



Children's Hospital Boston

Nasal and Sinus Surgery for Children

**Department of Otolaryngology & Communication Enhancement
Pre-operative Informational Series**



childrenshospital.org/oto | 617-355-6462

Introduction

This booklet will explain the details of the most common nasal and sinus surgical operations so that you may be better able to make an informed decision about the desirability of surgery for you or your family member.

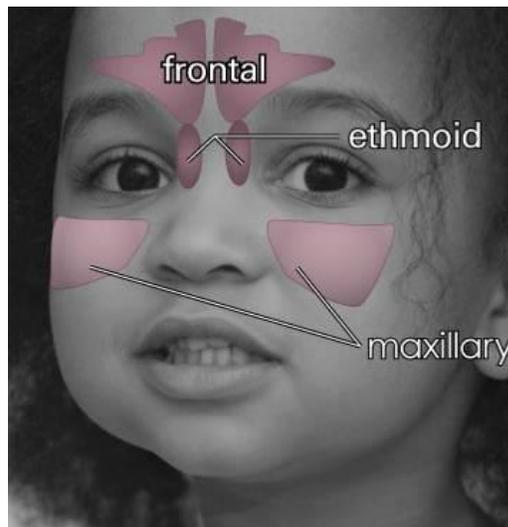
Why intranasal and sinus surgery?

Intranasal surgery is recommended as part of comprehensive care for a number of conditions affecting the nose and sinuses. Breathing through the nose may be reduced because of an abundance or misplacement of certain tissues. There may be an infection, growths, or polyps within the nose or sinuses which must be removed.

At times it is necessary to enter one or more of the sinuses. Such surgery may improve the passage of air into that sinus, remove infected or diseased tissue in the sinus, or investigate the state of the sinus with suspected sinus disease. Another reason to enter the sinus is gain access to vital structures located behind or around the

sinus, such as blood vessels supplying a nose bleeding uncontrollably.

In order to better understand the need for nasal and sinus surgery, it is important to understand certain information about the normal nose and sinuses and changes that are caused by disease.



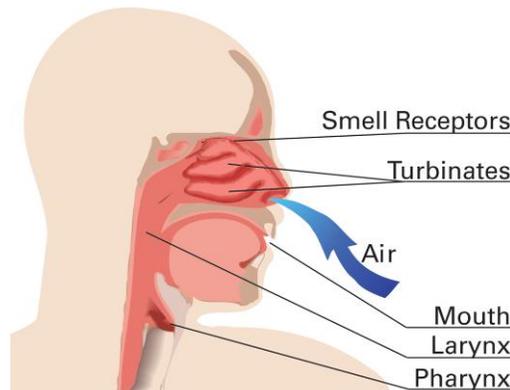
The normal and diseased nose and sinus

The nose serves as an air duct to direct inhaled air into the lungs. The nose warms and humidifies the air that passes through it. Unmodified dry and cool room air that enters the windpipe and lungs may

produce crusting of mucus and ultimately partially block the airway.

The nose also contains specialized receptors, which react with fragrances in the air to produce a sense of smell. In order for this sense of smell to operate properly, the linings within the nose must be moist and the airway within the nose must be open sufficiently to permit the fragrances to reach the smell receptors.

The nasal cavity is divided into right and left sides by a wall called the nasal septum. This wall is built somewhat like a sandwich: nasal lining on either side of a central supporting structure composed of cartilage and bone. The cartilage and bone are frequently broken or displaced by injuries to the nose. Such injuries may occur at any time in life. Even the trauma of passing down the birth canal may cause some displacement.



along the sides of the nasal cavity. This swelling may be caused by dryness, allergies, infection, malfunctioning nervous control of the nose, or a combination of several of these factors.

Swelling of the linings of the nose may be generalized or localized. A common localized type of swelling is the *nasal polyp*, which is tissue

The displacement of the nasal septum, called a nasal septal deviation can lead to the narrowing of one side of the nasal cavity and enlargement of the opposite side. If there is sufficient deviation to one side, it may be impossible for any air to pass through that side of the nose. In this case the opposite side conducts all of the air into the throat. In some persons the septal deviation is “S” shaped. The displaced septum blocks the front portion of one side of the nasal cavity, but it also blocks the rear portion of the other side. Both sides of the nose are blocked forcing one to breathe through the mouth.

engorged with liquid and hanging down from the upper walls of the nose into the airway. Nasal polyps interfere with breathing and occur in allergic individuals, but control of allergies does not always result in control of the polyp’s growth or re-growth after medical or surgical therapy. True nasal polyps are not tumors. It is often difficult to differentiate the two entities without removal and examination under the microscope. Often the polyps may be shrunken by the use of certain steroid nose sprays.

