AB stewardship in ENT

Antimicrobial Resistance: A crisis

Antibiotic resistance is a global health threat. Antimicrobial-resistant infections currently claim 700,000 lives a year globally. By 2050, antimicrobial resistance could result in a loss of 10 million lives a year. A greater mortality than that of cancer (Reference: The Review on Antimicrobial Resistance: Tracking Drug-resistant infections globally: Final report and recommendations O'Neill J. May 2016. Antimicrobial stewardship across 47 South African hospitals: an implementation study. Brink AJ. et al. *Lancet Infect Dis* 2016; 16: 1017–25)

Below shows a trend of AB use in South Africa

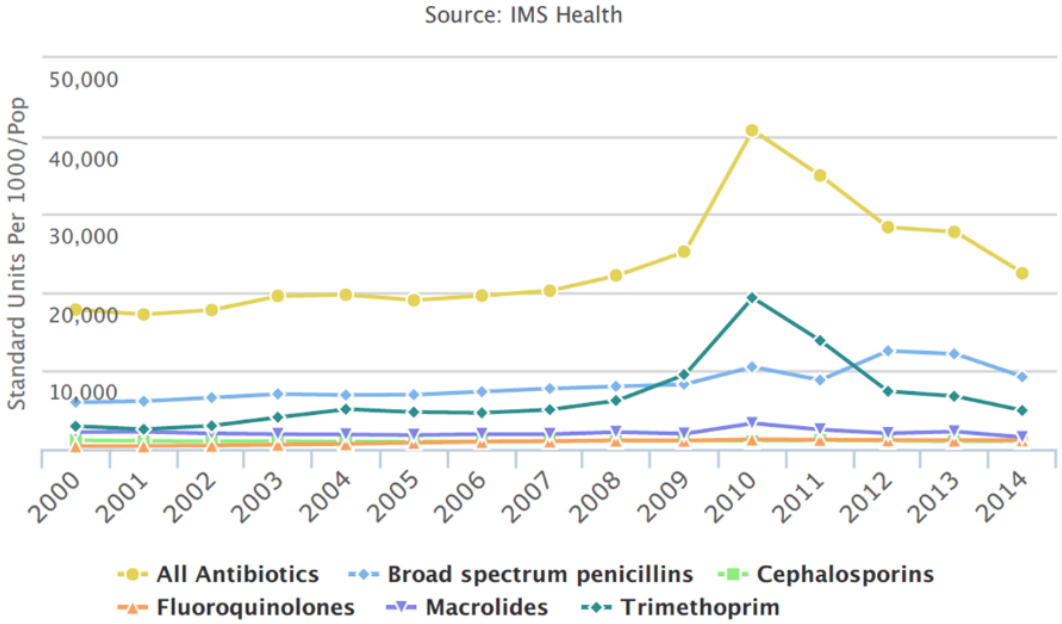
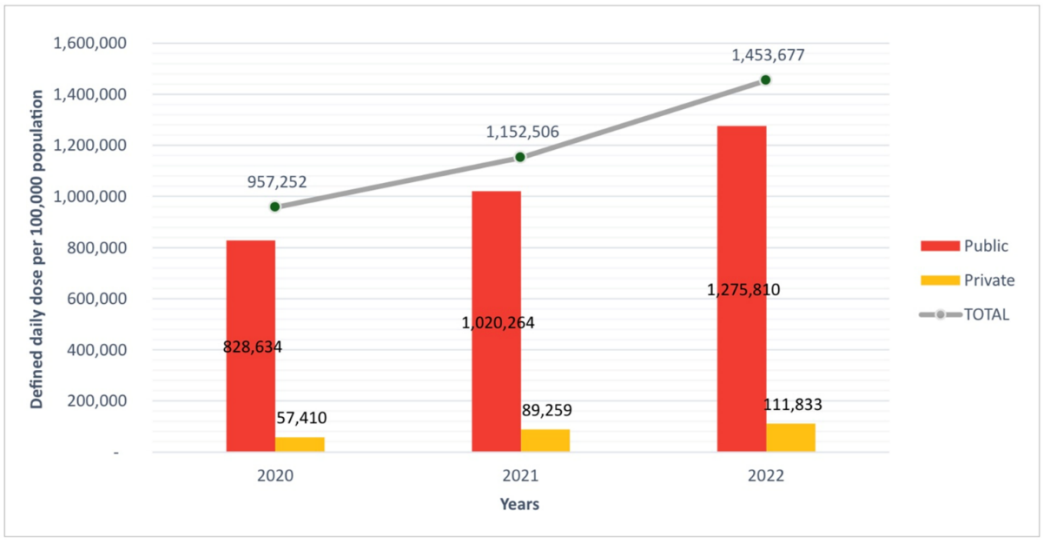


