

Prevalence and Management of Rhinosinusitis in Developing Countries: the Case of Mbingo Baptist Hospital, North West Region, Cameroon

Article by Tcheuwebe Liale Honore
RN-BSN, Texila American University
Email: honor_liale2002@yahoo.fr

Abstract

Rhinosinusitis occurs worldwide and affects about 16% of the adult American population annually significantly impairing their quality of life. Allergic rhinitis and chronic rhinosinusitis are prevalent non communicable diseases increasing around the world, even in Africa.

This study is aimed at assessing the prevalence and management of rhinosinusitis in Mbingo Baptist Hospital, in children, teenagers and adults. In Cameroon, the investigator did not find any readily documented and published statistics indicating the case of rhinosinusitis. In the hospital where this study was carried out, observation made in the frequency of rhinosinusitis and knowing the possible complications prompted the investigator find out about the prevalence and its management.

Thus the following research question of “what is the prevalence and management of rhinosinusitis?”

Our main objective is to assess the prevalence and management of rhinosinusitis in Mbingo Baptist Hospital.

More specifically, the investigator will be able:

- *To define and describe rhinosinusitis*
- *To assess the management of rhinosinusitis in MBH*
- *To come out with the prevalence of rhinosinusitis in MBH*
- *To ascertain the standard management of rhinosinusitis*

The prevalence of AR is very high (>35%) among Nigerian Africans, and it is likely that environmental factors are responsible for major differences with other countries. Knowing the prevalence of Rhinosinusitis will serve as reference for many other investigations. This prevalence would tend to increase if the condition is not well managed at the level of the hospital.

This is a cross sectional study in which data are collected from the hospital registers for patients having rhinosinusitis since 2011 till 2015. With these data, we aim at giving the prevalence of rhinosinusitis during this period.

The study will also include 5 case studies met in the ENT department during the period of the study both on an in-patient and out-patient basis. We shall assess the demographic data, patient’s history and management. The aim of these case studies is to have an in-depth idea on the management of rhinosinusitis in Mbingo Baptist Hospital compared to the already addressed international standards.

Statistics of all cases of rhinosinusitis were taken from the ENT department registers from the year 2011 to 2015 (January to September). It is obvious that the prevalence of adult patients with rhinosinusitis is more than two times the prevalence of both the children and teenagers mixed. The total number of children from 2011 to 2015 was 677, teenagers were 514 and adults 3477, for a final total of 4668 people with rhinosinusitis. This may be due to the fact that adult patients have re-infections or relapsed conditions and therefore need to visit the hospital more frequently. This also may show their increase fragility and incapacity to control or to resist the allergens or causative agents. This information is better symbolized on figures 16, 17 and 18. For all of them the number of patients seen with rhinosinusitis was higher in 2014.

From the table indicating the total prevalence of Rhinosinusitis from 2011 to 2015, it is showing that the prevalence of rhinosinusitis is lowest in 2015 with a percentage of 10.5% and highest in 2011

(13.9%). The total average prevalence (from 2011 to 2015) is 11.7%. Since the department began being functional by 2011, population awareness about this condition was not well spread and resulted to an increase in prevalence in relation to the total number of patients seen in that year, which obviously is the smallest number.

As far as the management of rhinosinusitis is concerned, from the 5 case studies seen, it consisted in general of the following: Normal saline drops, Nasal decongestant, Corticosteroid spray and tablets, Antibiotics, Antihistamines, Functional Endoscopic Sinus Surgery.

To conclude, Rhinosinusitis which is the inflammation of the nasal mucosa, has proved to be a problem in the sub-Saharan African regions as described in the literature review. It is a universal health concern in the sense that it affect anybody and anyway provided the allergens or causative agents are present. This condition can either be acute or chronic, allergic and non-allergic, and can be managed medically and surgical, all depending on the gravity of the condition.

Though the prevalence of rhinosinusitis depends on the realities of each country and even reach up to 35% in Nigeria, the one identified by this study and representative of the whole country is lower (11.7%). The fact that this prevalence is around this average value, and considering the type of management done by the health professional which meet standard protocols and practice, we can say that rhinosinusitis is under control. Because population is dynamic, it may difficult to bring that value lower. Proper preventive measures will help reduce the prevalence of rhinosinusitis, among which the intensified education of the population and on preventive measures.

The standard guideline of management of rhinosinusitis will consist of one or the combination of the following:

1. Antihistamine (1 week to 1 month) (may continue for a period of 6 months)
2. Corticosteroids (2 weeks to 1 month)
3. Antibiotics (penicillins or cephalosporins with sometimes with an addition of anaerobes antibiotics like metronidazole) (5 days to 2 weeks dependently)
4. Nasal decongestant (1 to 2 weeks) (if associated with severe nasal congestion)
5. Nasal spray steroids (2 weeks to 1 month) (may continue for a period 6 months)
6. Surgical intervention (Functional Endoscopic Sinus Surgery) for those patients with facial sinuses polyps.

Keywords

1. **AR-** Allergic Rhinitis
2. **CAR-** Chronic allergic rhinitis
3. **RS-** Rhinosinusitis
4. **CRS-** Chronic rhinosinusitis
5. **MBH-** Mbingo Baptist Hospital
6. **IgE-** immune-globulin E
7. **IL-** interleukin
8. **INC-** intranasal corticosteroid
9. **(F)ESS-** (Functional) endoscopic sinus surgery
10. **CT-** computerized tomography
11. **NP-** Nasal polyp
12. **OMU-** ostiomeatal unit

Introduction

Background and problem statement

It occurs worldwide and affects about 16% of the adult American population annually significantly impairing their quality of life. The direct costs associated with rhinosinusitis are higher than the background costs due to increased clinic visits and prescribed medications and the indirect costs due to inactivity days leading to reduced productivity are enormous. It has been found to be one of the

most costly physical conditions for American citizens with approximately \$6 billion spent overall on its management

Allergic rhinitis (AR) and chronic rhinosinusitis (CRS) are prevalent non communicable diseases increasing around the world, even in Africa. These chronic diseases confer a significant burden through direct or indirect symptoms, complications and cost. In contrast to developed countries, the government health program of many African countries focus only on transmissible diseases, malnutrition, maternal and infant mortality, while data on respiratory diseases remain scarce. The prevalence of AR is very high (>35%) among Nigerian Africans, and it is likely that environmental factors are responsible for major differences with other countries. AR prevalence is much higher in urban area, especially in capital cities from Africa. CRS is not less common. The advent of HIV-AIDS has further worsened the incidence of CRS in Africa. Local allergens related to African environmental settings are not well known. House dust mites and cockroaches are reported as major allergens in Africa, while pollen allergens remain poorly described. AR predisposes to development of other airway comorbidities such as allergic asthma, rhinosinusitis, nasal polyposis, adenoid hypertrophy and otitis media. Both AR and CRS significantly affect the quality of life of Africans through direct cost (payments to doctors for frequent consultations, prescribed medications, over the counter (OTC) drugs, alternative and complementary drugs), indirect costs (loss of work hours and school days) and intangible costs (loss of quality of life, pain and suffering, psychological maladjustment, social costs). These costs become significant in countries with high prevalence of allergy and low per capital income, as seen both in the Anglophone and Francophone African countries.