Blockage of one or both sides of the nasal airway may also occur because of swelling of the nasal linings, particularly those located

Breathing dry air causes the lining of the nose to swell since blood flow to the nose must increase in order to carry additional fluids to the surfaces of the nasal linings. If the dry air produces crusting of the nasal

linings, the nasal linings may also swell due to damage by the crusts.

Allergies to air-borne substances such as pollen, dust, molds and animal debris frequently cause swelling of the nasal linings. Chronic infections of the nose or sinuses may also cause troublesome swelling of the nasal linings.

The four pair of paranasal sinuses are air reservoirs located around the sides and above the nose. They are connected to the nasal cavity by small openings located along the sides of the nose. The sinuses stockpile a supply of moist, warm air and occupy variable amounts of space beneath the surface of the face so that we each have a unique facial appearance.

In many circumstances your doctor may recommend a special X-ray called a CT Scan in order to better identify if there is disease affecting your child's sinuses. This will also assist your doctor in determining whether endoscopic surgery is feasible.

The sinus ventilation system is unique.

There is only one ventilation tunnel between each sinus and the nasal cavity. Infections or allergies may cause swelling of tissues

around that tunnel causing blockage.

The blockage may lead to pooling of mucus within the sinuses causing infection.

The infection creates further swelling of the tissues around the tunnel.

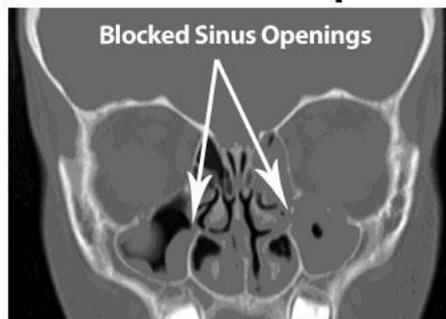
Medical treatment of nasal and sinus disease

It is usually

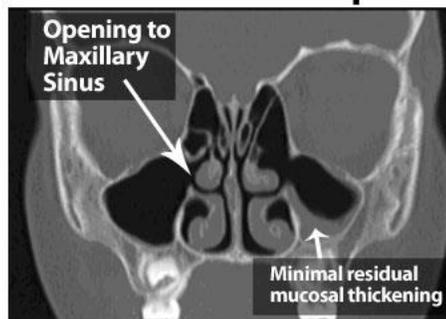
advisable to first treat nasal and sinus disease using medical therapy. Surgery is usually reserved for problems resistant to medical treatment or for problems which require immediate removal of nasal tissue. Sometimes direct access to the sinuses and sinus tissues is necessary with tumors, severe sinus fractures or infections

Nasal blockage due to a deviated nasal septum may be compounded by other

Sinusitis Preop



Sinusitis Postop



CT scans

problems that cause swelling of the nasal linings such as dryness, allergies, polyps or infection. It is important to identify and treat these problems before resorting to septal surgery.

Medical treatment of sinus disease includes the use of antibiotics to help control the infection and indirectly reduce swelling of the sinus linings. Other medications such as decongestants, administered as nose drops or taken by mouth, may directly reduce the swelling of nasal and sinus tissues.

Antihistamines may also help reduce such swelling particularly in the allergic patient.

Nasal steroid sprays may also help reduce nasal congestion associated with allergy.

Many individuals with chronic nasal blockage, chronic nasal disease, and even certain types of chronic sinus disease can live safely and relatively comfortably with their problems. For this reason, the potential side effects, risks and complications of prolonged medical treatment versus a surgical procedure must be weighed against the probable benefits of each.



What to do at home before surgery

Recovery from surgery produces a significant stress on the body. Even relatively minor surgery such as a nasal polypectomy may induce fatigue for several days up to a week. Complicated and extensive sinus surgery creates even greater stress on the body.

One should prepare for surgery as if he or she were preparing for an athletic event. Children should get an abundance of rest and should eat healthy foods regularly for at least two weeks prior to surgery.