Figure 19: *Total antibiotic consumption and procurement results for South Africa by sector in DDD/100,000 population.*



(Reference: 1. Antibiotic Use in South Africa, Center for Disease Dynamics, Economics & Policy. https://resistancemap.cddep.org/AntibioticUse.php
2. Antimicrobial Stewardship: The South African Perspective. Precious Matsoso Director General; National Department of Health; South Africa 13th November 2015. http://www.who.int/phi/implementation/Precious_Matsoso_MoH_South_Africa.pdf?ua=1)

SURVEILLANCE FOR ANTIMICROBIAL RESISTANCE and CONSUMPTION - SA, 2021
SOUTH AFRICN ANTIMICROBIAL RESISTANCE NATIONAL STRATEGY FRAMEWORK; A ONE HEALTH APPROACH 2017-2024 (https://knowledgehub.health.gov.za/)

Data below comes from the government website.

- Klebsiella pneumoniae
    - 70% Blood specimen isolates (BSIs) are non-susceptible to 3rd generation cephalosporins
    - 40% BSIs are non-susceptible to 1st generation carbapenems
- Pseudomonas aeruginosa
    - 33% BSIs are non-susceptible to carbapenems
    - 17% BSIs is non-susceptible to 3rd and 4th generation cephalosporins and to piperacillin-tazobactam
- Staphylococcus aureus
    - 17% BSIs are non-susceptible to cloxacillin (MRSA)
- Acinetobacter baumannii
    - 80% BSI are resistant to carbapenems
- Enterococcus faecalis / faecium
    - 1.3% BSIs are resistant to vancomycin
- Escherichia coli
    - 25% BSIs non-susceptible to 3rd generation cephalosporins
    - 33% BSIs are non-susceptible to ciprofloxacin

Klebsiella pneumoniae is the commonest organism isolated from blood in both the public and private sectors followed by Staphylococcus aureus, Escherichia coli and then Pseudomonas aeruginosa and Acinetobacter baumannii. The prevalence of extended spectrum beta-lactamase (ESBL)-producing Klebsiella has increased from 65 to 70% over the past five years, which limits the use of cephalosporins as treatment options.

E. coli had showed increasing resistance to quinolones with 33% of isolates resistant to ciprofloxacin, a common empiric treatment for urinary tract infections (UTIs). 25% of E. coli is an ESBL-producer, resistant to 3rd generation cephalosporins.

P. aeruginosa isolates regarded as hospital acquired infections (HAIs) are showing resistance of 20% to piperacillin-tazobactam and 33% to carbapenems, which are commonly used as first and second line treatments, respectively.

Carbapenem resistance in A. baumannii is 80%, with consistent findings across the country, as well as increasing levels of resistance over time. 20% of isolates show non-susceptibility to tigecycline. This limits treatment options to last resort antimicrobials such as colistin.

Methicillin resistance in Staphylococcus aureus (MRSA) is the only major bacterial resistance mechanism to show a decline over the past five years from 23% to 18%.

Enterococcus faecalis susceptibility to ampicillin is greater than 95% but this is not unusual, however the majority of E faecium have always been resistant to ampicillin. The growing concern is of vancomycin resistance (one of the last resort antimicrobials).

The GERMS-SA2 surveillance programme showed that resistance to penicillin of 4% for Streptococcus pneumoniae occurs mainly in children under five years of age and young adolescents and originates from community settings.

Antimicrobial Use:

The most used antibiotics in the public sector in 2020 were extended-spectrum penicillin, accounting for 28% of total antibiotics used. This was followed by oral trimethoprim-sulfamethoxazole and metronidazole at 13% and 12% respectively. By contrast, in the private sector extended spectrum penicillin, carbapenems and 3rd generation cephalosporins accounted for 41%, 20%, 13% respectively. Macrolides have more than doubled in proportionate use from 5% to 11% between 2018 and 2020, which may reflect possible increases in use during the COVID-19 pandemic in South Africa from March 2020 and ongoing at the time of writing this report. The private sector used more carbapenems as an overall percentage compared to the public sector; but both have high broad-spectrum penicillin usage.
Use of antibiotics has the possibility of driving resistance amongst ESKAPE pathogens and should be a target for future monitoring. (ESKAPE = Enterococcus faecalis and Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa and Escherichia coli)

