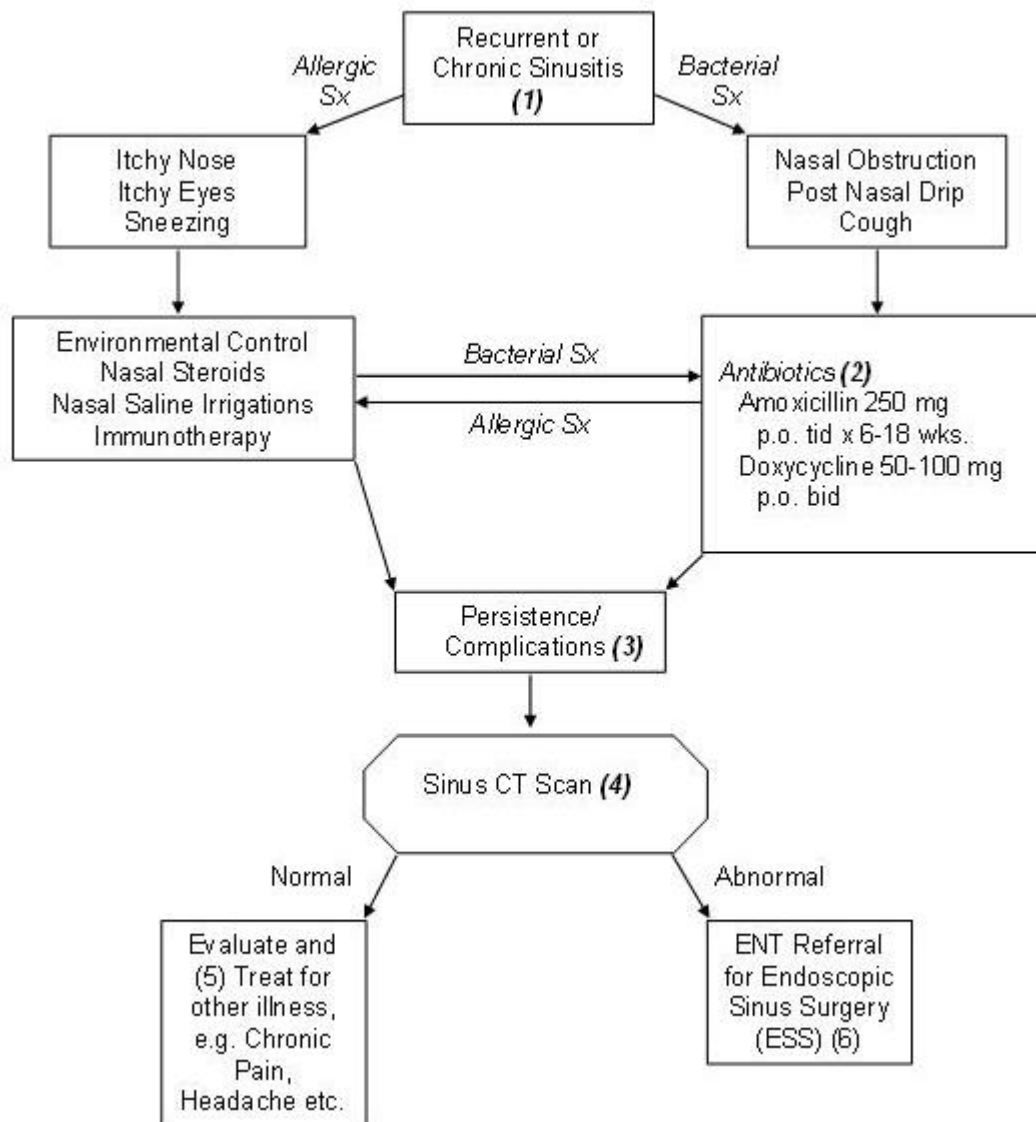




Ambulatory Healthcare Pathways for Ear, Nose, and Throat Disorders

NOSE

SINUSITIS



[1] Definition: Chronic sinusitis is a mucociliary transport abnormality in which the paranasal sinuses are neither aerated nor drained. As a consequence low-grade bacterial infection ensues. While pain is common it is difficult to distinguish the pain of chronic sinusitis from that of headache. Hence, the most reliable symptoms are nasal obstruction, nasal congestion, postnasal drip, cough, not feeling well and finally facial pain. Chronic sinusitis is

a sinus infection that persists for periods of 6 or more weeks.

Recurrent sinusitis is a similar illness in which the disease responds to antibiotics, but then after normal health, once again recurs. Typically the infections are recalcitrant to treatment and often require 3 or more weeks of antibiotics.