Do not take aspirin or aspirin-containing products (Advil™, Motrin™, Ibuprofen, Bufferin™, Alka-Seltzer™, etc.) for two weeks prior to surgery. These drugs interfere with platelet function and may cause significant bleeding problems. If the patient requires a medication for pain relief or fever control, aspirin substitutes such as Tylenol™ (Acetaminophen) may be used.

If your child is currently taking medication, continue its use up to the night before surgery. At the time of admission, be certain to notify the doctor completing your child's physical examination about any medications that your child should be taking while in the hospital. If the medication has not been ordered, the nurses will notify us so that we may arrange for your child to receive it.

What is a pre-operative evaluation?

Your child may need to come to the hospital within 30 days prior to the surgery for a pre-operative evaluation. At this time an anesthesiologist will assess your child's medical/surgical history. He/she will also explain the risks of general anesthesia. A nurse will also review what you can expect during hospitalization. You may also meet with a representative from the hospital Business Office if there are any concerns regarding your insurance. This pre-operative evaluation takes place in the Admitting Office and may last as long as two hours. In an effort to avoid confusion, we ask that only a parent and child who is having surgery come to this meeting.



Since your child will be having general anesthesia, certain laboratory tests may be performed during this evaluation. These include a red and white blood count to determine if your child is anemic or has evidence of a recent infection. The blood's chemical composition and ability to clot may also be tested. Children with more complicated medical histories may also have a chest x-ray and an electrocardiogram. These tests check for the presence of disease in the heart or lungs prior to surgery.

If you feel that your child should have additional laboratory tests or that one of the above mentioned tests should be omitted, please communicate this to us or to other members of our staff.

Just before the operation

It is absolutely necessary that your child have nothing to eat after midnight prior to the scheduled surgery. Clear liquids (apple juice and water) may be drunk up to two hours before surgery. **Do not allow your child to have any milk, gum, lollipops or hard candy on the morning of surgery.** This is necessary in order that your child's stomach be empty. Sudden nausea and vomiting during the

induction of general anesthesia could cause food material in the stomach to enter the windpipe and lungs.

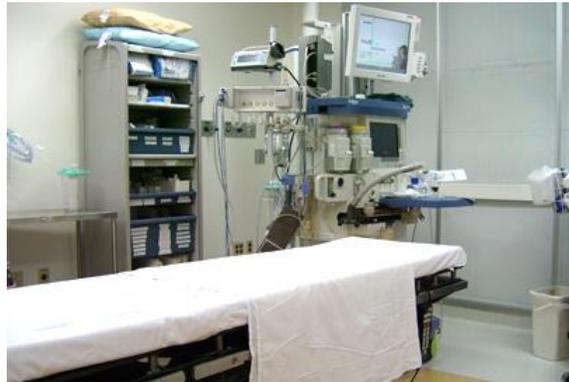
In the pre-operative area we will usually have an opportunity to see you and your child to answer any last minute questions.

If you have any important questions regarding the procedure itself, its benefits, risks or complications which have not been previously answered

by either reading this pamphlet or by our prior discussions, it is best to discuss these matters before your child comes to the hospital on the day of surgery. Please be certain to contact us so that we may discuss your concerns in detail.

Prior to leaving the pre-operative room enroute to the operating room, your child may receive preliminary anesthetic medications as ordered by the anesthesiologist. These may include a sedative and are usually administered orally.

After your child leaves the pre-operative area, he or she will go into the operating room where general anesthetic will be administered, usually by mask. In older



children and adolescents, a plastic intravenous catheter will be placed in the hand or arm in the holding area. Once your child is asleep, anesthetic gases will be used to maintain a pain-free state during the remainder of the operation.

Once your child is asleep, a breathing tube called an endotracheal tube will be carefully placed by the anesthesiologist. This tube permits us to protect the airway and maintain adequate

breathing during the operation.

The operations: details and potential complications

NASAL SURGERY: Nasal polypectomy

Once anesthesia is induced, nasal polyps can be removed from each nasal cavity. The tissue will later be examined under the microscope to confirm the diagnosis of a benign nasal polyp. The report is usually available by the time of the post-operative examination.

Usually the bleeding induced by this operation is minimal and stops during the procedure itself. Packing is not routinely used. However, in some instances, it may be necessary to temporarily pack the nose at the conclusion of the operation. If such packing becomes necessary, it will either be removed prior to discharge or several days later in the office.

When your child returns home, he or she should pursue quiet activity for one week. If you note any oozing of bloody material from your child's nose, you should notify us.