Thus the following research question of “what is the prevalence of rhinosinusitis?”

General objective

Our main objective is to assess the prevalence and management of rhinosinusitis in Mbingo Baptist Hospital.

Specific objective

More specifically, the investigator will be able:

- To define and describe rhinosinusitis
- To assess the management of rhinosinusitis in MB
- To come out with the prevalence of rhinosinusitis in MBH
- To ascertain the standard management of rhinosinusitis

Hypothesis

Knowing the prevalence of Rhinosinusitis will serve as reference for many other investigations. This prevalence would tend to increase if the condition is not well managed at the level of the hospital.

Significance of the study

This study will go a long way to give information on the total number of rhinosinusitis cases from 2011 to 2015, in children, teenagers and adults. It will also go a long way to portray the management of rhinosinusitis with standardised protocols.

Scope of the study

This study is aimed at assessing the prevalence and management of rhinosinusitis in Mbingo Baptist Hospital, in children, teenagers and adults.

Limitations

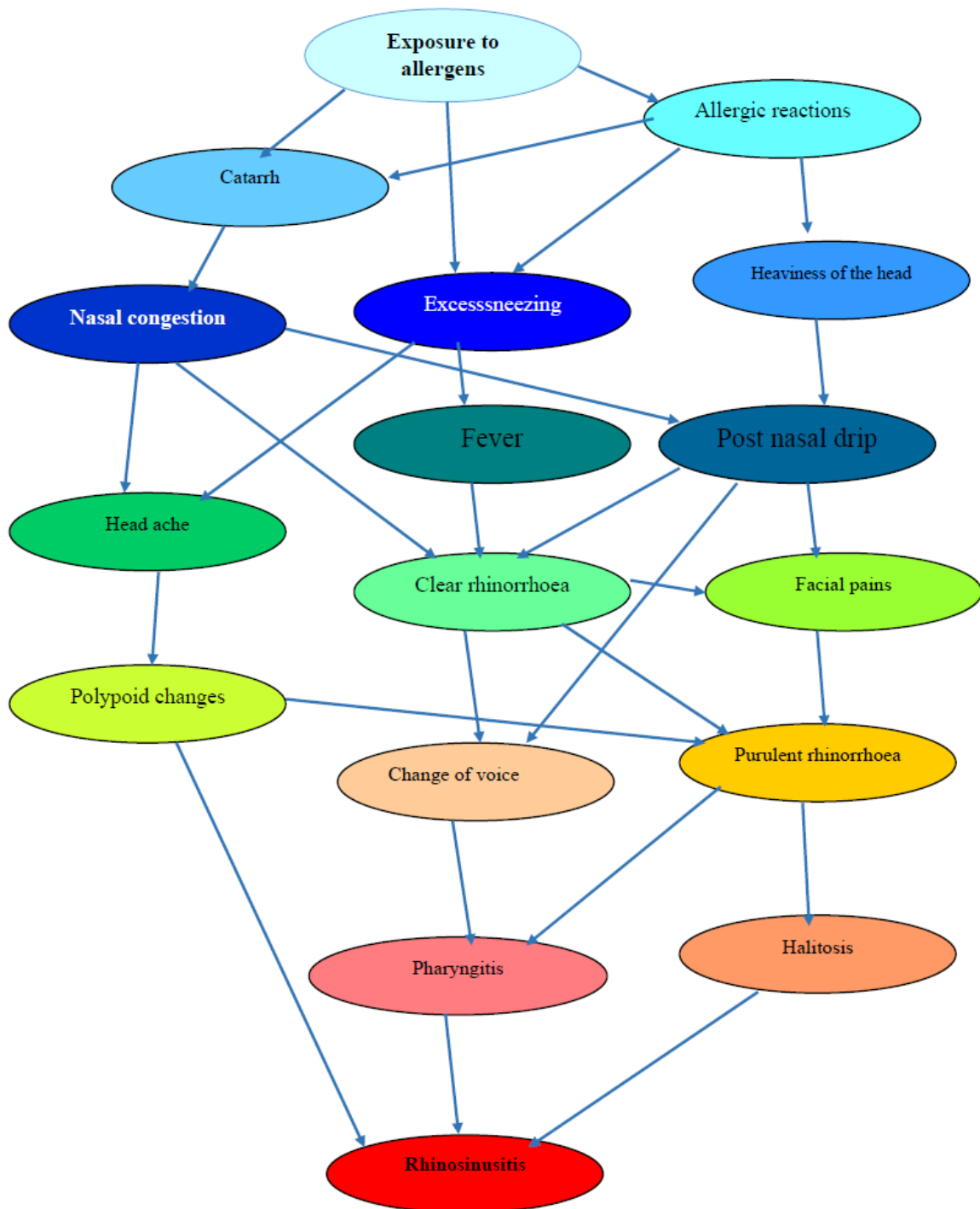
Financial and time constraints are the main limitations for this study. Without these the investigator would have worked in all the referral hospitals of the North West Region and why not in the whole Country.

Ethical statement

This study was approved by Texila American University. Since this was a retrospective study, informed written consent could not be obtained from the study participants. However, records of all participants were anonymised and de-identified for the purpose of such a study.

Conceptual model/ framework

This model illustrate the pattern through which rhinosinusitis occurs. It all start with a stimulating factors that could be found endogenously or exogenously. Once exposed to the allergens, the process starts by a response to the stimulant and the patient will react by excessive sneezing, nasal blockage, then post nasal drip, headache, facial pains and fever. There may be nasal polyps formation, with halitosis, hoarseness of voice, pharyngitis.



Definition and characteristics

Rhinosinusitis denotes the concurrent inflammatory and infectious process affecting the nasal cavities and the contiguous paranasal sinuses resulting from the interaction of multiple host and environmental factors.

Rhinosinusitis, also known as a sinus infection or Sinusitis is inflammation of the sinuses resulting in symptoms. According to the official journal of American Academy of Otolaryngology-Head and Neck Surgery, Chronic sinusitis affects approximately 12.5% of people.

Sinusitis significantly impacts quality of life measures with decrements in general health perception, vitality and social functioning comparable with that observed in patients who have angina or chronic obstructive pulmonary disease. Sinusitis is one of the main reasons for which an antibiotic is prescribed and for lost productivity in the work force.