[2] Antibiotics: The key to antibiotic therapy of chronic sinusitis is to provide the antibiotic for an extended period of time to allow the mucociliary transport system time to recover. This is typically 6-12-18 weeks. The antibiotics suppress bacterial infection while the mucociliary transport system recovers. Because there is significant morbidity to potent high dose antibiotics taken over these extended periods, the typical prescriptions are for penicillins, tetracyclines and erythromycins. These are prescribed in low-doses and are taken for a long period of time. Amoxicillin 250mgs 3 x a day is the preferred medication. Doxycycline is an alternate medication. Cephalexin, 250mgs orally 3x days is an alternative for those who claim cutaneous penicillin allergy. The key to the antibiotic therapy is the 6-12 weeks duration.

[3] Complications: These include extension of disease into the orbit or CNS.

[4] Sinus CT Scan: The CT scan is the hallmark of the failure of medical therapy. The CT scan should be taken at a time that the patient is ill. If it is abnormal, then the patient indeed has chronic sinusitis and it is presumed that endoscopic sinus surgery will be indicated and will provide benefit. If the CT scan, taken at a time when the patient is ill, is absolutely normal, then it is presumed that the illness is not a chronic sinusitis. The illness will not respond favorably to surgical intervention. The presumed diagnosis is some other illness, such as, midfacial pain syndrome, which is a chronic pain syndrome -- or one of the trigeminal headaches. Further medical evaluation and therapy is indicated.

[5] Evaluate and Treat: The trigeminal nerve modulates many illnesses of which chronic sinusitis is only one. The differential list of frontal headaches is all modulated by the trigeminal nerve. If the pain is localized over the sinuses, some describe this as a midfacial pain syndrome. Surgical therapy has provided no benefit for these individuals. Further medical evaluation is indicated. If no other specific diagnosis is reached, a midfacial pain syndrome diagnosis is made and the patient is treated with chronic pain medication.

[6] Endoscopic Sinus Surgery (ESS): ESS is an operation which opens the individual sinus ostia and restores normal mucociliary transportation. For those individuals with chronic or recurrent sinusitis the operation has a 90% success rate with low morbidity in the hands of the experienced, rhinologic surgeon.

A. Nasal medicaments include decongestants, mucolytic agents, topical decongestants,

antihistamines, nasal and systemic steroids and leukotriene inhibitors. The following list these by generic names:

1. Decongestants
 - a. pseudoephedrine
 - b. phenylpropanolamine
2. Mucolytic agents
 - a. water
 - b. garlic
 - c. guaifenesin
 - d. iodine
 - e. nasal saline drops
 - f. nasal saline irrigation
3. Topical decongestants
 - a. neosynephrine
 - b. oxymetazoline
4. Antihistamines
 - a. non specific:
 - diphenhydramine (Benadryl®)
 - others
 - b. H1 specific:
 - oral
 - topical
5. Steroids
 - a. topical nasal steroids
 - b. oral steroids
6. Leukotriene inhibitors
7. Antibiotics
 - a. tobramycin
 - b. gentamycin
8. Antifungal agents

There is little science and much individual opinion about the treatment of the common cold. We recommend nasal saline, garlic, horseradish, and lots of water. Chicken soup is recommended as a treatment for the common cold. Its efficacy is probably related to the garlic. It is therefore an excellent treatment for it contains fluids, salts, and the garlic which stimulates rhinorrhea. Antihistamines concentrate and increase the viscosity of nasal mucus and impair mucociliary clearance. They are therefore counterproductive. They may provide benefit for individuals with allergic rhinitis. Topical decongestants are addictive, but many physicians recommend their judicious use. Oral decongestants remain efficacious. Systemic steroids suppress immunity and are not normally prescribed. Topical nasal steroids are indicated for the treatment of allergic rhinitis.

Their benefit for infection and anatomic abnormalities has not been investigated. Tylenol and NSAIDS are recommended for malaise and/or pain.

