.muhc.ca/>)

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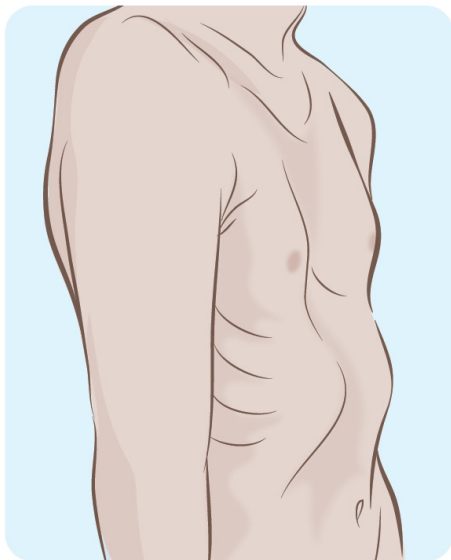
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Introduction

If you have pectus excavatum (PE) or pectus carinatum (PC), you have a condition that affects the chest area. Normally, the ribs, sternum (breastbone), and the cartilage tissue develop so that the sternum is flat.

In PE,
the sternum is sunken in.



In PC,
the sternum is pushed out.



This booklet will explain your

- surgical options
- preparation before surgery — if you decide to do the surgery
- expectations after surgery — how you might feel, what it might look like — if you decide to do the surgery
- exercises and good habits to learn—no matter what you decide

Review this booklet with your family.

If you decide to have surgery, you will be part of a program called a **care pathway.**

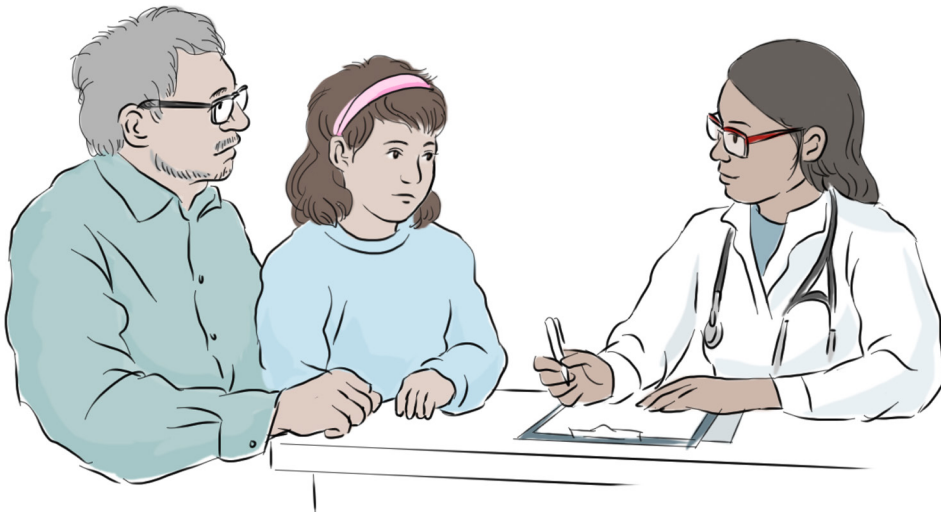
The goal of this program is to help you recover quickly and safely.

Research shows that patients will recover faster if they do the things described in this guide. There are instructions on eating and drinking, physical activity, and controlling your pain.

If surgery is right for you, bring this booklet on the day of your surgery.

Use it as a guide during the hospital stay. Hospital staff will review it with you as you recover and before going home.

We know that having surgery can be stressful for patients and their families. Remember that you are not alone. We will support you every step of the way. Please ask if you have any questions about your care.



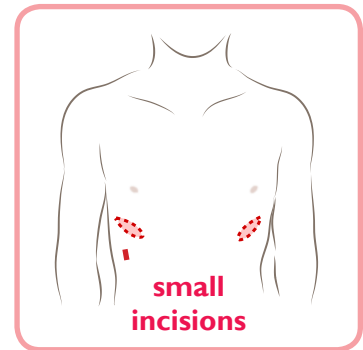
Surgical Options for PE/PC

Here are the main surgical treatment options for pectus excavatum (PE):

- **Surgery – the Nuss procedure**

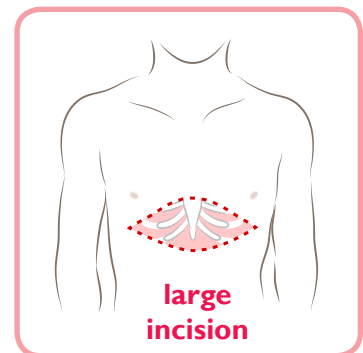
This is **minimally invasive surgery**.

This means that the surgery uses small cuts instead of one large cut to open the area (see picture). It is for patients whose condition affects their quality of life. The procedure uses a metal bar inside the body, under the sternum, to fix the shape of the chest area. The bar is removed 2-3 years later.



- **Surgery – the Ravitch procedure**

This is **open surgery**. This surgery uses one large cut to open the area. It is a more complex type of surgery that involves removing some cartilage (connective tissue) close to the ribs and moving the sternum to correct the shape of the chest. This procedure is rarely used for PE.



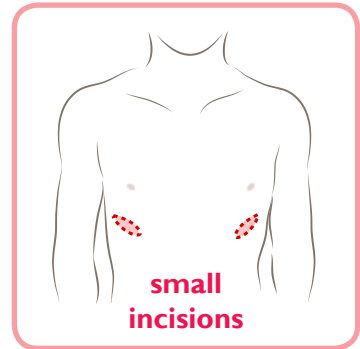
Here are the main surgical options for pectus carinatum (PC):

- **Surgery – reverse Nuss or Abramson**

This is a **minimally invasive surgery**.

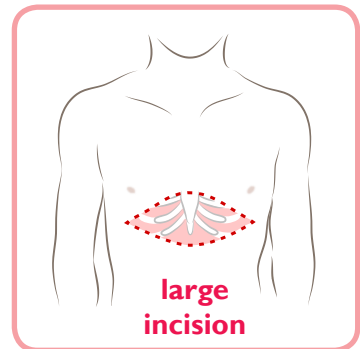
This means that the surgery uses 2 small cuts instead of one large one to open the area.

The procedure corrects the problem by placing a metal bar under the skin and over the sternum. This squeezes down the chest and reshapes the chest area. The bar is removed 2-3 years later.



- **Surgery – the Ravitch procedure**

This is **open surgery**. This surgery uses one larger cut to open the area. This type of surgery involves removing the abnormal cartilage while keeping its lining intact. The sternum is moved to its normal position, immediately correcting the chest shape. Over the following months, the cartilage regrows so that the chest shape and strength become normal.



What to do if you decide to go ahead with surgery

I'm ready!

- **Who do I contact?**

Please contact _____ your surgeon and/or CWAC nurse and let them know that you would like to go ahead with the surgery.

- **What's next?**

Someone from our team will contact you back and schedule tests or visits you may need.

First, we will do a CT scan of your chest to evaluate how serious your PE or condition is. (You may not need a scan if you have PC). Your surgeon will review the images and discuss the results with you. When you are ready, the surgeon will send a request to the Régie de l'assurance maladie du Québec (RAMQ) to confirm that they will cover your surgery and hospital-related fees. The surgery and all related costs are covered by Quebec Medicare only if the abnormality is considered severe.

You may have other visits with specialists. They may include:

- Cardiology, (Cardiac Echo) – Montreal Children's Hospital (MCH)
- Dermatology - MCH
- Psychology – Shriner's Hospital for Children (SHR)
- Genetics - SHR
- Social Work - SHR
- Physiotherapy - SHR

If needed, you may have a pulmonary function test and/or an exercise test.