Children's sinuses are not fully developed until late in the teen years. Although small, the maxillary (behind the cheek) and ethmoid (between the eyes) sinuses are present at birth. Unlike in adults, paediatric sinusitis is difficult to diagnose because symptoms of sinusitis can be caused by other problems, such as viral illness and allergy.

Classification of rhinosinusitis

a. By duration of symptoms

Of the various sub-classifications of rhinosinusitis, the simplest differentiation is based on duration of symptoms. Acute rhinosinusitis is defined by 3 of the guidelines as symptom duration of 4 weeks or less (Clinical Practice Guideline: Adult Sinusitis and the Rhinosinusitis Initiative). The European Position Paper on Rhinosinusitis and Nasal Polyps and British Society for Allergy and Clinical Immunology guidelines qualify acute rhinosinusitis as lasting less than 12 weeks, with complete resolution of symptoms. The Clinical Practice Guideline: Adult Sinusitis includes a category of sub-acute rhinosinusitis, defined as symptom duration between 4 and 12 weeks, whereas the Joint Task Force on Practice Parameters definition specifies 4 to 8 weeks. Recurrent acute rhinosinusitis is classified by the Clinical Practice Guideline: Adult Sinusitis guidelines as 4 or more episodes of acute rhinosinusitis within 1 year, without persistent symptoms between episodes. The Joint Task Force on Practice Parameters defines recurrent rhinosinusitis as 3 or more episodes per year.

Four of the 5 guidelines (European Position Paper on Rhinosinusitis and Nasal Polyps 2007, British Society for Allergy and Clinical Immunology, Clinical Practice Guideline: Adult Sinusitis, Rhinosinusitis Initiative) designate Chronic rhinosinusitis as symptoms persisting 12 weeks or longer, whereas the Joint Task Force on Practice Parameters indicates 8 weeks.

b. By severity of symptoms

All 5 guidelines recognize that an assessment of symptom severity is important to define the magnitude of disease and assist with treatment selection. For clinical purposes, the European Position Paper on Rhinosinusitis and Nasal Polyps 2007 and British Society for Allergy and Clinical Immunology guidelines categorize disease severity on the basis of a 10-cm visual analogue scale (VAS) that has been statistically validated for use in patients with RS. Patients responding to the question "How troublesome are your symptoms of rhinosinusitis?" provide a rating, with the scale ranging from 0 ("not troublesome") to 10 ("worst thinkable troublesome").

Scores are categorized as follows, between 0 and 3, mild disease; greater than 3 to 7, moderate disease; and greater than 7 to 10, severe disease. Scores greater than 5 have been correlated with quality of life detriments.

c. Acute rhinosinusitis

Acute sinusitis is usually precipitated by an earlier upper respiratory tract infection, generally of viral origin, mostly caused by rhinoviruses, coronaviruses, and influenza viruses, others caused by adenoviruses, human parainfluenza viruses, human respiratory syncytial virus, enteroviruses other than rhinoviruses, and metapneumovirus.

If the infection is of bacterial origin, the most common three causative agents are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. Until recently, *Haemophilus influenzae* was the most common bacterial agent to cause sinus infections. However, introduction of

the H. influenza type B (HIB) vaccine has dramatically decreased H. influenza type B infections and now non-typable H. influenza (NTHI) are predominantly seen in clinics. Other sinusitis-causing bacterial pathogens include Staphylococcus aureus and other streptococci species, anaerobic bacteria and, less commonly, gram negative bacteria.

Viral sinusitis typically lasts for 7 to 10 days, whereas bacterial sinusitis is more persistent. Approximately 0.5% to 2% of viral sinusitis results in subsequent bacterial sinusitis. It is thought that nasal irritation from nose blowing leads to the secondary bacterial infection.

Acute episodes of sinusitis can also result from fungal invasion. These infections are typically seen in patients with diabetes or other immune deficiencies (such as AIDS or transplant patients on immunosuppressive anti-rejection medications) and can be life-threatening. In type I diabetics, ketoacidosis can be associated with sinusitis due to muco-mycosis.

Chemical irritation can also trigger sinusitis, commonly from cigarette smoke and chlorine fumes. Rarely, it may be caused by a tooth infection. (Leung RS, Katial R (March 2008). "The diagnosis and management of acute and chronic sinusitis". Primary care). This will lead to what is called allergic rhinitis.

According to the American Academy of Family Physician, Acute rhinosinusitis has a relatively rapid onset, is normally of four weeks' duration or less and symptoms totally resolve. Most cases are viral in origin. Resolution of symptoms usually occurs within five to seven days, and most patients recover without medical intervention. The subcategory of acute bacterial rhinosinusitis is more likely to evolve into chronic disease or to spread outside the sinuses to the orbital area or to the meninges. Acute bacterial rhinosinusitis is suggested by symptoms including purulent drainage that worsens after five days or persists beyond 10 days, and/or symptoms that are out of proportion to those typically associated with a viral upper respiratory process.⁶ Recurrent acute rhinosinusitis is defined as four or more episodes of acute disease within a 12-month period, with resolution of symptoms between each episode (each episode of at least seven days' duration). Sub-acute rhinosinusitis is basically a low-grade continuum of acute infection of more than four weeks' but less than 12 weeks' duration. Chronic rhinosinusitis is distinguished by symptoms that persist for 12 weeks or more.

Young children are more prone to infections of the nose, sinus, and ears, especially in the first several years of life. These are most frequently caused by viral infections (colds), and they may be aggravated by allergies. However, if the child remains ill beyond the usual week to ten days, a sinus infection may be the cause.

- **Allergic and non-allergic rhinitis**

- i. **Allergic Rhinitis** occurs when the body's immune system over-responds to specific, non-infectious particles such as plant pollens, molds, dust mites, animal hair, industrial chemicals (including tobacco smoke), foods, medicines, and insect venom. During an allergic attack, antibodies, primarily immunoglobulin E (IgE), attach to mast cells (cells that release histamine) in the lungs, skin, and mucous membranes. Once IgE connects with the mast cells, a number of chemicals are released. One of the chemicals, histamine, opens the blood vessels and causes skin redness and swollen membranes. When this occurs in the nose, sneezing and congestion are the result.

Seasonal allergic rhinitis or hay fever occurs in late summer or spring. Hypersensitivity to ragweed, not hay, is the primary cause of seasonal allergic rhinitis in 75 percent of all Americans who suffer from this seasonal disorder. People with sensitivity to tree pollen have symptoms in late March or early April; an allergic reaction to mold spores occurs in October and November as a consequence of falling leaves.