NASAL SURGERY: Nasal septal reconstruction

This operation is designed to straighten the nasal septal wall in order to improve the airway on one or both sides. Portions of the cartilage and bone which protrude out into the airway may be removed as part of the operation. Commonly the only incision necessary is made inside the nose and is not readily visible.

After removal of any bone and cartilage, packing is placed into the nose in order to hold the linings against one another during the early phases of the healing process. This packing is usually removed during the first or second day following surgery. In some cases, it is desirable to leave some packing material, usually pieces of silicone sheeting,

in place for a longer period of time. This sheeting is then held in place with sutures, which will be removed in the office or for the anxious patient, in the operating room.

Removal of cartilage and bone may reduce the strength of the nose, making it more vulnerable to injury if an accident should occur. For this reason, individuals regularly participating in contact sports should consider delaying septal surgery until they are no longer at high risk for sustaining an injury to the nose.

NASAL SURGERY: Partial turbinate reduction

Patients with an abundance of reactive nasal lining tissue may benefit from removal of a portion of the lining tissue and its underlying bone. The tissue removed is usually a portion of the inferior turbinate, one of the baffles located on the side walls of the nose. Often this procedure is combined with surgery on the nasal septum and performed under general anesthesia.

This type of surgery usually requires a prolonged period of healing within the nasal cavity for new surface linings to form. This period may be as long as several months and is associated with crusting and often blood-tinged material within the nasal cavities. It will be necessary to use

lubricating nose drops and a good air humidification system during this time.

The major complications associated with this type of surgery include a prolonged healing phase and excessive dryness of the nasal cavity. If the remaining tissue lining is insufficient to humidify the incoming air, excessive crusting and dryness will occur.

The healing phase may be prolonged by such dryness and can persist indefinitely. In time the nose is once again able to provide effective humidification, but occasionally this does not occur.

Lubricating nose drops (saline, Ocean Mist™) may then be used on a regular basis.



Endoscopic surgery usually requires no external incision since all surgery is either performed through the nasal cavity or through the front wall of the sinus by making a tiny incision in the gum inside the upper lip.

Complications associated with endoscopic sinus surgery include bleeding, infection, swelling or numbness of the cheek, lips and teeth on the operated side and loss of sense

of smell. These complications are extremely rare with endoscopic surgery. Additionally, many of the sinuses are in close proximity to the eyes and brain, so injury to these structures is possible but rarely seen.

Many of the operations

Endoscopic sinus surgery

Today, the nose and sinuses are examined and treated by using telescopes passed either through the nasal cavity or in some cases through the front wall of the sinus. This is called endoscopic sinus surgery. This type of procedure may not be appropriate for the management of sinus disease in every patient.

which are discussed in detail in this pamphlet may be done endoscopically if your doctor feels that is appropriate. These operations include nasal examination under anesthesia, nasal polypectomy, partial turbinate reduction, maxillary sinus surgery, ethmoid sinus surgery, frontal sinus surgery and sphenoid sinus surgery.

SINUS SURGERY: The maxillary sinuses

The maxillary sinuses are located in the cheeks and extend backward under each eye socket. In endoscopic maxillary sinus surgery, your child's surgeon places a small scope through the nose to better view and open the sinus and remove diseased tissue. Sometimes the sinus may be examined and disease treated using a tiny scope passed either through the nasal cavity or through the front wall of the sinus. *Endoscopic sinus surgery* is not appropriate for managing all types of problems.

Problems associated with surgery on or around the maxillary sinus include *swelling* of the cheek and *numbness* of the cheek, lips, and teeth on the operated side. The swelling of the cheek usually peaks between 18 and 30 hours after the operation and then gradually resolves. Usually the face will not become black and blue.

The numbness and peculiar sensations in the lips, face and teeth are due to the effects of the surgery upon branches of the *infraorbital nerve* which supplies sensation to these regions. The stretching of the lip

during surgery coupled with swelling which occurs after the operation leads to **temporarily** diminished function of the nerve. It may take anywhere from days to as long as a year for normal function to return to the nerve. In rare cases, particularly in the presence of infection, completely normal function may never return.



SINUS SURGERY: The ethmoid sinuses

The ethmoid sinuses are located deep in the face on either side of the nose, extending backward next to the sides of the eye sockets. These sinuses may be entered either through the nose or

through incisions made through the skin between the corner of the eye and the bridge of the nose. The approach through the nose is satisfactory for surgery involving nasal polyps. Ethmoid surgery conducted within the nose may be completed using a tiny scope and other instruments. This endoscopic sinus surgical technique permits better visualization of vital structures.