The drivers of antibiotic resistance include:

- Antibiotics play a vital role in the management of bacterial infections, reducing morbidity and preventing mortality. They are estimated to increase life expectancy by 20 years. However, the extensive use of antibiotics in animal and human health, agricultural, and environmental sectors has resulted in drug resistance that threatens to reverse the life-saving power of these medicines. A tipping point has been reached for the international community, where we find ourselves entering a “post-antibiotic era”.
- In South Africa, the identification and publication of the first untreatable, pan-resistant Klebsiella pneumoniae from the urine of a patient admitted for cardiac surgery, and the emergence of colistin resistant genes in poultry and humans represents the extreme end of the spectrum of increasingly common multi-drug resistant (MDR) bacterial infections in this country.
- AMR or the ability of a microorganism to withstand treatment with an antimicrobial medicine, is a significant and multifaceted public health problem and a direct threat to human and animal health, food security and the continued use of available antimicrobials. The societal and financial costs of treating antimicrobial resistant infections in humans and animals will place a significant human and economic burden on society and compromise food security.
- Sixty percent of the human pathogens come originally from animals and therefore it is clear that AMR poses a serious global threat to both animal and human disease treatment. From an animal health perspective antimicrobial agents are essential tools for protecting animal health and welfare, and also contribute to satisfying the increasing world demand for safe food of animal origin,

Amount of antibiotics used:

- The total volume of antibiotics used by humans and animals according to international estimates suggest that half of all antibiotics prescribed in humans are unnecessary, either as no infection exists, the infection is not caused by a bacterium, or antibiotics are prescribed for too long a duration. Approximately, 80% of all antibiotics used globally are for animal health, agriculture and aquaculture to prevent or treat infection, or for growth promotion in the feed of animals.
- Reliance on broad-spectrum antibiotics, which have activity against a wide range of different bacteria will select out a greater range of resistant bacterial populations as opposed to narrow-spectrum antibiotics, which target the specific bacteria causing infection.
- Poor infection control practices leading to the acquisition and spread of hospital acquired infections.
- Hospitalized patients are at high risk of developing a MDR bacterial infection, as they are often immune-compromised, may have MDR bacteria transferred to them as a result of poor hand hygiene practice by health care professionals, and may have MDR bacteria introduced into the body as a result of invasive procedures and devices.
- Lack of veterinary health professionals, weak regulations and enforcement mechanisms to oversee antimicrobial use and control of its appropriate application in animals.

The strategic framework consists of five strategic objectives:

- Strategic objective 1: Strengthen, coordinate and institutionalize interdisciplinary and intersectoral efforts through national and provincial One Health governance structures which encompasses human, animal, and environmental health experts.
- Strategic objective 2: Diagnostic Stewardship to improve the appropriate use of diagnostic investigations to identify pathogens and guide patient and animal treatment and antimicrobial management whilst strengthening quality laboratory systems for the detection of disease.
- Strategic objective 3: Optimize surveillance and early detection of AMR and antimicrobial use to enable reporting of local, regional, and national resistance patterns to optimize empiric and targeted antibiotic choice.
- Strategic objective 4: Enhance infection prevention and control and biosecurity to prevent the spread of resistant microbes to patients in healthcare settings and between animals, farms and countries. Reduced use of antimicrobials by disease prevention and community measures includes wide-reaching vaccination programs, improvements in water and sanitation, and improved biosafety.
- Strategic objective 5: Promote appropriate use of antimicrobials in human and animal health through AMS practices and controlled access to antimicrobials to ensure availability.

South African Antibiotic Stewardship Programme (SAASP):
https://cct.mycpd.co.za/fidssa/SAASP_Antibiotic_Guidelines_2015.pdf

Antibiotics in ENT

ENT related infections:

- It is common – **30-40%** of all primary care visits are **ENT related**
- Bacteria
    - Most common bacteria, for the majority of ENT conditions, are
        - ***Streptococcus pneumonia, Haemophilus influenza, and Moraxella catarrhalis***
    - *Haemophilus influenza* has replaced *Streptococcus pneumonia* as the most frequently isolated pathogen following routine vaccination of children with PCV-7 (2009) and PCV-11 (2011)
- Systemic reviews suggest that in high-income countries the benefit of antibiotic use for acute pharyngotonsillitis, acute otitis media (AOM), and acute bacterial rhinosinusitis (ABRS) is extremely limited (NNT 1/13)
- However, there is **limited data** from low- and middle-income countries, where rheumatic fever and complicated mastoiditis are common

When to prescribe antibiotics?