Perennial allergic rhinitis occurs year-round and can result from sensitivity to pet hair, mold on wallpaper, houseplants, carpeting, and upholstery. Some studies suggest that air pollution such as automobile engine emissions can aggravate allergic rhinitis. Although bacteria is not the cause of allergic rhinitis, one medical study found a significant number of the bacteria Staphylococcus aureus

in the nasal passages of patients with year-round allergic rhinitis, concluding that the allergic condition may lead to higher bacterial levels, thereby creating a condition that worsens the allergies.

Patients who suffer from recurring bouts of allergic rhinitis should observe their symptoms on a continuous basis. If facial pain or a greenish-yellow nasal discharge occurs, a qualified ear, nose, and throat specialist can provide appropriate sinusitis treatment.

ii. **Non-Allergic Rhinitis** does not depend on the presence of IgE and is not due to an allergic reaction. The symptoms can be triggered by cigarette smoke and other pollutants as well as strong odors, alcoholic beverages, and cold. Other causes may include blockages in the nose, a deviated septum, infections, and over-use of medications such as decongestants

d. Chronic rhinosinusitis (CRS)

Chronic rhinosinusitis (CRS) is a complex disease associated with inflammation of nasal and sinus tissue. Currently, the cause of CRS remains unclear but researchers have proposed several mechanisms. In healthy people, the nose and sinuses are lined with epithelial cells and other specialized cells that form a mucosal barrier. This barrier serves to protect the underlying tissues from the millions of allergens, microbes, and particulates inhaled regularly. Such inhaled particles can be trapped in mucus and cleared through the action of cilia on nasal epithelial cells that move mucus out of the airways. In CRS, the mucosal barrier can be defective. Epithelial cells do not function normally, leading to a weak and permeable barrier. This impaired barrier is exposed to more particles and does not repair itself as well as a healthy barrier. There is increased thick mucus production in CRS that cannot be easily cleared away by nasal epithelial cilia.

Some people with CRS have persistent growth of fungi or bacteria such as *Staphylococcus aureus* in their nose and sinuses.

In some cases, the organism does not cause significant damage to tissue. However, problems can occur if an immune response is mounted against the colonising organism or to the toxins it makes. This immune response can cause inflammation and damage to the sinus and nasal tissues and worsen CRS.

- **Cardinal signs or symptoms**

Prolonged duration of rhinosinusitis (RS) symptoms (more than 8-12 weeks) is the primary reason to evaluate a patient for CRS. In this regard, it is important to distinguish CRS from recurrent ARS, the latter of which is typified by 2 to 4 isolated episodes of ARS per year, with complete resolution of symptoms between episodes. Such episodes should be treated like any other ARS event but also warrant further work-up to investigate potential underlying causes for the recurrence (e.g., AR, cystic fibrosis, immunologic deficiency, ciliary dyskinesia, anatomic abnormalities).

- **Factors contributing to sinusitis chronicity**

A similar set of factors contributes to sinusitis chronicity, but in addition other aspects of the host immune microbial interaction play a key role.

- **Ostial blockage**

The importance of sinus ostial patency was eloquently stated by Senior and Kennedy: "Sinus health in any patient depends on mucous secretion of normal viscosity, volume, and composition; normal muco-ciliary flow to prevent mucous stasis and subsequent infection; and open sinus ostia to allow adequate drainage and aeration.

While defect of any of these elements can result in acute, recurrent acute or chronic sinusitis, ostial blockage is key in the cycle for the vast majority of sinusitis in asthmatic and nonasthmatic patients alike." The above statement applies to all sinuses, but the sinus ostia most commonly blocked are those that drain through the ostiomeatal unit (OMU). Hence the anterior ethmoid and maxillary sinuses are the most commonly affected sinus areas in both acute and chronic sinusitis. Frontal sinusitis results from obstruction of the nasal frontal duct. Posterior ethmoid and sphenoid sinusitis

results from obstruction of their respective ostia, which collectively drain through the sphenoidal recess. In chronic sinusitis inflammatory mucosal thickening often persists despite treatment with antibiotics. This further impedes normal mucociliary clearance and may directly obstruct sinus ostia.

- **Delayed recovery of mucociliary function**

Mucostasis, hypoxia, microbial products, and chronic inflammation probably all contribute to diminished mucociliary function in chronic sinusitis. Studies are conflicting on whether chronic sinusitis is associated with a significant reduction in ciliary beat frequency, but a decrease in mucociliary clearance has been consistently demonstrated. Other contributing factors to slowing of clearance include changes in the viscoelastic properties of mucus, ciliary loss, and other ultrastructural signs of epithelial damage.

- **Mucus “recirculation” and osteitis**

Other factors contributing to sinusitis chronicity include mucus “recirculation” and osteitis. Recirculation of sinus mucus from the maxillary sinus has been described in some patients with an accessory sinus ostium. Secretions exit the sinus through the natural sinus ostium and enter the middle meatus. Some of the secretions then re-enter the maxillary sinus through the accessory ostium, usually located inferior to the OMU (ostiomeatal unit) on the lateral nasal wall. From experience, accessory ostia to the maxillary sinus are quite common (approximately 20% of cases). Osteitis has been described by histologic analysis of ethmoid bone removed from patients with chronic sinusitis. It may occur as a direct result of infection or as a result of sinus surgery with lack of mucosal preservation. The histologic findings include a marked acceleration in bone turnover with new bone formation, fibrosis, and the presence of inflammatory cells. It has been argued that these changes mimic osteomyelitis in the jaw and that osteitis may therefore represent a form of chronic osteomyelitis and a strong reason for disease recurrence despite surgery or antibiotic use.

- **Microbial factors in persistence**

Most studies have pointed to differences between acute and chronic sinusitis in terms of microbial pathogens. In acute sinusitis, the predominant organisms are *Streptococcus pneumoniae*, *Hemophilus influenzae*, and (in children) *Moraxella catarrhalis*.

In studies of chronic sinusitis the most common organisms identified were those described above plus *Staphylococcus aureus*, coagulase-negative *Staphylococcus*, and anaerobic bacteria. The relative pathogenicity of the organisms in sinusitis is unknown, with the greatest uncertainty surrounding the role of coagulase-negative *Staphylococcus* and anaerobes.

Insufficient attention has been given to the potential for emergence of antimicrobial resistance during antibiotic treatment for chronic sinusitis. As demonstrated in the study of Brook et al, β -lactamase-producing bacteria can emerge during antibiotic treatment during the transition from acute to chronic sinusitis. Another possibility is the emergence of intermediate- or high-level penicillin resistance during treatment. This type of resistance, resulting from alterations in penicillin-binding proteins, presently ranges from 28% to 44% for *S pneumoniae* isolates in various regions of the United States. There are very limited data on the prevalence of these isolates in chronic sinusitis, but it appears that isolation of penicillin-resistant pneumococci is most commonly seen in patients with recent use of two or more antibiotics. Many of these organisms also demonstrate multiple drug resistance.