- B. Amoxicillin 250 mg p.o. tid is the drug of choice for acute sinusitis. It is the author's experience that this low dose works. Many experienced physicians use higher doses such as 500 mg tid or 875 mg bid. If the patient fails to respond or relapses the addition (NOT SUBSTITUTION) of Augmentin® 250 mg provides amoxicillin 250 mg + clavulanic acid. The amount of clavulanic acid in Augmentin® 250 and 500 is the same. The Augmentin® supplement is only taken while the patient is ill, usually 3–7 days. The patient completes the antibiotic course with amoxicillin 250 tid. This is cost-effective and minimizes the occurrence of side effects such as intestinal disturbance and yeast or fungal infection.
- C. If the penicillin allergic patient fails a second generation macrolide, a second generation cephalosporin effective against H. influenzae and M. catarrhalis can be given or a quinolone can be prescribed.
- D. Ciprofloxacin or other quinolone is given when the patient persists or relapses after beta lactam resistant antibiotic treatment. It is effective against Pseudomonas and methicillin resistant Staphylococcus. While ciprofloxacin was the first available quinolone and is the best for pseudomonas, others are available.
- E. These are low dose, low side effect, long-term antibiotic treatments. These prescriptions are continued until the patient is well and then half again as long. They can be administered for 6, 12, 18, or more weeks. The long-term toxicity and risk of low dose antibiotics is less than even the shortest of general anesthetics.
- F. Complications include periorbital infection and brain abscess. Frontal and sphenoid sinusitis also requires prompt aggressive treatment and early referral because of their propensity to cause meningitis and brain abscess.
- G. Diagnosis is a clinical one. Sinus CT without contrast is used to determine operative strategy. Plain film sinus x-rays have limited utility in the diagnosis of acute sinusitis and are of no value in the evaluation of chronic sinusitis.

The diagnosis of sinusitis is made from the clinical history. The most important symptoms are fatigue, nasal obstruction, post nasal drip, cough and nasal congestion. Pain is not a useful symptom as there are many causes of facial pain. The reason the primary care physician (PCP) orders the CT is to save the cost of a specialist visit.

If you believe the patient does not have sinus disease, but rather sinus headaches, order the CT when the patient is at their worst, for when they see that the x-ray is

normal they will realize they do not need antibiotics and do require other treatment.

Overview of Sinusitis

Acute sinusitis is extremely common. Most upper respiratory tract viral infections develop a mucopurulent rhinorrhea. Virtually, all of these involve the sinuses. The average American suffers acute viral rhinosinusitis twice annually.

Fortunately, most of these resolve and as the underlying mucosa regains its integrity, the bacterial infection resolves.

Acute bacterial sinusitis is caused by mucociliary transport obstruction at the sinus ostia. This may be inflammation in the anterior ethmoids with secondary obstruction of the maxillary and/or frontal sinus drainage systems or it can be swelling and obstruction of the ostia directly, all of the above are compounded by anatomic narrowing and by previous inflammation with resultant cicatricial scarring.

The two most common causes of acute ostial obstruction are the common cold and allergic rhinitis. In these situations the ostia are narrowed and the mucociliary transport systems of the sinuses are impaired. Secretions stagnate and are infected by the ever present upper respiratory tract bacteria including: *Streptococcus*, *H. influenza*, *M. catarrhalis* and occasionally *Staphylococcus* and *Pseudomonas*. Bacteriology according to Dr. Fairbanks is listed in Table I.

Table 1.

	Children	Adults
<i>S. pneumoniae</i>	35-42%	20-43%
<i>H. influenzae</i>	21-28%	22-35%
<i>M. catarrhalis</i>	21-28%	2-10%
<i>Strep. Species</i>	3-7%	3-9%
<i>Anaerobes</i>	3-7%	0-9%
<i>Staph. aureus</i>	-	0-8

The treatment for acute bacterial sinusitis is antibiotics. The ancillary nasal medicaments are the art of medicine, and while they may improve patient comfort, have no proven benefit for outcome. Antibiotic therapy is driven by susceptibilities. Those relative to sinusitis are listed in Table 2. according to Dr. Fairbanks.

Most patients respond to antibiotics within 36– 48 hours. If within this period they fail to respond or continue to worsen, one assumes the bacteria are resistant to the antibiotic and second line antibiotic therapy is recommended.

Table 2. Susceptibility of Isolates of PK/PD Breakpoints
Percentage of Strains Susceptible

Agents	<i>S. pneumoniae</i>	<i>H. influenzae</i>	<i>M. catarrhalis</i>
Amoxicillin/clavulanate	92	98	100
Amoxicillin	92	70	7
Cefixime	66	100	100
Cefpodoxime	75	100	85
Cefdinir	76	100	85
Ceftriaxone	96	100	94
Cefuroxime	73	83	50
Erythro-clarithromycin	72	0	100
Telithromycin	84	?	100
Azithromycin	71	2	100
Clindamycin	90	0	0
Doxycycline	80	25	96
Resp. quinolones	99	100	100
TMP/SMX	64	78	19

Acute isolated frontal and sphenoid sinusitis is uncommon, but when it occurs, is concerning because of its immediate proximity to the brain and potential to cause meningitis and brain abscess. If frontal or sphenoid sinusitis fails to respond within 24 hours, it requires aggressive treatment, including IV antibiotics. If it does not respond to intravenous antibiotics, surgical drainage is indicated. Emergent frontal sinusitis presents with isolated frontal sinus pain of acute onset. The patient is sick and has fever. The white count is elevated with a left shift. The sinus is tender to percussion. Emergent sinus CT scan is indicated. If abnormal, the patient is admitted for IV antibiotic therapy. Failure to improve within 24 hours is an indication for emergency surgery.