A serious risk associated with ethmoid sinus surgery is the development of one or more *eye problems* during or after surgery. This is

a rare occurrence. Swelling in the eye socket may temporarily reduce mobility of the eye causing double vision. It may also cause decreased function of the drainage system which carries tears away from the lid troughs. It is not unusual to notice tears spill over into the face for a limited time after surgery. This problem is usually self-limited, but, in occasional cases, a small operation is required to reopen a tear duct blocked with scar tissue.

If unusual bleeding or swelling should occur in the vicinity of the nerve supplying the eye, your child's vision could be impaired. The occurrence of this complication is an emergency and could require immediate surgery to remove packing or reduce pressure around the eye.



disease is noted, your surgeon may recommend an open approach. Entry to these sinuses is accomplished by creating an incision.

Once the incision is made, a "door" in the front wall of the sinus is created with the aid of the sinus CT obtained prior to surgery. Because the front wall of the sinus may be involved with the disease process, as with a depressed skull fracture, sometimes the sinus must be entered through its floor. This

type of entry requires an incision just below the eyebrow.

Once the sinus is entered, disease is removed. Surgical treatment for severe chronic frontal sinus

disease includes the removal of the entire lining of the sinus.

SINUS SURGERY: The frontal sinuses

The frontal sinuses are located in the forehead just above the eyebrows. The frontal sinuses can be accessed endoscopically or through an open approach. In some instances an endoscope can be used to widen the opening to the frontal sinus. If more extensive frontal

The most frequent complication after frontal sinus surgery is prolonged swelling and is often associated with discomfort. This problem varies with each individual. Other complications depend upon the nature of disease for which the frontal sinus has been opened. The operation may not be successful in eradicating the recurrent infections, headaches or visual problems. In occasional cases the fat placed within the

frontal sinus may fail to establish a blood supply and an air-filled sinus will remain.

SINUS SURGERY: The sphenoid sinus

The sphenoid sinuses are located deep inside the skull at the back end of the nasal cavity. These are accessed with telescopes through the nostrils.

The risk associated with this type of surgery may be the development of bleeding, or one or more eye problems during or after the operation. These complications are usually **extremely rare** but must be considered when surgery is discussed.

An additional complication associated with sphenoid sinus surgery is the leakage of brain fluid (spinal fluid) into the sinus. This occurs when a small crack develops in the wall of the sinus. Because of the close proximity of the sinus to the brain tissue, this can be a troublesome problem requiring repair with another operation. Again, this complication is extremely rare but also must be considered.



After the general anesthetic

After surgery is over, your child will be awakened from general anesthesia. This aspect of the procedure may prolong your child's stay in the operating room, but it is important that your child be reasonably awake before the endotracheal tube is removed. After your child is awake enough to return to the recovery room, we will meet with you to discuss the results of the

operation.

Your child will remain in the recovery room between one and one-half hours after the operation until the breathing patterns are satisfactorily stabilized.

Occasionally, if there was an undue reaction to anesthesia, it may be necessary to leave the endotracheal tube in place in the recovery room. If prolonged placement of the endotracheal tube is necessary, your child may be transferred to the intensive care unit for closer observation.

The recuperation period

The recuperation period begins as soon as the recovery from anesthesia is complete. A major goal is to gradually increase fluid intake in order to maintain normal fluid

balance and to promote healing. During the first hours of this period, your child may have a gastrointestinal reaction to the anesthesia manifested as nausea and vomiting. We will order medication that the nurses administer to reduce this response. If your child experiences such a reaction, please be certain to request this medication.

Your child's nose or face may be uncomfortable after surgery. Pain medications will be ordered to help lessen some of the associated pain. A non-aspirin pain reliever such as Tylenol™ may be administered every four hours as a general pain reliever and may be supplemented with more powerful narcotic medications, administered either by IV or by mouth. Narcotics tend to interfere with bowel function and ultimately may induce gastrointestinal discomfort.

Packing blocking your child's nose will make eating and drinking less pleasurable, however your child should begin drinking fluids as soon as the stomach is settled. Fluids maintain the body's hydration, and must be adequate before removing your child's intravenous access.