- **Inflammatory factors in sinusitis**

Inflammation plays a key role in chronic sinusitis pathogenesis. Infectious and non-infectious stimuli appear to contribute, but the precise role of each in chronic sinusitis remains unclear. Two types of inflammation occur in sinusitis, contributing variably to the clinical expression of disease. Infectious inflammation is most clearly associated with acute sinusitis resulting from either bacterial

or viral infection. Non-infectious inflammation is so named due to the predominance of eosinophils and mixed mononuclear cells and the relative paucity of neutrophils commonly seen in chronic sinusitis.

Diagnostic measures of RS (Rhinosinusitis)

Rhinosinusitis (RS) can generally be diagnosed adequately on the basis of clinical findings alone, without the use of special imaging techniques or other assessments. However, the consensus guidelines recognize particular situations in which special assessments may have a role.

Other means include:

- **CT- computed tomography.** It is good for cases before surgery and for evaluation of cases with recurrent RS. Also, the presence of nasal congestion or blockage, discolored rhinorrhea or postnasal drip, facial pain or pressure, hyposmia or anosmia together with consistent pathologic findings during nasal endoscopy or on CT scan establishes the diagnosis
- **Magnetic resonance imaging (MRI)** is overly sensitive to the transient mucosal changes associated with a normal nasal cycle.
- **Nasal Endoscopy.** Compared with anterior nasal examination, nasal endoscopy provides a better means of examining the middle meatus region and sphenoidal recesses for the presence of purulence associated with RS.
- **Nasal Culture.** Nasal culture is not generally recommended for the routine work-up of uncomplicated ARS;
- **Sinus Puncture.** Although rarely indicated for routine patient care, sinus puncture is the methodology considered the criterion standard for confirming bacterial pathogens within the maxillary sinuses.

Management of rhinosinusitis

- i. Topical intranasal corticosteroids (INS) and nasal douching** are first-line treatment for RS.

Nasal douching clears the sino-nasal cavity from pathogens and pro-inflammatory mediators. INS targets the inflammatory response underlying nasal congestion, promote osteomeatal complex drainage and occasionally improve the sense of smell. Moreover, a significant reduction in polyp size in cases of CRS with NP (CRSwNP) has been reported. Based on clinical experience, systemic corticoids remain important for the treatment of CRSwNP, as they provide short-term symptom relief. Short term courses of oral corticosteroids are usually given two to three times yearly.

- ii. Oral antibiotics together** with topical corticosteroids have been proven to act synergistically, though antibiotics are reserved for the acute exacerbations of RS.

Low-dose macrolides (erythromycin, clarithromycin, roxithromycin and azithromycin) are the most studied antibiotics for CRS treatment have been used as a long-term antibiotic treatment in CRS, while topical antibiotics remain an option for refractory cases where traditional topical steroids and oral antibiotics are ineffective.

- iii. Nasal irrigation (douching)** is a safe, inexpensive method with beneficial effects such as improvement in mucous clearance, enhanced ciliary beat activity, removal of antigens, biofilms or inflammatory mediators.

Intranasal decongestants like xylomethazoline improve sinus ventilation through nasal decongestion, though prolonged use may have an opposite effect resulting in rhinitis medicamentosa.

- iv. Antihistamine** have a minimal beneficial in CRS patients with concomitant AR.

According to the GALEN study, approximately, 57% of patients with CRS report symptoms of allergic rhinitis (AR) as well. The correlation with asthma is stronger in those patients with both CRS and AR symptoms.

In the absence of AR, CRS has a positive correlation with a late onset asthma. To sum up, checking for allergy is advocated in CRS patients.

- v. Antileukotrienes (montelukast)** might have a beneficial effect in patients with NP (nasal polyp).

Following the current evolution in phenotyping, more personalized treatments based on the underlying inflammation will most likely be considered in the future.

vi. Surgery

Systematic reviews of cohort studies, large outcomes studies consistently support the safety and efficacy of functional endoscopic sinus surgery (FESS) for chronic rhinosinusitis (CRS) with nasal polyps

Methods

Description of the study area

Mbingo Baptist Hospital is the largest of six hospitals run by the Cameroon Baptist Convention Health Services (www.cbchealthservices.org). This referral hospital originally begun as a leprosy settlement in 1952. Currently, it is a 290-bed referral teaching facility providing high quality, affordable and accessible care to those in need, as an expression of Christian love and witness. The hospital is located at 4300 feet elevation in the Northwest Region of Cameroon, 37 km north of Bamenda, the regional capital. Patients are currently received from throughout Cameroon and some surrounding African countries. The hospital runs a 24 hours service (three shifts system) with an average of 72,000 outpatients seen annually. The hospital is staffed by 15 full time specialty-trained physicians, 20 resident physicians, and a support staff of 600. It has a security system to safeguard clients, staff, and their

The services provided include Hansen's Disease (Leprosy), general consultations & Inpatient services, dental services, imaging (X-Ray/Ultrasound), pharmacy, orthopaedic, ENT, Eye, and general surgeries, HIV/AIDS Prevention & Care Services (PMTCT & Care and Treatment), a referral laboratory, physiotherapy & Prosthetic services, technical services, Pan African Academy of Christians Surgeons (PAACS) Program, Christian Internal Medicine Specialization (CIMS), Chaplaincy/Social services, Palliative Care, and Catering Services.

It is in the ENT department that all patients with ENT related issues are being handled. Our study will consist of assessing the prevalence of rhinosinusitis from the ENT department in Mbingo Baptist Hospital.

• The ENT department of mbingo baptist hospital

The ENT department in Mbingo Baptist Hospital started functioning around the year 2010 by an ENT surgeon, Cameroonian and trained in Kenya. There were a lot of challenges in the beginning as it was a new field and he needed to do everything on his own and then, he gradually "borrowed" some other nurses from various units to assist him in one or two things.

He later on decided to train ENT clinical officers to help in handling most of the clinical activities while he would be busy with surgical activities. With time these clinical officers could also assist him in the theatre activities.

The ENT department is a specialty department. This means that it is dealing with patients having ENT problems.

• Process to reach ENT department and admission process

When a patient comes to the hospital having ENT issues, the normal process wants that the screener sees the patient first then refers to the OPD doctor when needing special attention. This doctor after his assessment will refer the patient to the ENT department for further assessment and proper management.

When the patient reaches the ENT department, he is being screened and if he needs to be admitted, the admission sheet is filled with the presenting complaints, history, physical examination, impression/diagnosis, orders. After this step, the patient will care and advance some money at the in-patient payment office, then go to the laboratory just near the in-patient payment office for primary lap investigations, then go to the admission room where the auxiliary nurses taking demographic

information from the patient and his caregiver(s). From here the patient can go to ward to which he is admitted depending on the condition, the age and the gender.