- When a diagnosis of a bacterial infection is made
    - Four D's
        - Correct Diagnosis
        - Correct Drug
        - Correct Dose
        - Correct Duration
- When to use a higher dose as first line treatment?
    - When there are risk factors for *Streptococcus pneumonia* such as
        - Recent anti-biotic use
        - <3 and >65 years
        - Immunocompromised
        - Day-care attendees or siblings of children attending day-care centres
        - Health care workers / environment
    - Severely ill, toxic patient
    - Complicated disease

B-lactam allergy

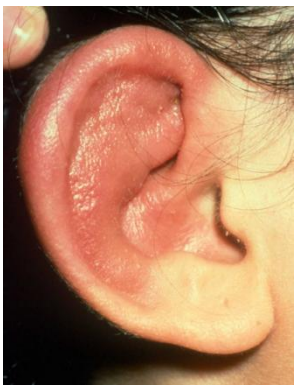
- Differentiate between the immediate type I IgE hypersensitivity and the rest
    - Type I IgE hypersensitivity symptoms and signs includes
        - **Anaphylaxis, Angio-oedema, Urticarial rash, Bronchospasm**
    - These patients should avoid penicillin / amoxicillin / ampicillin
- Patients with lesser reactions may tolerate second and third generation cephalosporins
- To exclude or confirm a B-lactam allergy (penicillin) order a Skin prick test or CAST test

Individual sites
Below follows a very short description of ENT conditions with the appropriate management. More details with regard to the pathologies are discussed under their separate headings.

Ears

Pinna

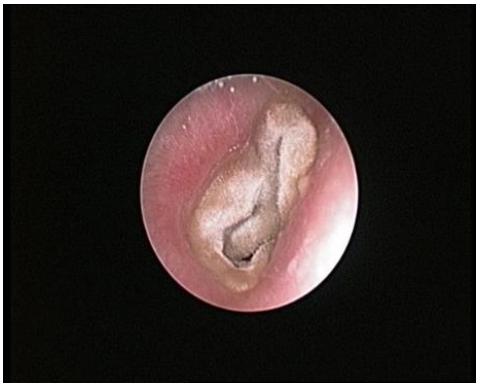
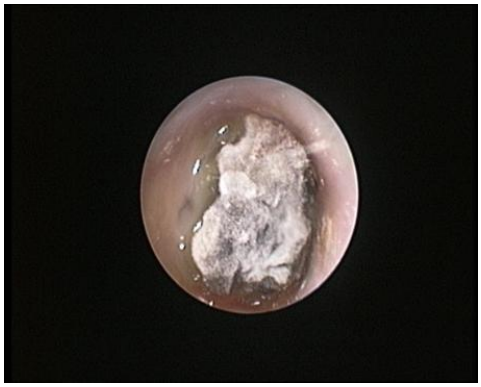
- Cellulitis / chondritis
- Amoxycillin / clavulanic acid
- Cephalosporin
    - 2^{nd} / 3^{rd}



Right ear with perichondritis involving most of the pinna except the lobule.

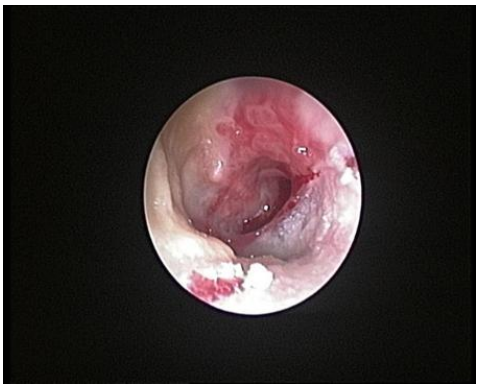
Fungal otitis externa

- Difficult
- Needs cleaning of external ear canal
- Boric acid
- Alcohol / Acetic acid
    - Swimmers drops
- Anti-fungal cream
- **Never anti-bacterial topical drops**



Two different ears (difficult to say which side). Hyphae can be seen and the one on the right has the typical "wet newspaper" appearance.