We will give you the **surgery date, pre-operative clinic visit date** and **location** after RAMQ approval.

- **Why do I need to do these tests?**

The tests and appointments will help us give you the best care.

Getting ready for your surgery

Be active

Try to exercise every day. Your fitness level before surgery can make a difference in how you recover. If you are already exercising, keep up the good work. If not, start slowly adding exercise to your day. Exercise does not need to be hard to make a difference. A 10-minute walk is a good place to start.



Eat well

It is important to give your body enough energy throughout the day. Eat three meals per day and include protein-rich food at every meal. You should also eat healthy foods like fruits, vegetables, nuts, and seeds.



Communicate

Talk about the surgery and ask questions. Speak with your family, friends, or support group. Let the medical staff know how they can make you feel more comfortable.

Contact your school and let them know that you plan to have surgery. They can help you plan your schoolwork and suggest ways to make it easier when you return.



Talk to your siblings

Don't forget to talk about the surgery to your brothers or sisters. This can be a stressful time for them too, and it can affect their day-to-day routine.



Plan ahead

To prepare for your surgery, your family may need to:

- get help with meals, laundry, cleaning, or babysitting during or after the surgery
- stock the fridge and freezer with food that is easy to reheat so that your family can care for everyone at home



Stop smoking (cigarettes, vaping, and cannabis)

If you or anyone around you smokes, stop smoking before surgery. Avoid secondhand smoke. Smoking and secondhand smoke can cause lung problems and can slow down your recovery. Your doctor can help you.



Avoid alcohol and other recreational drugs

Do not drink alcohol or use recreational drugs at least 24 hours before your surgery. Alcohol and other drugs can also affect your recovery. They can **interfere** with the medicine you will get in the hospital and cause **drug interactions**. Please tell us if you need help.



A **drug interaction** is a change in the way that a drug normally works. This can mean that the medicine we give you may not produce the effects we expect, which can be dangerous. Prescription and non-prescription drugs can cause interactions.

Your pre-operative clinic visit

The Admitting department will contact you to tell you where and when to go for your pre-operative clinic visit (MCH or Shriners)

Montreal Children's Hospital Pre-operative Clinic:

Located in Room B 03.3103 (Block B, Level 3)

Shriners Hospital Pre-operative Clinic:

Located in Room 4.67 (4th floor)

Before your pre-operative visit, you will have a chest CT scan. Other tests may have already been done or will be done on the day of the clinic visit. (If these tests were done outside the MCH or Shriners, make sure a copy has been scanned to your file and bring an extra copy just in case):

What can you expect from the pre-operative clinic visit?

At your clinic visit, we will:

- check your general health
- plan your care
- make sure you are ready for surgery
- perform necessary blood tests
- answer all your questions

Who will you see at the pre-operative clinic visit?

You will meet the health care team:

- ▶ A **preop clinic nurse** will explain how to get ready for surgery and what to expect after, and check:
 - your height and weight
 - your vital signs
 - what medicine* you take

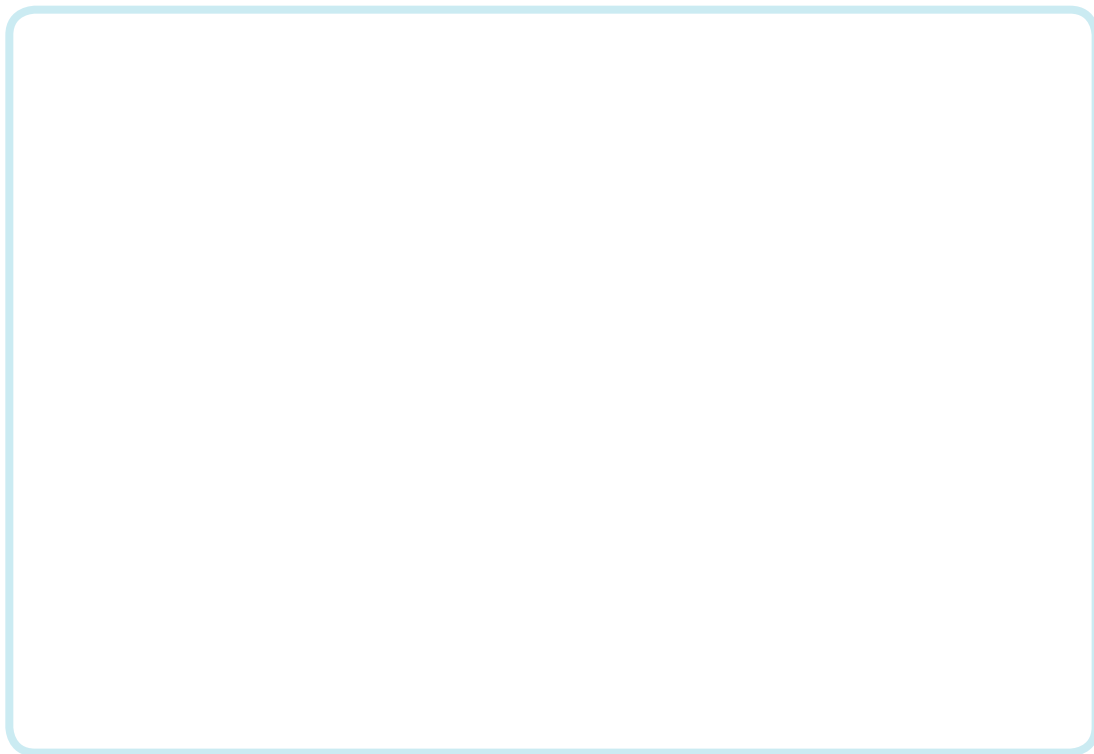
Are you taking any prescription or non-prescription medicine, including herbal products? Tell us! We need to know about all the medicine you take to ensure a safe surgery.

- ▶ A **pediatrician** will ask you questions about your health and perform a complete physical exam. If you have medical problems, you may see another specialist before surgery.
- ▶ An **anesthesiologist** will explain how they will manage your pain. This doctor may give you **sedatives** (calming medicine) before surgery and pain medicine during and after the surgery.
- ▶ A **pain nurse** will talk to you about your pain management plan and make sure you know what to expect. The nurse will also talk about **integrative medicine**. This is part of the treatment plan and can improve your recovery. It includes breathing exercises, self-hypnosis, and guided imagery.
- ▶ **Your surgeon** will describe the surgery again, answer your questions, and explain the recovery plan. They will tell you what to expect after surgery: how you may feel and what you may be able to do every day as you recover.
- ▶ The **child life specialist** will help you if you feel anxious and may accompany you on the day of surgery.
- ▶ A **physiotherapist** may help you with exercises.
- ▶ A **social worker** may meet with you and your family if you need financial support or help with accommodations before or after the surgery.



The pre-operative visit is a good time to ask more questions if you have any.

Do you have any questions? Write them down here.



Before your surgery, the **pre-operative clinic doctor** will explain what medicine you should

- ☐ stop taking before surgery
(please stop: herbal medicine, natural supplements)
- ☐ keep taking.....
(please continue: asthma meds, seizure meds etc.)

Questions before surgery

If you have any questions before your surgery, you may contact:

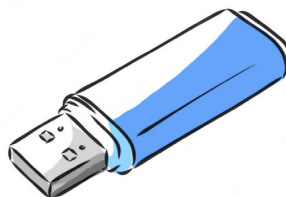
At the MCH:

The Pre-operative clinic nurses at
514-412-4312, Monday to Friday, 7:30 a.m. to 3:30 p.m.