When the patient reaches the ward, he is admitted by nurse and orders are carried and signed and acted upon while the patient is being put in the bed.

Research design, methodology and ethical considerations

This is a cross sectional study in which data are collected from the hospital registers for patients having rhinosinusitis since 2011 till 2015 (January to September). With these data, we aim at giving the prevalence and management of rhinosinusitis during this period.

The study will also include 5 case studies met in the ENT department during the period of the study both on an in-patient and out-patient basis. We shall assess the demographic data, patient's history and management. The aim of these case studies is to have an in-depth idea on the management of rhinosinusitis in Mbingo Baptist Hospital compared to the already addressed international standards.

Results

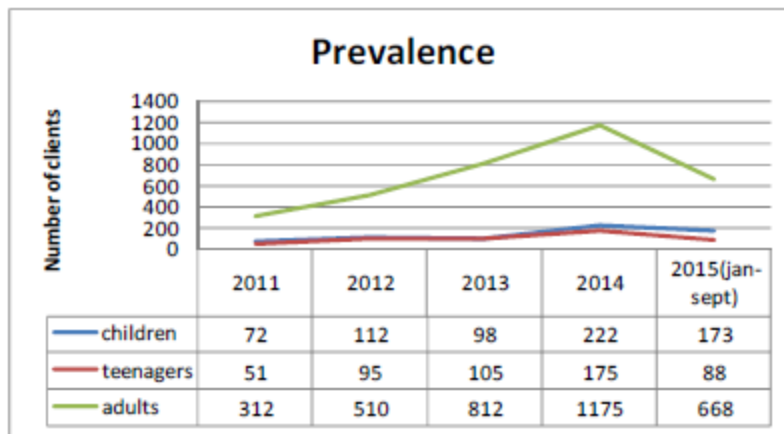


Figure 15. prevalence of rhinosinusitis

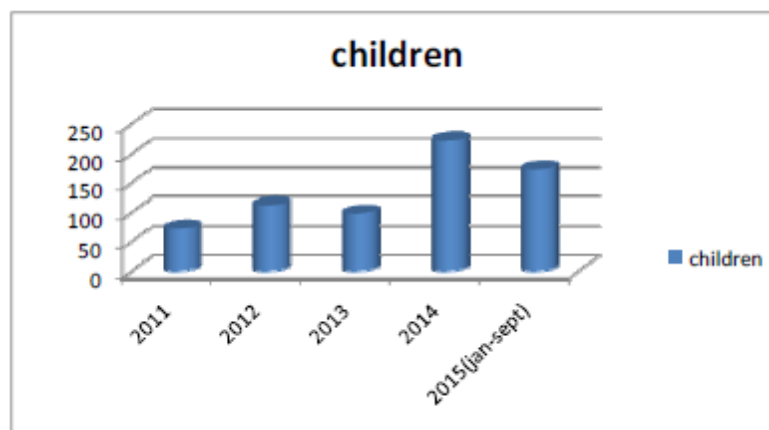


Figure 16. prevalence of children with rhinosinusitis

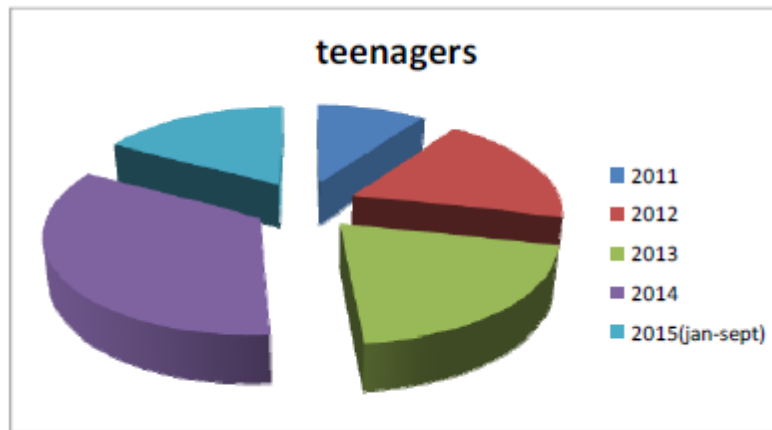


Figure 17. prevalence of rhinosinusitis in teenagers

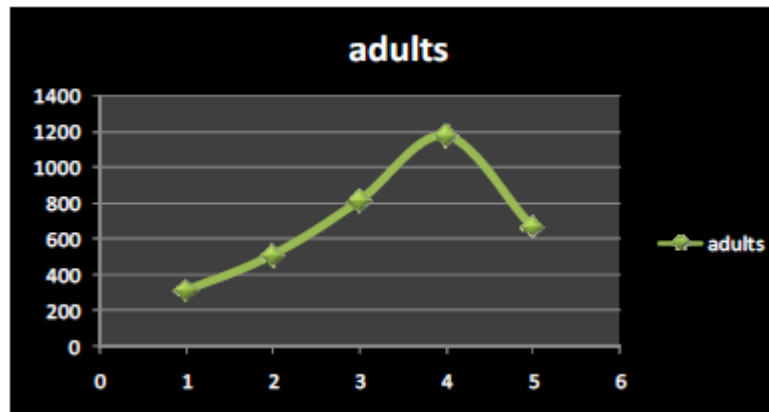


Figure 18. prevalence of rhinosinusitis in adults

Table 1. Total prevalence of Rhinosinusitis from 2011 to 2015

Years	2011	2012	2013	2014	2015	total
Total population per year	3125	6682	9244	11803	8850	39704
Total number of patients with rhinosinusitis	435	714	1015	1572	929	4665
Prevalence per year (%)	13.9%	10.7%	11%	13.3%	10.5%	59.4% Average= 11.7 %