The same paradigm is true for sphenoid sinusitis and ethmoid sinusitis with periorbital cellulitis or abscess.

Recurrent sinusitis is the diagnosis for those who clear the sinus infection, but very shortly after discontinuing antibiotic therapy, develop a new infection. This can be from a narrowed, scarred, or otherwise damaged sinus drainage, or it can result from ongoing allergic or other inflammatory rhinitis. Low dose prophylactic antibiotics are indicated, but if, after 6–12 weeks of antibiotics the sinusitis again recurs, the prognosis without surgical drainage is poor.

Chronic sinusitis is an entirely different illness. To understand chronic sinusitis one must understand the mucociliary transport system.

The nose and paranasal sinuses are lined with upper respiratory tract epithelium. This is an epithelium with cilia covered by a mucus blanket floating on a layer of saline. Bacteria, irritants and other particulate matter are trapped in the mucus layer and then carried along by the ciliary motion out of the sinuses, to the back of the nose, and into the pharynx. If the mucociliary transport system is impaired, the sinuses will be chronically infected. Aerobes and anaerobes are easily grown. Culture and sensitivity and stronger and stronger antibiotics provide little benefit. Attention must be directed towards the cause of the mucociliary transport system impairment. This may be anatomic or it may be scarring from repeated infections. Very often it is caused by or worsened by allergy and very often it is worsened by the irritants present in today's polluted air. If the cause cannot be identified and corrected, the patient is chronically infected, congested, obstructed, and ill with sinus symptoms such as pain, postnasal drip and cough.

If a patient with sinusitis continues to have symptoms after 6-12 weeks of appropriate antibiotic and nasal steroid therapy, ENT referral is indicated.

With the advent of nasal endoscopy and sinus CT, we have come to learn that plain sinus radiographs are misleading so much of the time, that they are of no benefit. Even the presence or absence of maxillary and frontal sinusitis is often misinterpreted on plain radiographs. Plain sinus radiographs are virtually never requested.

The diagnosis of sinusitis is made on the basis of history and physical examination. Sinus CT is ordered primarily as a "road map" for the operating surgeon. It can be ordered, however, to document presence and extent of disease.

If a patient is being referred for an ENT consultation, one should request a sinus CT prior to the visit.

MRI is a poor imaging examination for sinus disease and would never be ordered in lieu of sinus CT. If diffuse sinusitis is present on MR, a sinus CT will be indicated.

Lastly, sinus CT is not the end all for evaluating sinus disease. Some individuals with sinus symptoms and normal sinus CT will be found to have chronically inflamed sinus mucosa at surgery. This group does benefit from sinus surgery despite negative imaging studies. Endoscopic sinus surgery has become the surgery of choice for sinus disease. Conversely, the old surgical procedures including Caldwell-Luc, nasal antral windows, external ethmoidectomy, etc. are rarely recommended.

Endoscopic sinus surgery evolved from the understanding of the mucociliary transport system and a realization that the best way to obtain normal healthy sinuses is to enlarge

the natural sinus ostia.

Once an improved drainage system is established, the diseased sinus mucosa reverts to normal.

The surgery is relatively safe and is performed as an outpatient. Discomfort is minimal, convalescence is short, and complications are few. Overall success rates are around 90%.

There are certain conditions in which the prognosis is less than 90%. Individuals with the ASA sensitivity or sampters triad (asthma, aspirin sensitivity, and nasal polyps) do poorly with all treatments. They can be improved with sinus surgery. We do not speak of cure, we speak of control, and for many, surgery has improved control significantly.

Nasal polyps are felt to be a result of inflammation, present in those with infection, allergy, and other sources of irritation. Patients with nasal polyps do benefit from endoscopic sinus surgery, but the cure is only as good as the subsequent control of the underlying inflammatory rhinitis. Post polypectomy treatment is twice daily pulsatile nasal irrigation and topical nasal steroids. This treatment continues for life.

Many patients with asthma have allergic rhinitis and chronic sinusitis. Endoscopic sinus surgery will improve the sinus disease. Those individuals, whose asthma worsens during flare ups of their nasal and sinus illness, will have marked benefit in their nose and their lungs following sinus surgery. Carefully selected groups will have very high cure rates; poorly selected groups will have limited benefit.

Many HIV infected patients will develop sinonasal disease as their HIV illness progresses. These patients will benefit greatly from endoscopic sinus surgery followed by twice daily nasal irrigations. Many children and young adults with cystic fibrosis will have sinonasal disease; many will have nasal polyps. These people also benefit from early endoscopic sinus surgery followed by aggressive nasal irrigations.