At the Shriners Hospital:

The Info Nurse at 514-282-6972

If you would like to see pictures from inside your chest during the surgery, please bring 1 or 2 USB keys and ask your surgeon. Due to the recording system, it may not always be possible to make a copy, but we can try. Discuss it with your surgeon ahead of time.



Confirming the surgery

At the MCH:

The MCH Admitting Department will phone you to confirm what day and at what time to come to the hospital after your pre-operative visit. They will ask you to arrive 2 hours before your planned surgery time.

Exception: If your surgery is at 7:30 a.m., arrive at 6:00-6:30 a.m.

Date of surgery:

Time to arrive:

At the Shriners Hospital:

The Booking Department will call 1-2 weeks before your surgery to schedule your pre-operative clinic visit and surgery.

**You may need a COVID test 24 hours before surgery.
If so, the pre-operative team will tell you.**



Cancelling your surgery

If you get sick after your pre-operative clinic visit, we may need to reschedule to protect your safety. The surgery must be cancelled if you have a fever, runny nose, cough, congestion, etc.

At the MCH:

Please call the Pre-operative clinic to cancel an appointment: 514-412-4312 or 514-934-1934 ext 24458 or 24312.

At the Shriners Hospital:

Please call the general number: 514-842-4464. They will transfer your call to the OR department.

Your surgery may be delayed or cancelled because of an emergency. If this happens, your surgeon will rebook your surgery as soon as possible.

Begin integrative medicine

Use deep breathing, self-hypnosis, or guided imagery exercises.

(Your pain nurse explained these exercises during the pre-operative clinic visit.)



Washing

The night before surgery



Wash your hair and body with a special soap*. Do not use this soap on your face or ears. Rinse well.



Do not use lotion or oils.



Remove nail polish.



Wear clean clothes to bed.

*4% Chlorhexidine Gluconate Skin Cleanser (found at your local pharmacy)

The morning of surgery



Take a shower with the special soap.



Do not wear lotion, perfume, makeup, jewelry, or piercings.



Do not shave the area where we will do the surgery.



Put on clean and comfortable clothes.



Remove contact lenses if you wear them. Wear glasses instead.



If you have long hair, braid it, or tie it back with an elastic band (no metal on the band).

What to eat and drink

The day before your surgery

Eat and drink normally until midnight. Drink 2 ½ - 4 cups (650-1000 ml) of one of the carbohydrate drinks listed below during the evening:

Carbohydrate drinks suggestions

Apple juice, Gatorade, 7 Up, cranberry cocktail, commercial iced tea or lemonade without pulp



1000 ml (about 4 cups)

Do not have any food, dairy products, or juice with pulp after midnight.



The morning of surgery

- **Do not eat any food.**
- **Do not have any dairy products or juice with pulp.**
- **Do not chew gum or candy.**

Up to 2 hours before surgery

- Drink as much as you want (at least 2 cups = 500 ml) of carbohydrate drinks



1-2 hours before surgery

- Drink up to 1 cup (250 ml) carbohydrate drinks or clear fluids
NOT MORE



0-1 hours before surgery

- **NO drinks unless you have permission from anesthesia**



Clear fluids includes water, black coffee (no milk or cream), and clear tea.
Do not give orange juice.

What to bring to the hospital

- Medicare card and hospital cards
- this booklet
- X-rays or other diagnostic images or reports, if done at another location
- list of medicine that you take at home (ask your pharmacist to give you a list)
- 2 packages of gum for after the surgery
- bathrobe, slippers, pyjamas, loose, comfortable clothing for going home
- toothbrush, toothpaste, mouthwash, comb, deodorant, soap, shaving supplies, if needed, tissues, and perhaps earplugs
- stuffed animal, blanket, or pillow
- «distraction kit» to help keep your mind off the pain, for example, music, movies, electronic games, or drawing material
- package of sanitary pads if needed
- glasses, contact lenses, hearing aids, and their storage containers labelled with your name, if needed
- sleep mask (optional)
- USB key (optional)



Except for the electronic devices mentioned, please do not bring anything of value (credit cards and jewelry). If you do, please always keep them with you or leave valuable items with a parent.

The hospital is not responsible for lost or stolen items.



What will happen on the day of your surgery?

Register and check-in on time

Arrive at the time we gave you.

At the MCH:

Enter the building through the Montreal Children's Hospital main entrance. Take the first set of elevators and go to the 3rd floor. Register at the same location as the Pre-operative Clinic, Block B, level 3 (B 03.3103).

At the Shriners Hospital:

Enter the building through the Shriners Hospital main entrance. Go to the Reception desk on the RC level. You will get an identification sticker with your picture. Next, we will send you to register at the Admission office. Take the elevators to the 4th floor. As soon as you come out of the elevators, you will see the Pre-Admission reception desk. From here, we will send you to Room 4.67.

What do I do after I register?

We will show you where to go. At both hospitals, the surgical area is on the 3rd floor. You may be asked to give your cell phone number so that the recovery room can contact your family. You and your parent(s) will be given a hospital bracelet.

The nurse will:

- make sure your hospital id is correct
- ask you to change into a hospital gown
- make sure your personal belongings are in a safe place
- complete a pre-operative checklist with you, including a review of medicine you take and any allergies you may have
- check your weight and height
- ask you to empty your bladder



After, you will see the:

- surgical team
- anesthesiology team (the doctor who will put you to sleep)

The anesthesiologist will give you pain medicine.

This may include acetaminophen (e.g. Tylenol). If needed, they will also give a medicine to help you relax.

- child life specialist (if needed)

Signing consent forms

- You or your parents will sign consent forms. If you are 14 years or older, you can sign your own consent forms.

Wait until they call you to the Operating Room

- When the operating room is ready, a member of the surgical team will bring you there. In the operating room, you will be asleep and pain-free during your surgery.



Waiting room for your family

Once you are in the operating room, your family may wait for you in the ***waiting room**. The space is small, so we ask that you limit the number of people with you. It will be 2 or 3 hours before you can have visitors.

At the MCH: Block B, level 3

At the Shriners Hospital: Family Room, 3rd floor

Internet access



At the MCH:

Network: CUSM-MUHC-PUBLIC

Username: public

Password: wifi

At the Shriners Hospital:

Network: PFA

No user name or password is needed.

User must read and accept internet rules and conditions.