Table 2. Case studies

<i>Cases</i>	<i>Demographic data</i>	<i>Clinical history and manifestations</i>	<i>Physical examination</i>	<i>Management</i>	<i>others</i>
Case 1 25-09-2015	7 years old male, from Bafoussam	<ul style="list-style-type: none"> • Coming in with complaints of catarrh of yellowish coloration for about 3 weeks now. • Also associated with excessive tearing, sneezing mostly at night. • Difficulty in breathing • Head ache • Is not on any drugs as yet. 	<ul style="list-style-type: none"> • Discolored rhinorrhoea- yellowish • Halithosis • Afebrile • After nasal cleaning, inferior turbinates inflamed and mildly obstructive • Lungs-clear 	<p>Diagnosis- Acute rhinosinusitis</p> <p>Treatment</p> <ul style="list-style-type: none"> • Parent counselled about condition • Loratadine 10 mg PO, 1 tab daily for 2 weeks • Nasonex nasal spray, 2 puffs per nostril BID for 30 days • Amoxicillin 250 mg PO TID for 10 days 	<ul style="list-style-type: none"> • Review in 2 weeks for follow up
Case 2 05-10-15	6 years old female, from Mbingo private school of the deaf	<ul style="list-style-type: none"> • Excess sneezing for about 3 weeks, mostly in evenings • Mild head ache • Itchy nostrils throat and ears • Nil nasal obstructions • Nil nasal rhinorrhoea 	<ul style="list-style-type: none"> • Child afebrile • Conjunctivae- pink • Nose: inferior turbinates hypertrophy but non obstructive, mildly pale • Throat: NAD • Breathing- clear 	<p>Diagnosis: Allergic rhinitis</p> <p>Treatment</p> <ul style="list-style-type: none"> • Client and parent instructed on the necessity to avoid allergens especially cold. • Drug –loratadine 10 mg tablets, to take ½ tablet daily for 2 weeks, during evenings 	<ul style="list-style-type: none"> • Review in 2 weeks or before if no improvement
Case 3 Date: 12-10-15	11 years old, female From Wum	This patient is known with chronic rhinosinusitis and has been coming to the hospital with for follow-up. Also, at a point	No significant abnormality	<p>Diagnosis :</p> <ul style="list-style-type: none"> • resolving chronic rhinosinusitis • - R/O allergic rhinitis 	- May need to refill PRN

		<p>due to financial constraints and long distance away from the hospital, they defaulted their appointments. Apparently had a good response to previous treatment.</p> <p>First seen during outreach to Wum and now with complaints of:</p> <ul style="list-style-type: none"> • Rhinorrhoea- creamy and clear watery most often • Occasional nasal blockage • Itchy throat, nose and ears • Associated mild headache 		<p>Plan:</p> <ul style="list-style-type: none"> • Counselling on the importance of early consultation when symptoms exacerbate • Avoid contact with irritating elements/items • Loratadine 10 mg tablet, daily for 2 weeks 	
<p>Case 4 Date: 17-10-15</p>	<p>Age: 6 years old, male From the integrated school of the deaf, Mbingo</p>	<ul style="list-style-type: none"> • A known client with hearing impairment from the integrated school of deaf, coming in with: • Mouth and noisy breathing • Discoloured catarrh for about 2 weeks • Halitosis • Associated productive cough and mild chest pain 	<ul style="list-style-type: none"> • Discoloured purulent rhinorrhoea • Associated obstructive hypertrophied nasal turbinates • Throat- ok • Facial paranasal sinuses tenderness and pains • Auscultation: lungs with noisy and crackly breathing • Fever – 38.7°C • other vital signs normal 	<p>Impression: Bacterial rhinosinusitis with lower respiratory infections</p> <p>Plan:</p> <ul style="list-style-type: none"> • Prednisolone 5 mg tablets po • Take 3 tabs daily for 7 days • Then 2 tabs daily for 7 days • Then 1 tab daily for 7 days • Loratadine 5mg po for 2 weeks • Pydotherin syrup (nasal decongestant), 5 mls bid for 2 weeks • Normal saline nasal spray, 2 puffs per nostril BID for 2 weeks 	<ul style="list-style-type: none"> • To be reviewed in the ENT department in 2 weeks • Paediatrician to review for further inputs

				- Amoxyl syrup 250mg/5ml, BID for 10 days	
Case 5 Date: 23-10-15	Age: 19 years, male	This client was seen and has been managed fir chronic rhinosinusitis with nasal polyp. He was put on prednisolone (systemic steroids) for 1 month and then topical steroids (nasal spray) for an additional 1 month. Was also given antihistamines for a period of 2 months and antibiotics for a month. For these 2 months the outcome of the treatment was not very satisfactory as most of the symptoms were still present. He was asked to do a CT scan that revealed bilateral fullness of the maxillary sinuses.	<ol style="list-style-type: none"> 1. Still with mild facial pains 2. Bilateral nasal polyps can be perceived (right side more than left) 3. Generally stable client 4. Halitosis 5. Clear rhinorrhoea 	<p>Diagnosis- Chronic rhinosinusitis with Nasal polyp</p> <ol style="list-style-type: none"> 6. Based on this, he was booked for FESS (Functional Endoscopic Sinus Surgery) on the 26-10-15. 7. Surgery was done on the 26-10-15 8. Post op management <ul style="list-style-type: none"> • Nasal pack maintained for 24 hours • Monitor vital sign closely • Maintain IV Normal Saline for 24 hours • Regular diet • Ambulate • Can be discharge in 24 or 48 hours if bleeding controlled • Oral prednisolone 5mg, 35mg daily for 1 week then 25 mg daily for another 1 week. • After pack removal, oxymethazoline nasal drop, 3 drops per nostrils TID for 3 days • Loratadine 10 mg PO 	9. Review in 2 weeks for follow up.

				daily for 2 weeks • Amoxicillin 500 mg tablets PO TID for 5 days. • PRN nasal crust gentle removal	
--	--	--	--	--	--

Discussion of results

1. Prevalence of rhinosinusitis

Statistics of all cases of rhinosinusitis were taken from the ENT department registers from the year 2011 to 2015 (January to September). It is obvious that the prevalence of adult patients with rhinosinusitis is more than two times the prevalence of both the children and teenagers mixed. The total number of children from 2011 to 2015 was 677; teenagers were 514 and adults 3477, for a final total of 4668 people with rhinosinusitis. This may be due to the fact that adult patients have re-infections or relapsed conditions and therefore need to visit the hospital more frequently. This also may show their increase fragility and incapacity to control or to resist the allergens or causative agents. This information is better symbolized on figures 16, 17 and 18. For all of them the number of patients seen with rhinosinusitis was higher in 2014.

From the table indicating the total prevalence of Rhinosinusitis from 2011 to 2015, it is showing that the prevalence of rhinosinusitis is lowest in 2015 with a percentage of 10.5% and highest in 2011 (13.9%). The total average prevalence (from 2011 to 2015) is 11.7%. Since the department began being functional by 2011, population awareness about this condition was not well spread and resulted to an increase in prevalence in relation to the total number of patients seen in that year, which obviously is the smallest number.

2. Management of rhinosinusitis

As far as the management of rhinosinusitis is concerned, from the 5 case studies seen, the first case, a 7 years old male, with a diagnosis of acute rhinosinusitis, was managed with antihistamine, a steroid nasal spray, antibiotic and counselled about condition.

The second case, was a 6 years old female, diagnosed with allergic rhinitis (acute). She was managed with an anti-histamine only

The third case, 11 years old female, was first seen during a community outreach and was treated. She was referred to the hospital for follow up. So she had resolving chronic rhinosinusitis with associated allergies. She was given only an antihistamine and was seriously counselled on the importance of early consultation with relapse.