After surgery the nose may be packed overnight and possibly for several days. Your child may be given post-operative antibiotics to help suppress bacterial growth in the

healing nose and sinus cavities. In most cases, your child will be discharged the day following surgery. If there are any post-operative concerns, your child may need to stay longer for observation.

General risks and complications

We have already outlined specific risks and complications for each type of surgical procedure. In this section we will discuss more general issues associated with this type of surgery.

The most common issue associated with nasal and/or sinus surgery is bleeding from the operative site. This will most frequently occur during the first two days following the operation but may occur later in the healing process. Bleeding generally occurs if a small blood vessel, which appeared closed during the operation, opens during the post-operative period. It may also occur if crusty material strikes healing tissue and exposes a blood vessel beneath. Although most bleeding is self-limited, continued bleeding may indicate a major complication and requires a doctor's examination. In rare cases, repacking with or without re-admission to the hospital may be necessary.

A second problem involves *post-operative infection*. This is usually manifested by a fever, continued or increased swelling at the

operative site, or development and persistence of pain and redness at the operative site. If these symptoms occur, you should contact us at once. Your child may be taking an antibiotic to prevent infection, but occasionally infection occurs even while taking antibiotics, necessitating a change. If your child is not on an antibiotic and develops an infection, we will prescribe antibiotics.

A third complication involves a reaction to the *general anesthetic* used. These reactions occur uncommonly and in practically all cases are well treated by medication and/or discontinuation of the general anesthetic.



Post-operative care

Recovery from a general anesthetic and surgery requires a considerable amount of energy on the part of the body. Your child should not return to normal activity including school for at least one week following the operative procedure. Your child may pursue quiet activity at home but need not stay in bed. Keep in mind that your child will likely not feel completely recovered for a least a week or two, depending on the type of operation.

Your child's diet should include soft, cool foods which minimize the amount of muscular work that the mouth and facial muscles must do after surgery. By the end of a ten-day to two week period, your child may return to a completely normal diet.

We cannot stress too strongly that fluid intake must be maintained. This will prevent your child from becoming dehydrated.

Dryness is the enemy of the nose and sinuses, particularly after surgery. Use a humidification system such as a steam vaporizer or larger humidifier to maintain the relative humidity in your child's surrounding at the 50-60% level. To avoid

bacterial growth, rinse and refill the vaporizer daily.

Your child may be given an antibiotic to take by mouth. If we have prescribed one, give it regularly as it will reduce the chances that a post-operative infection may occur and delay the healing process. You may also be given nose drops or nose spray to use after surgery. Be certain your child uses the medication as directed. It is designed to lubricate the nasal linings and to minimize

swelling of tissues during the healing process.



Do not allow nose blowing for at least two to three weeks after surgery or as directed by your physician. Such actions could induce bleeding or force air up into the sinuses and displace tissues from their normal positions.

The appearance of blood-tinged mucus usually indicates your child is not keeping the nasal or sinus linings moist enough, and efforts toward humidification should be intensified. If you notice any persistent bleeding, please notify us.

Post-operative evaluation

We will schedule a routine post-operative visit approximately two weeks following the surgical procedure. At that time we will assess your child's progress and the degree of healing. Additional visits on a weekly or biweekly basis may be necessary to clean the operative site of crusts and to assess healing. If a plastic plate was sutured within the nose, this will usually be removed after two to three weeks.

Good communication with us will be absolutely necessary to ensure that you obtain an optimal result from your child's surgery. If you have questions or concerns, please be certain to discuss them with us.

If you notice any evidence of bleeding, please notify us. In most cases you should bring your child immediately to the hospital emergency room. We or one of our associates will meet with your child for an emergency examination.

How to reach us

During the day

- Call the ORL Nursing line: 617-355-7147.
- If your issue is not urgent, and you reach voicemail, leave a message and we will usually be able to return your call in 1-2 hours.
- If your issue is urgent, and you reach voicemail, listen to the end of the message and you will hear instructions as to how to page the nurse on call for immediate attention.

Nights, weekends & holidays

- Call the Children's Hospital Boston paging operator at 617-355-6369. Ask for the ORL doctor on-call and give the operator your name and phone number.
- Set your phone to received blocked caller IDs. Most of our physicians have blocked caller IDs and will not be able to reach you if your phone blocks these calls.
- To schedule an appointment at any of our locations, please call 617-355-6462 from 8:30 a.m. to 5:00 p.m. Monday through Friday.