Other resources

Cafeteria: Located in the Adult Atrium on the level S1 or 6th floor (Shriners Hospital)

Vending machines: Level S1: Block B & Block C or in the cafeteria on the 6th floor (Shriners Hospital)

Stores: Galleria, Rez-de-chaussée (RC) & Atrium

Bank machines: Blocks C & D, Rez-de-chaussée (RC), Block B S1

***National Bank Family Resource Centre** (library): Block A, Rez-de-chaussée (RC.1107)

***Adult Resource Centre** (library): Block B, Rez-de-chaussée (RC)

Prayer and meditation room: Level 2: MCH - Block A (Room A 02.0045), and MUHC - between blocks C & D (Room C 02.1178)

**Due to COVID and other unexpected situations, rules about visiting patients may be different than what is described here. Speak with the health care team to find out about visiting hours or any specific rules. Some services may also be temporarily closed.*

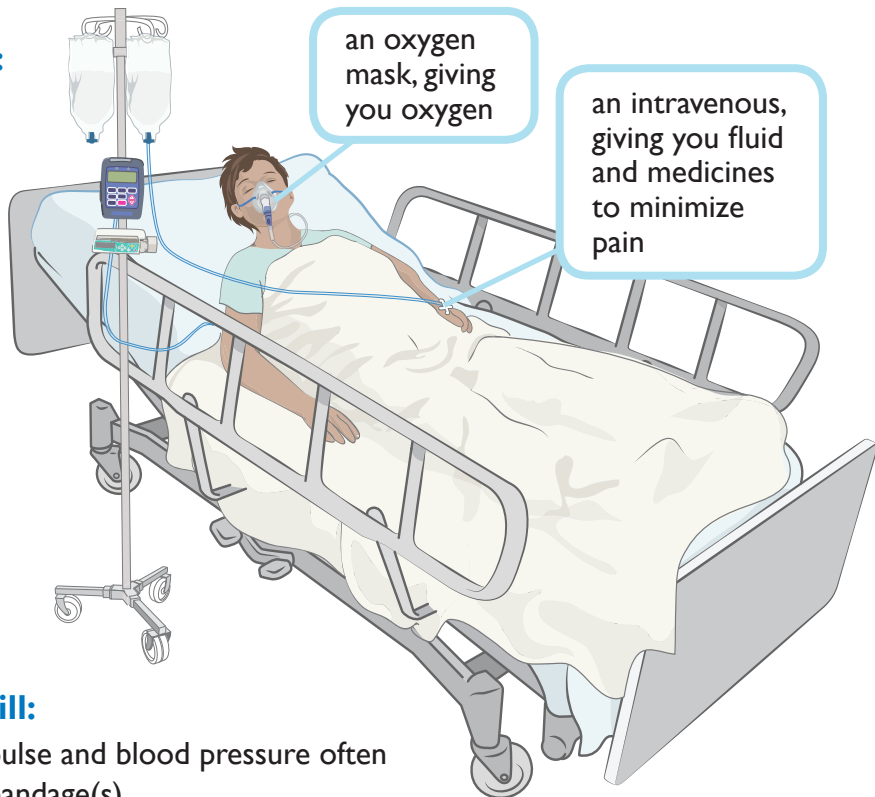
In the Post-Anesthesia Care Unit (PACU) / Recovery Room

After your surgery, you will wake up in the Post-Anesthesia Care Unit (PACU), also called the Recovery Room. This is an area where we watch patients closely as they wake up from surgery.

The PACU will contact your parents on their cell phone or see them in the waiting area.

*Your family may visit you once you are awake. Only two people are allowed at a time. Visitors must be over 14 years old.

You will have:



Your nurse will:

- check your pulse and blood pressure often
- check your bandage(s)
- make sure you are comfortable

A chest X-ray will be done in the PACU.

What kind of medicine will you have?

In hospital

You will take acetaminophen and **NSAIDs** – for pain.

We may also give you other medicines for pain, for muscle spasms and to prevent constipation.

You may also have **an epidural or a continuous nerve block** for the first 3 days. These deliver a pain medicine to block the pain by numbing the area.

We may also add **Morphine intravenously through a pump that you can control**. This is a small machine that gives you a safe dose of morphine when you press the button.

On day 3, we will usually remove your epidural, continuous nerve block, or the morphine pump, whichever one you have. This is so that you can start taking oral medicine (by mouth).

Starting in June 2022, you may receive **Intercostal Nerve Cryoablation (INC)**. INC is a technique that minimizes pain by deep freezing the chest wall nerves. The frozen nerves stop sensing the pain, but gradually regrow in the following months. Patients who have INC do not need an epidural, require much less pain medicines. These patients will usually go home the day after surgery.

At home

You may continue these at home:

- Morphine
- Acetaminophen (like Tylenol)
- NSAIDs/anti-inflammatory (like Advil or ibuprofen)

Please follow our advice on page 38 to help prevent **constipation**. Being constipated means that your bowel movements (stool/poop) may become hard and difficult to pass.

Medicine like morphine may also cause itchiness, nausea, or vomiting. Tell us if this happens to you. We can usually adjust your medicine to lessen these side effects.



Pain after surgery

How much pain will you feel?

You will feel some discomfort after this surgery. This will gradually diminish over time.

You can expect to feel some or all of these at some point:

- pressure on the chest
- aching on the sides of the chest
- back tightness
- on your chest - a burning feeling or no sensation
- pain when you breathe deeply

How to manage your pain

Your job is to let us know where, when, and how it hurts.

Our job is to help manage your pain.

Everyone feels pain differently, so we cannot know exactly how you feel just by looking at you. By letting us know how you feel, we can provide pain relief when you need it.

Why is pain relief so important?

Pain relief helps you:

- breathe easily
- move easily
- sleep better
- eat better
- recover faster



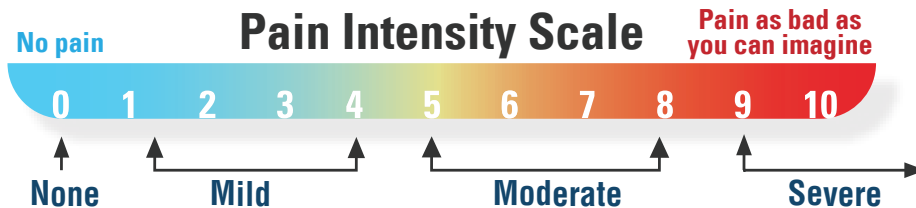
Remember – do not hide your pain. Having pain can make you not want to move around. Good pain control can speed up your recovery.

Questions we will ask you

The questions we ask will help your nurse decide how to manage your pain.

Using the Pain Intensity Scale, how much does it hurt?

Tell us how much it hurts, using the pain scale from 0 to 10.



0 means no pain. 10 is the worst pain you can imagine.

We will work on keeping your pain score low (usually around 3 or 4) so you are comfortable most of the time.

How does it hurt?

Describe your pain with words such as burning, pressure, or pinching. You may come up with your own words to describe what you are feeling.

When does it hurt?

Tell us when it hurts. For example, does it hurt when you move, when you take a deep breath, all the time?

What makes your pain better or worse?

Is there something that seems to make the pain better? Is there anything that makes it worse? For example, an afternoon nap or shower may help or not. Let us know.

What can you do when the pain gets worse?

Tell someone who can help

When the pain gets worse, tell someone about it – your health care team or your parents. Your nurse can give you medicine to make you more comfortable.

**Do not wait until it hurts too much.
Tell us if you are in pain. We can help.**

Distract yourself

You can also try to keep yourself busy or distract yourself. Electronic devices, TV, or music, are ways to keep your mind off the pain.

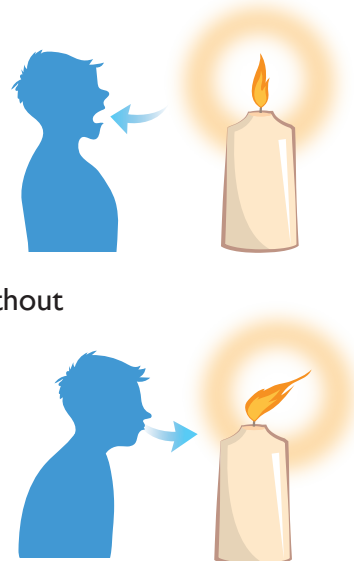
Move or change positions

You can also try changing positions or using ice or a warm pack. Move regularly (follow the instructions we give you for after surgery), even if it feels uncomfortable at first. This will help your muscles loosen up and will usually prevent the pain from getting worse.