Bacterial otitis externa

- Keep the ear dry
- Ciprofloxacin topical drops
    - In combination with steroid drops
- Anti-bacterial creams
- Boric acid
- Alcohol / Acetic drops


Left ear with puss, erythema and some keratinised skin between 3 and 6 o'clock.

Treatment of diffuse Otitis Externa

- Clean ear canal
    - Ear bud – mopping = Ear toilet
    - If it's swollen shut, you need to insert some type of plug – see below
- Bacterial
    - Ofloxacin and steroid ear drops
        - Cilodex®
        - Safe in external and middle ear cavity
    - Boric acid powder
    - Gentamycin and others
        - Sofradex®, Covomycin D® etc
        - Toxic to the inner ear. Therefore, **unsafe if there is a tympanic membrane perforation.**
- Fungal
    - More difficult to treat
    - Canestan cream®
    - Swimmers drops, Acetic acid, Gentian violet, Methiolate, Boric acid powder
- Combination
    - Quadriderm cream®
    - Mupirocin / Clotrimazole / steroid

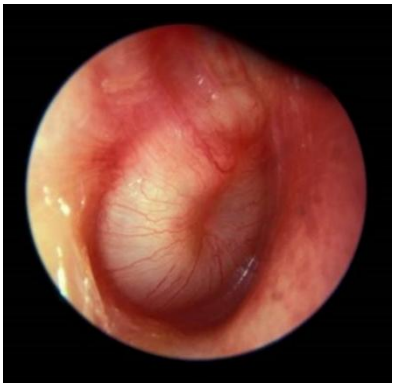
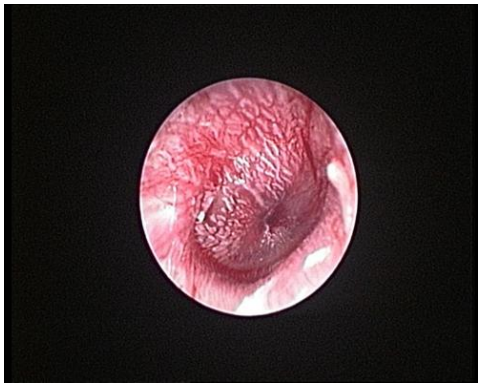
- Ear canal swollen shut
    - Creams as above on a ribbon gauze, and then inserted into the external ear canal

SEE VIDEOS OF EAR CANAL CLEANING AND BORIC POWDER!
https://youtube.com/shorts/SNXWIkNz0jE
https://youtube.com/shorts/fGeZzGU8oQA

Acute otitis media – without perforation

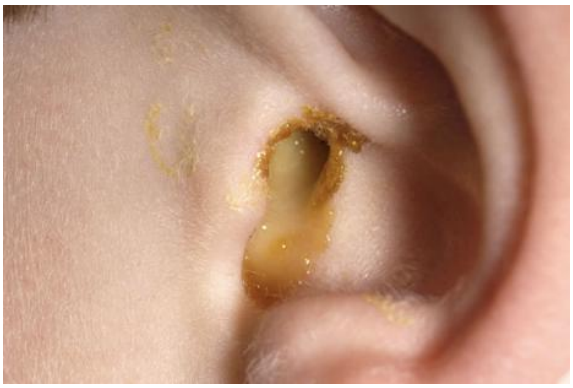
Background:
- It is estimated that 75% of children will have at least one episode of AOM by the age of three
- Mostly due to viruses, and bacterial AOM has a high spontaneous resolution rate
- Therefore, anti-biotics are deferred for 48 hours **except** for
    - Bulging tympanic membrane and fever > 38^0C (controversial)
    - The very young (< 1-2 years)
    - Immunocompromised
    - Recurrent AOM
    - Symptoms and signs of complicated AOM
    - Pain > 48 hours
    - Limited access / follow up capability (controversial)
- It has been proven in large meta-analysis that pain relief is the most important aspect in the treatment of AOM