The fourth case, 6 years old boy, was one of the complicated type. He was diagnosed with bacterial rhinosinusitis with associated lower respiratory tract infections. He was prescribed corticosteroids tablets, nasal decongestant, anti-histamines, and antibiotics. He was later referred to the paediatrician for more inputs.

The fifth but not the least case, was a 19years old male. This case too has been followed up by the ENT department and was diagnosed to have chronic rhinosinusitis with nasal polyps. He was first place on corticosteroid (topical spray and tablets) and antibiotics for some months of treatment. He had persistent symptoms and was asked to do a CT scan which showed bilateral maxillary sinuses fullness with Polypoid changes. He later had a Functional Endoscopic Sinus Surgery. After this he was managed as follows on discharge home:

1. Nasal douching solution (normal saline drops)
2. Nasal decongestant
3. Corticosteroid spray and tablets
4. Antibiotics
5. Antihistamines

Conclusion

Rhinosinusitis which is the inflammation of the nasal mucosa, has proved to be a problem in the sub-Saharan African regions as described in the literature review. It is a universal health concern in the sense that it affect anybody and anyway provided the allergens or causative agents are present.

This condition can either be acute or chronic, allergic and non-allergic, and can be managed medically and surgical, all depending on the gravity of the condition.

Though the prevalence of rhinosinusitis depends on the realities of each country and even reaches up to 35% in Nigeria, the one identified by this study and representative of the whole country is lower (11.7%). The fact that this prevalence is around this average value, and considering the type of management done by the health professional which meet standard protocols and practice, we can say that rhinosinusitis is under control. Because population is dynamic, it may difficult to bring that value lower. Proper preventive measures will help reduce the prevalence of rhinosinusitis, among which the intensified education of the population and on preventive measures.

The standard guideline of management of rhinosinusitis will consist of one or the combination of the following:

1. Antihistamine (1 week to 1 month) (may continue for a period of 6 months)
2. Corticosteroids (2 weeks to 1 month)
3. Antibiotics (penicillins or cephalosporins with sometimes with an addition of anaerobes antibiotics like metronidazole) (5 days to 2 weeks dependently)
4. Nasal decongestant (1 to 2 weeks) (if associated with severe nasal congestion)
5. Nasal spray steroids (2 weeks to 1 month) (may continue for a period 6 months)
6. Surgical intervention (Functional Endoscopic Sinus Surgery) for those patients with facial sinuses polyps.

Recommendations

- Mbingo Baptist Hospital should include allergic test in the lab investigations. In Mbingo, they base themselves mostly on clinical histories and complaints from the patients. This test will help differentiate between allergic rhinitis and non-allergic rhinitis.
- Increased education of the population on the condition (rhinosinusitis), its causative agents, its complications, and preventive measures would go a long way to reduce its prevalence.
- There is a need to have a CT scan in the Hospital. All patients that need CT scan are referred to some other places (like in Bafoussam, Douala or Yaoundé) and sometimes out of Bamenda town, to have the CT done, when the scan in Bamenda town is broken.
- Further studies may demonstrate the reasons behind this increase in the prevalence of rhinosinusitis in adults more than in children and teenagers.

References

- [1]. Bhattacharyya N. Contemporary assessment of the disease burden of sinusitis. *Am J Rhinol Allergy*. 2009;23(4):392-395
- [2]. Brook I, Frazier EH, Foote PA. Microbiology of chronic maxillary sinusitis: comparison between specimens obtained by sinus endoscopy and by surgical drainage. *J Med Microbiol* 1997; 46:430-2.
- [3]. Brook I, Yocum P, Frazier EH. Bacteriology and beta-lactamase activity in acute and chronic maxillary sinusitis. *Arch Otolaryngol Head Neck Surg* 1996; 122:418-23.
- [4]. Brook I. Bacteriologic features of chronic sinusitis in children. *JAMA* 1981; 246:967-9.
- [5]. Fokkens W, Lund V, Mullol J, European Position Paper on Rhinosinusitis and Nasal Polyps Group. European position paper on rhinosinusitis and nasal polyps 2007. *Rhinology*. 2007;45 (suppl 20):1-139 <http://www.ep3os.org/EPOS2007.pdf> Accessed February 16, 2011
- [6]. Fokkens WJ, Lund VJ, Mullol J, Bachert C, Alobid I, Baroody F, et al. EPOS 2012: European position paper of rhinosinusitis and nasal polyps 2012. *Rhinol Suppl* 2012:1- 298.
- [7]. Gliklich RE, Metson R. The health impact of chronic sinusitis in patients seeking otolaryngologic care. *Otolaryngol Head Neck Surg*. 1995;113(1):104-109 [PubMed]
- [8]. Global atlas of allergic rhinitis and chronic rhinosinusitis. 2015
- [9]. Jarvis D, Newson R, Lotvall J, Hastan D, Tomassen P, Keil T, et al. Asthma in adults and its association with chronic rhinosinusitis: the GA2LEN survey in Europe. *Allergy* 2012; 67:91-98.

- [10]. Klossek JM, Dubreuil L, Richet H, Richet B, Beutter P. Bacteriology of chronic purulent secretions in chronic rhinosinusitis. *J LaryngolOtol* 1998; 112:1162-6.
- [11]. Pleis JR, Lucas JW, Ward BW. Summary health statistics for U.S. adults: National Health Interview Survey, 2008. National Center for Health Statistics. *Vital Health Stat* 10. 2009; (242):1-157 www.cdc.gov/nchs/data/series/sr_10/sr10_242.pdf Accessed February 16, 2011 [PubMed]
- [12]. Prokopakis E, Vlastos I, Pant H, Ferguson BJ. Chronic rhinosinusitis observation or treatment. *Curr Opin Allergy Clin Immunol* 2013; 13:31-36.
- [13]. Prokopakis EP, Hellings PW, Velegrakis GA, Kawauchi H. From ancient Greek medicine to EP3OS. *Rhinology* 2010; 48:265-272.
- [14]. Prokopakis EP, Vlastos IM, Ferguson BJ, Scadding G, Kawauchi H, Georgalas C, et al. SCUAD and chronic rhinosinusitis. Reinforcing hypothesis driven research in difficult cases. *Rhinology* 2014; 52:3-8.
- [15]. Ramadan HH. What is the bacteriology of chronic sinusitis in adults? *Am J Otolaryngol* 1995; 16:303-6.
- [16]. Rontal M, Bernstein JM, Rontal E, Anon J. Bacteriologic findings from the nose, ethmoid, and bloodstream during endoscopic surgery for chronic rhinosinusitis: implications for antibiotic therapy. *Am J Rhinol* 1999; 13:91-6.