Use visual imagery – the candle

A technique called “imagery” can also lessen the pain. People who use it often feel more relaxed and feel less pain. Here is how it works.

- Imagine a big candle in front of you, with a lovely big flame. You can give it the shape and color you like.
- Close your eyes.
- Breathe in slowly. Feel the air gently filling your lungs.
- Softly blow on the candle, just enough to move the flame without blowing it out. Imagine the flame moving with each breath.
- Repeat this 10 times - ten breaths in, ten breaths out.
- See how you can control your breathing. The air goes in and out gently. After each breath out, you feel better.
- Notice that your shoulders and your back muscles are more relaxed. Your whole body is more relaxed. Appreciate how much control you have over your body and mind.



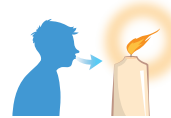
Daily Goals after surgery

One parent or caregiver can stay overnight with you.

Day 0 (Day of Surgery)

Integrative medicine
Do your breathing exercises,
guided imagery, or self-hypnosis

3 times
every day



Use your inspirimeter
Breathing & coughing exercises

Once every hour you are awake

An inspirimeter is a small machine that helps you breathe deeply to prevent lung problems. To use it:



- Put your lips around the mouthpiece. Breathe in deeply, and try to hold the red ball up for 2 to 4 seconds.
- Take out the mouthpiece. Breathe out. Rest for a few seconds.
- Repeat this exercise 10 times every hour while you are awake.
- Take a deep breath and cough. If you have some secretions, cough them up.

Leg Exercises

This helps with blood flow in the legs. Repeat each exercise 4 to 5 times every half hour while you are awake.



- Circle your feet to the right. Circle your feet to the left.
- Wiggle your toes and bend your feet up and down.
- Stretch your legs out straight.

Diet

Clear liquids only



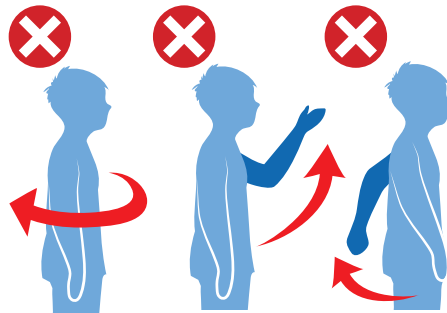
Chew Gum

15-30 minutes, 1 time



Activity - Remember

- Sleep on your back.
- Do not roll around, twist around or turn on your side.
- Watch your posture. Bend at the hip when sitting. Do not slouch or slump when sitting.
- Do not reach your elbows above your shoulders. Do not reach your hands out far in front or in back.
- It is important to move around soon after surgery. Start your exercises in bed when you wake up. Continue them while you are in hospital. These exercises help to prevent pneumonia, blood clots, and muscle weakness, and will help you recover.



Activity – Bed angle

Sit up in bed with the nurse's help.

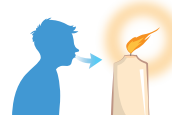
If possible, start to get up from bed. Your nurse should or physio can help (not your parent at first)



Day 1*

Integrative medicine
Do your breathing exercises,
guided imagery, or self-hypnosis

3 times
every day



Use your spirometer
Breathing & coughing exercises

Once every hour you are awake

An inspiriometer is a small machine that helps you breathe deeply to prevent lung problems. To use it:



- Put your lips around the mouthpiece. Breathe in deeply, and try to hold the red ball up for 2 to 4 seconds.
- Take out the mouthpiece. Breathe out. Rest for a few seconds.
- Repeat this exercise 10 times every hour while you are awake.
- Take a deep breath and cough. If you have some secretions, cough them up.

Leg Exercises

This helps with blood flow in the legs. Repeat each exercise 4 to 5 times every half hour while you are awake.



- Circle your feet to the right. Circle your feet to the left.
- Wiggle your toes and bend your feet up and down.
- Stretch your legs out straight.

* If you had INC to manage your pain, your daily goals and time in hospital will be different from what is described on each page.

Activities described for Day 1-2-3 will happen in 1 or 2 days. You may be able to leave the hospital on Day 1.

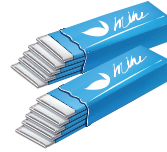
Diet

Move to a light diet
(when clear liquids
are tolerated)



Chew Gum

30 minutes, 3 times every day



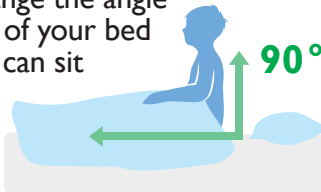
Activity - Remember

- Sleep on your back.
- Do not roll around, twist around or turn on your side.
- Watch your posture. Bend at the hip when sitting. Do not slouch or slump when sitting.
- Do not reach your elbows above your shoulders. Do not reach your hands out far in front or in back.
- It is important to move around soon after surgery. Start your exercises in bed when you wake up. Continue them while you are in hospital. These exercises help to prevent pneumonia, blood clots, and muscle weakness, and will help you recover.



Activity – Bed angle

Start to change the angle
of the head of your bed
so that you can sit
straight up
(up to 90°)



Activity – Sit in Chair

With the help of a
physiotherapist, nurse,
or parent, get out of
the bed to sit in the
chair at least 2 times
per day



Activity – Walk

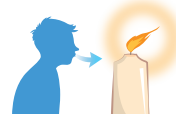
With the help of a
physiotherapist, walk
to the chair at least
2 times per day



Day 2*

Integrative medicine
Do your breathing exercises,
guided imagery, or self-hypnosis

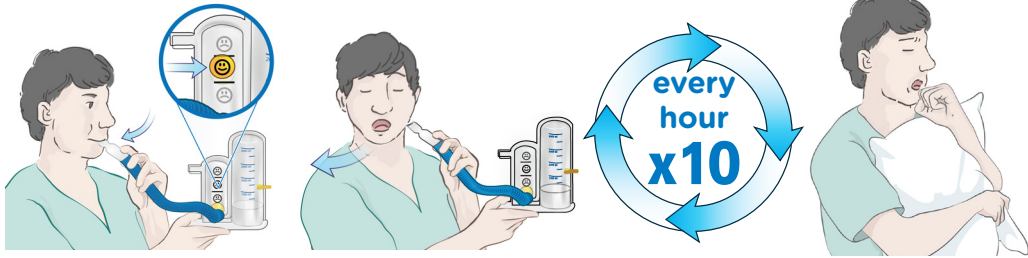
3 times
every day



Use your spirometer
Breathing & coughing exercises

Once every hour you are awake

An spirometer is a small machine that helps you breathe deeply to prevent lung problems. To use it:



- Put your lips around the mouthpiece. Breathe in deeply, and try to hold the red ball up for 2 to 4 seconds.
- Take out the mouthpiece. Breathe out. Rest for a few seconds.
- Repeat this exercise 10 times every hour while you are awake.
- Take a deep breath and cough. If you have some secretions, cough them up.

Leg Exercises

This helps with blood flow in the legs. Repeat each exercise 4 to 5 times every half hour while you are awake.



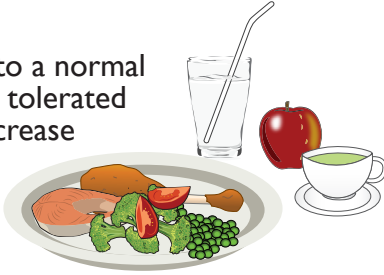
- Circle your feet to the right. Circle your feet to the left.
- Wiggle your toes and bend your feet up and down.
- Stretch your legs out straight.

* If you had INC to manage your pain, your daily goals and time in hospital will be different from what is described on each page.

Activities described for Day 1-2-3 will happen in 1 or 2 days. You may be able to leave the hospital on Day 1.

Diet

Move to a normal diet as tolerated and increase fibre



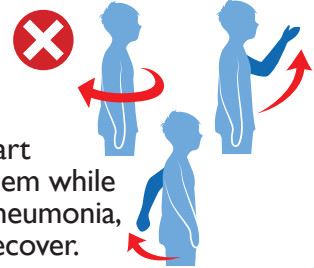
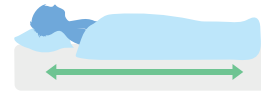
Chew Gum

30 minutes, 3 times every day



Activity - Remember

- Sleep on your back.
- Do not roll around, twist around or turn on your side.
- Watch your posture. Bend at the hip when sitting. Do not slouch or slump when sitting.
- Do not reach your elbows above your shoulders. Do not reach your hands out far in front or in back.
- It is important to move around soon after surgery. Start your exercises in bed when you wake up. Continue them while you are in hospital. These exercises help to prevent pneumonia, blood clots, and muscle weakness, and will help you recover.



Activity – Sit in Chair

Sit in chair 2 times per day



Activity – Walk

Walk 2 or 3 times per day (always accompanied)



Medicine

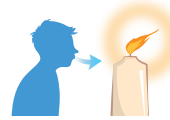
TRANSITION TO ORAL MEDICINE. On the evening of day 2, you will start taking oral morphine slow-release. You will be on this medicine for about 7-10 days. (You will not need this medicine if you had INC.)



Day 3* (or until you go home)

Integrative medicine
Do your breathing exercises,
guided imagery, or self-hypnosis

3 times
every day



Use your inspirimeter
Breathing & coughing exercises

Once every hour you are awake

An inspirimeter is a small machine that helps you breathe deeply to prevent lung problems. To use it:



- Put your lips around the mouthpiece. Breathe in deeply, and try to hold the red ball up for 2 to 4 seconds.
- Take out the mouthpiece. Breathe out. Rest for a few seconds.
- Repeat this exercise 10 times every hour while you are awake.
- Take a deep breath and cough. If you have some secretions, cough them up.

Leg Exercises

This helps with blood flow in the legs. Repeat each exercise 4 to 5 times every half hour while you are awake.



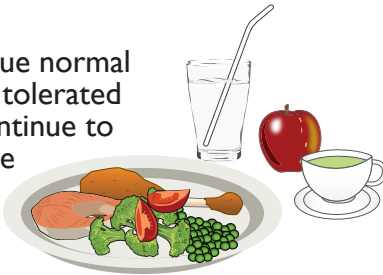
- Circle your feet to the right. Circle your feet to the left.
- Wiggle your toes and bend your feet up and down.
- Stretch your legs out straight.

* If you had INC to manage your pain, your daily goals and time in hospital will be different from what is described on each page.

Activities described for Day 1-2-3 will happen in 1 or 2 days. You may be able to leave the hospital on Day 1.

Diet

Continue normal diet as tolerated and continue to increase fibre



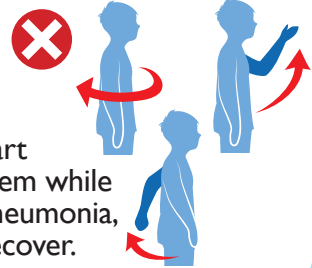
Chew Gum

30 minutes, 3 times every day



Activity - Remember

- Sleep on your back.
- Do not roll around, twist around or turn on your side.
- Watch your posture. Bend at the hip when sitting. Do not slouch or slump when sitting.
- Do not reach your elbows above your shoulders. Do not reach your hands out far in front or in back.
- It is important to move around soon after surgery. Start your exercises in bed when you wake up. Continue them while you are in hospital. These exercises help to prevent pneumonia, blood clots, and muscle weakness, and will help you recover.



Activity – Sit in Chair

Increase tolerance to sitting on chair



Activity – Walk

Walk 3 times per day (always accompanied)



Activity – Stairs

With the help of a physiotherapist, try the stairs



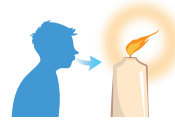
Medicine

Your epidural/ peripheral nerve block and PCA will be stopped and you will take orally Morphine immediate release. You will continue taking Acetaminophen, Ibuprofen, and other adjuncts.

Going home: Plan to go home before 12 pm

Integrative medicine
Do your breathing exercises,
guided imagery, or self-hypnosis

3 times
every day



Use your spirometer
Breathing & coughing exercises

Once every hour you are awake

An spirometer is a small machine that helps you breathe deeply to prevent lung problems. To use it:



- Put your lips around the mouthpiece. Breathe in deeply, and try to hold the red ball up for 2 to 4 seconds.
- Take out the mouthpiece. Breathe out. Rest for a few seconds.
- Repeat this exercise 10 times every hour while you are awake.
- Take a deep breath and cough. If you have some secretions, cough them up.

Leg Exercises

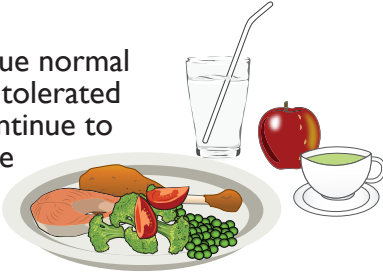
This helps with blood flow in the legs. Repeat each exercise 4 to 5 times every half hour while you are awake.



- Circle your feet to the right. Circle your feet to the left.
- Wiggle your toes and bend your feet up and down.
- Stretch your legs out straight.

Diet

Continue normal diet as tolerated and continue to increase fibre



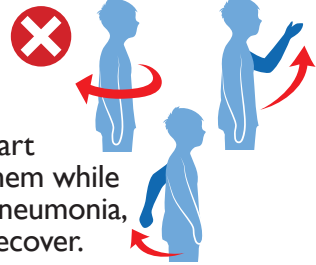
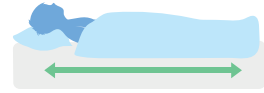
Chew Gum

30 minutes, 3 times every day



Activity - Remember

- Sleep on your back.
- Do not roll around, twist around or turn on your side.
- Watch your posture. Bend at the hip when sitting. Do not slouch or slump when sitting.
- Do not reach your elbows above your shoulders. Do not reach your hands out far in front or in back.
- It is important to move around soon after surgery. Start your exercises in bed when you wake up. Continue them while you are in hospital. These exercises help to prevent pneumonia, blood clots, and muscle weakness, and will help you recover.



Activity – Bed angle

With the physiotherapist, practice how to get up from lying flat. If you cannot do this alone, don't worry. You can still go home. We will teach a parent how to help.



Activity – Sit in Chair

Increase tolerance to sitting on chair



Activity – Walk

Continue walking 3 times per day (always accompanied)



Medicine

Before leaving the hospital, make sure you have a follow-up appointment with your doctor and a prescription for your medicine. Ask for a copy of your Xray and a letter from the surgeon.

At home – What can you do to help your recovery and what to expect?

The first 6-8 weeks after surgery...

You will have to change some of your movements during the first 6-8 weeks. This will ensure that the bar stays in place and will help get the best results.

What you can do and what you should avoid

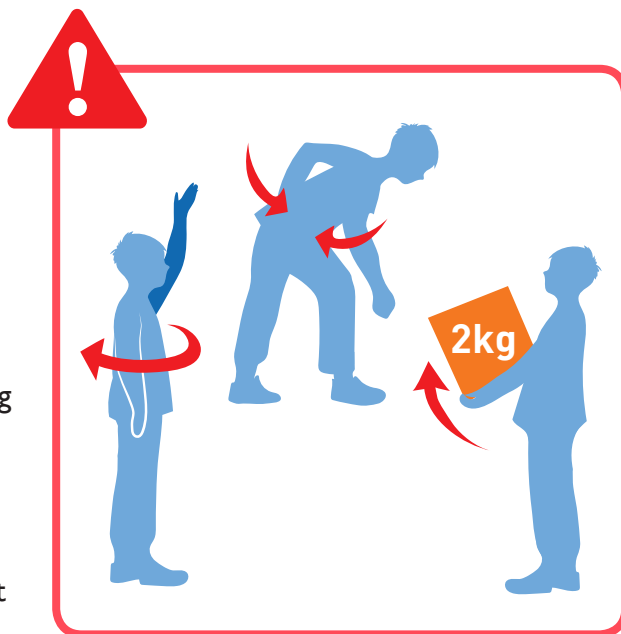
You should:

- shower when you get home, unless instructed otherwise by your surgeon. See suggestions on how to do so safely, below.
- take 10 deep breaths of 5 to 10 seconds twice a day
- keep your back straight and bend at the hips only
- continue getting in and out of bed as you learned in the hospital
 - sleep on your back at the beginning **(you may try to find a sleeping position that is more comfortable for you after the first couple of days)**
- walk several times a day. Increase the length of time gradually to a maximum of 30 minutes without stopping. Walking is excellent exercise, and no other physical activity is allowed during this time
- ask someone to walk beside you on the stairs until you feel confident
- remove objects from the floor that could make you stumble or fall
- return to school 1 to 3 weeks after surgery
 - think about how to carry your school material (the maximum weight allowed in a backpack is 2 kg)
 - get a bag with wheels
 - ask your school if they can lend you a copy of the books you need to use to keep at home
 - ask for help from a brother / sister / friend to put on your backpack and take it off



Avoid:

- bending your back forward, to the sides or **twisting your upper body**
- lifting your arms above the shoulders at more than 90 degrees
- lifting a weight of more than 2 kg
- putting pillows under your shoulders when lying down
- getting in positions that can put pressure on the rib cage and stomach muscles during the first 6 weeks

**How to take baths or showers**

You may take a shower or bath. Let the water run softly over your incision(s) and wash the area gently. Do not scrub.

To prevent falls, use a chair in the shower to sit down. Place a towel underneath so it does not move. Keep the bathroom door unlocked in case you need help.

How to take care of your incisions (cuts)

You will have small skin tapes, called Steri-Strips covering your incisions. Do not remove them. They will fall off by themselves. If they have not fallen off in 2 weeks, remove them yourself.

Your incisions(s) may be slightly red and uncomfortable after surgery. If the redness and pain are getting worse, let your surgeon know. It is normal to feel the ends of the bar under the skin, and it may seem more obvious as the swelling goes down.

At home – What can you do to help your recovery and what to expect?

The first 6-8 weeks after surgery...

How to sit and stand properly

Be sure to adopt a good posture right away!

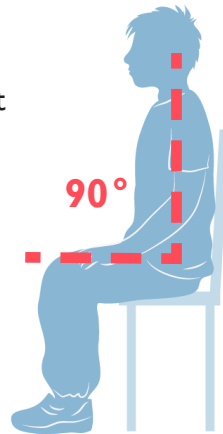
Standing Position

When standing, practice having the ear, the middle of the shoulder and the middle of the hip aligned.



Sitting Position

Keep your back straight. Support your feet by bending your hips at 90°. Avoid bending your back.



How to manage your pain

Follow the instructions your doctor and nurse gave you for treating your pain.

If the anti-inflammatory pain medicine (e.g. Celebrex or Advil) is causing burning or pain in your stomach, stop taking it and call your surgeon.

If you have severe pain that does not get better with the medicine, call your surgeon, the Acute Pain Service nurse or go to the emergency room.

How to manage nausea and constipation

Nausea can be a side-effect of these medicines.

They may also cause constipation. To help your bowels stay regular:



drink more liquids



eat more fiber (whole grains, fruits, vegetables, legumes, flax seeds, etc.)



have a hot beverage with your breakfast



get regular exercise
(a 10-minute walk is a good start)



take stool softeners your doctor ordered

What to eat and drink

You can eat anything you want to unless told otherwise by your doctor, nurse, or nutritionist.

Include foods that have protein to help your body heal. Meat, fish, poultry, and dairy products are good sources of protein. Be sure to eat protein-rich foods throughout the day (included in every meal) so your body can use proteins better.

If you find it hard to eat enough calories, try eating smaller amounts at each meal. Add nutritious snacks between meals, like:

- fruit + cheese
- yogurt + granola
- whole grain crackers + hard boiled egg
- trail mix (nuts + dried fruits)
- muffin + cow's milk or soy milk

If you are nauseous and cannot keep fluids down, call your surgeon.
To help with constipation, please read the previous section.

At home – What can you do to help your recovery and what to expect?

After 6-8 weeks, life gradually returns to normal...

You will be able to:

- start lifting your arms forward and sideways gradually until movements become complete
- slowly return to light aerobic activity swimming, jogging, cycling, badminton, etc.)
- return to contact sports, martial arts, and gymnastics 3-4 months after surgery, or as your surgeon indicates

After your follow-up appointments, your doctor will let you know if you need to see a physiotherapist. If you are worried about how you are improving, please speak with your doctor.



When to call your surgeon...

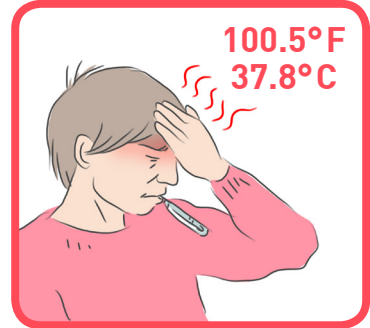
Call the hospital if you have any of these problems:



difficulty breathing



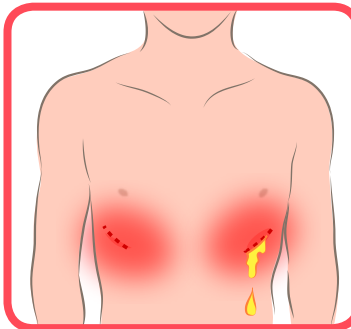
chest pain, for example, sudden pain during deep breaths, especially if combined with new bulging of the bar on the sides



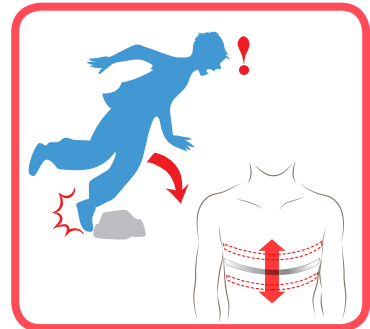
fever (temperature greater than 100.5° F or 37.8° C)



cough that does not improve



redness, drainage, pain or swelling at the incision



injury to the chest that could have caused the bar(s) to move

If you cannot reach your surgeon or the senior resident (fellow) in pediatric surgery, you can contact the nurses on the surgical floor. Otherwise, go to the MCH Emergency Department, or to a hospital closer to home.

Follow-up Appointments

You will have a follow-up appointment with your surgeon a few weeks after your surgery. This may be an in-person or a telehealth visit that you can have from home (using your phone, tablet or computer). We will give you information about your next appointment before you leave the hospital.

You will have these appointments over the next year:

- 2-3 weeks after surgery
- 3-4 months after surgery
- 1 year after surgery

*If you had a bar placed, you will have an appointment

- 6-12 months after the bar has been removed.

If you have any questions, phone us.

Dr. Sherif Emil: 514-412-4497

Dr. Jean-Martin Laberge: 514-412-4498

Dr. Hussein Wissanji: 514-412-4438

Other surgeon: _____

Questions you may have about daily living

- **How long does the metal bar stay in place?**

The bar remains in place preferably for 3 years, to prevent the sternum from returning to its original position.

- **How do we remove the bar?**

The surgeon will remove the bar as a Day Surgery, under general anesthesia.

- **Do I need a Medic Alert bracelet?**

Patients may apply for a Medic Alert bracelet. This will alert Emergency Medical Services personnel and other health care providers to push harder during compressions and to place defibrillation pads correctly due to the steel bar.

- **What do I do if I need an MRI?**

Before having a Magnetic Resonance Imaging (MRI), inform the radiologist that you have a metal bar (s) in your chest.

- **Do I need a letter for traveling? Will the bar set off the detectors at the airport?**

Although the bar should not trigger the metal detectors at the airport, it may. Your surgeon will give you a letter for when you travel. You will also have a picture of your chest X-ray which you can show.

- **When can I go back to school?**

You can return to school 1-3 weeks after surgery.

You should think about how to carry your school material (the maximum weight allowed in a backpack is 2 kg):

- get a bag with wheels
- ask your school if they can lend you a copy of the books you need to use
- ask for help from a brother, sister, or friend to put on your backpack and take it off

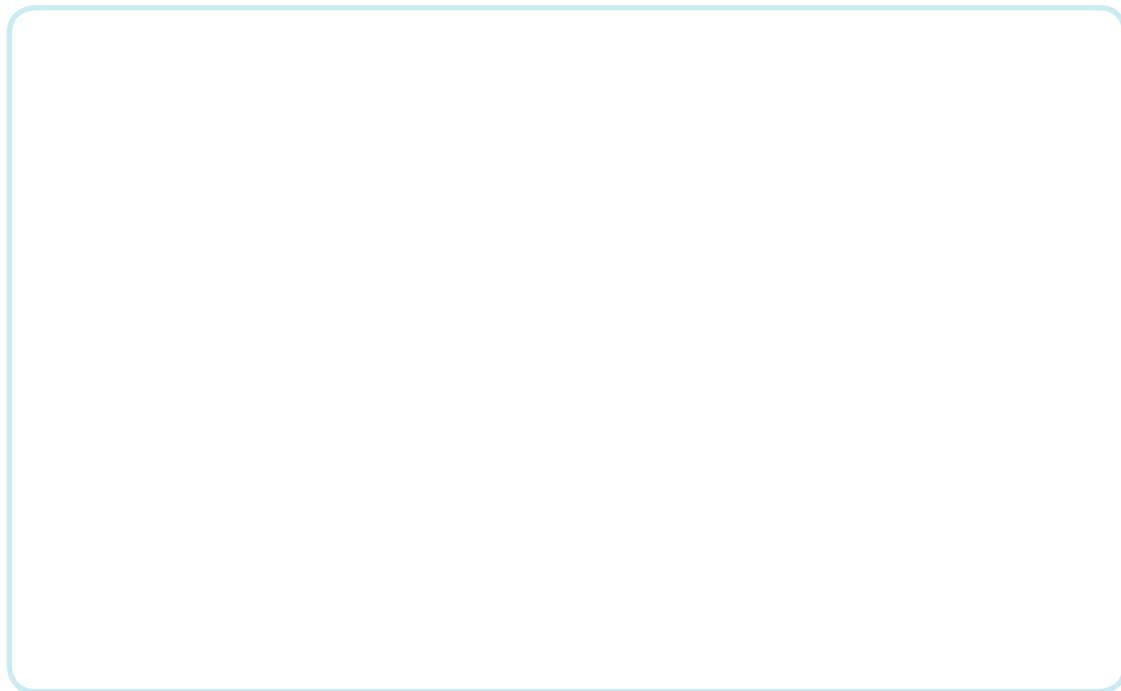
- **Activities – When can I start gym class or play sports?**

Walk several times a day. Increase the duration gradually to a maximum of 30 minutes without stopping. It is an excellent exercise and the only one permitted until 6 weeks after surgery. After 6 weeks, you may begin some sports, including some gym class activities. If you play contact sports, we recommend waiting 3-4 months. Every person recovers differently. Speak with your doctor at your follow-up appointment to find out if you are ready.

Resources

Personal Pain Medicine Diary

Once you are home, keep track of the pain medicines you are taking each day for 2 weeks.



Websites of interest for Patients

For more about NUSS:

<http://shrinerschildrens.org/chestwall/>

<https://www.chop.edu/conditions-diseases/pectus-excavatum>

Video of Nuss procedure:

<https://youtu.be/mduyxaQ3mmw>

Video of Reverse Nuss procedure:

<https://youtu.be/y44htI ZzVhw>

<https://www.shrinershospitalsforchildren.org/springfield/chest-wall-deformity>

Hospital Map



Montreal Children's Hospital

Shown on map as Blocks A & B

1001 Decarie Blvd, Montreal, Quebec H4A 3J1

Shriners Hospital for Children - Canada

Shown on map as S

1003 Decarie Blvd, Montréal, Québec H4A 0A9

Parking - Montreal Children's Hospital



Daily Rate

Less than 2 hours	FREE
2h - 3h59	\$6.25
4-24 hours	\$10.25

Parking Pass Rate

7 days	\$47
30 days	\$94 *

Parking Rate for Frequent User *

A frequent user is an out-patient who visits the hospital by car for their appointments or treatments at least ten (10) times per month.

* These parking rates do not apply to the staff nor its physicians.

* Certain conditions apply.

7 days	\$23.50	Unlimited entry and exit at the hospital where the pass was purchased. Certain conditions apply
30 days	\$47	

10 visits (flexible)	\$30	1 entry and 1 exit per visit, no expiry date
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Where to Pay



By debit card or credit card
Visa or MasterCard

**Customer Service
Parking Office**



By credit card
Visa or MasterCard

Barrier gate at exit
(hourly parking only)

Contact Us



Parking Service Desks
Montreal Children's Hospital

Location
A RC.1000

Extension
23427

Parking - Shriner's Hospital

Free parking for our guests is underground at the P3A level in the 100 area. To get to the public parking area, guests must drive past all the hospitals, turn left onto the contour road and immediately turn left again into underground parking. The moment you are going down the ramp towards the parking, you must look up to see the signage, take a ticket at the wicket and follow the signage for Shriners Hospitals for Children — Canada all the way to P3A 100, where you will find the parking entrance directly into level SS2 of the hospital.

Families must bring their parking ticket to the front desk for validation. Once in the hospital through the SS2 doors, please take the elevators that you will find in the museum up to RC.

Important: the families of children treated at Shriners Hospitals for Children who wish to take advantage of the free parking must park in the underground parking in the P3A – 100 area. Free parking does not apply to the express parking outdoors.

<https://www.shrinershospitalsforchildren.org/montreal/getting-here>

Shriners Hospitals for Children – Canada

1003, boulevard Décarie

Montréal, Québec H4A 0A9

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Notes

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