Antibiotics:
- High incidence of β-lactamase producing *Haemophilus influenza*
- Therefore, consider **Amoxicillin-clavulanate as first choice** instead of amoxicillin
- No β-lactam allergy
    - Children
        - (Amoxicillin 80-90 mg/kd/d in two divided dosages x 5-7/7)
        - Amoxicillin-clavulanate 90 mg/kg/d in two divided dosages x 5-7/7
        - Cefuroxime 30 mg/kg/d in two divided dosages x 5-7/7
        - Cefpodoxime 16 mg/kg/d in two divided dosages x 5-7/7
    - Adults
        - (Amoxicillin 1 gr q8h po x 5/7)
        - Amoxicillin-clavulanate 1-2gr bd po x 5/7
        - Cefuroxime 1000 mg q12h po x 5/7
        - Cefpodoxime 400 mg q12h po x 5/7
        - Rarely Ceftriaxone 50 mg/kg OD IM/IV x 3/7
- B-lactam allergy
    - Children
        - Azithromycin 10 mg/kg OD po x 3/7
        - Clarithromycin 15-30 mg/kg/d in two divided dosages x 5/7
        - Erythromycin 40 mg/kg/d in four divided dosages x 5/7
        - Rarely Levofloxacin 20 mg/kg/d in two divided dosages x 5/7
    - Adults
        - Levofloxacin 500 mg q12h po x 5/7
        - Moxifloxacin 400mg OD po x 5/7



Two pictures, both of right ears. The one on the left shows a building TM with obvious puss behind it (yellow). The righthand picture shows the haemorrhagic phase of AOM with also a building TM.

Acute otitis media with a perforation or post grommet otorrhea

- Clean ear – dry mopping
- Keep ear dry
- Ciprofloxacin topical drops
    - Cilodex® / Exocin® / Ciloxan®
- NEVER any other drops
- If persistent – oral antibiotics


Left ear with puss draining into the concha from the external ear canal.

Nose

The diseases below will be discussed in more detail under rhinology, but in the "acute rhinosinusitis" patient one needs to differentiate the following conditions.

	Acute viral rhinosinusitis (RS) (AVRS)	**Acute post viral RS (APVRS)**	**Acute bacterial RS (ABRS)**	**Recurrent ARS**
Symptoms	Two or more symptoms, of which one should be either **Blockage / obstruction / congestions** OR **nasal discharge** (anterior / posterior), and +/- facial pain pressure +/- reduction / loss of smell (cough in children)			
Additional symptoms	Fever, Cough, Toothache, Halitosis, Otalgia, Tiredness, Sore throat, Dysphonia, Pain on bending forward			

Time frame	< 10 days No severe fever No lasting purulence No worsening	Increase in symptoms after 5 days Persistent symptoms > 10 days Less than 12-week duration	Can occur early after an acute viral RS but is rare Chances of it being secondary bacterial infection correlates with days after onset and severity of symptoms	≥ 4 / year

When is it bacterial AND antibiotics will make a difference in acute bacterial rhinosinusitis (ABRS)?

Two different guidelines are available. The European based EPOS and American guidelines are given below. There is definite overlap between them and we think that both can be used.

- European / EPOS
    - At least 3 of the following 5
        - Discoloured discharge
        - Severe local pain (unilateral)
        - High fever (380C)
        - Double sickening
        - Elevated CRP / ESR
- American guidelines:
    - Any / all the following
        - Worsening of symptoms at day 5-7 after initial improvement
        - Symptoms persist for more than 7 days
        - Purulence and fever present for 3-4 days

What else points more to a bacterium?

- Acute onset
- Temperature above 38^0C
    - Strongly associated with *Streptococcus pneumonia and Hemophilus influenzae*
    - Particularly in conjunction with more severe symptoms (VAS)
- CRP and ESR
    - Low – Avoid AB
    - High
        - Correlates with bacterial disease on MCS / sinus puncture
        - Correlates CT changes
- Procalcitonin
    - Showed a reduction in AB prescriptions, without detrimental outcomes, if it was normal

Treatment:

AVRS

- Education
- Decongestants < 10 days
- NSAIDS / Paracetamol
- Zinc
- Vitamin C
- Nasal rinses
- Herbal medicine
    - BNO1016 (eg. “Sinupret®”)
    - Cineole
    - Andrographis paniculata

APVRS
- Intra-nasal cortisone spray (INCS)
- Decongestants
- Herbal medicine
- Nasal rinses
- Follow up plan
- Special investigations

ABRS
- As the other
- Antibiotics after 7-10 days

Antibiotics and dosages:

First line dosages in children
- Amoxycillin / clavulanic acid 45 mg/kg/d
- Cefpodoxime 4-8 mg/kg/d
- Cefuroxime 15 mg/kg/d

Failure / Step up dosages in children
- Amoxycillin / clavulanic acid 90 mg/kg/d
- Cefpodoxime 16 mg/kg/d
- Cefuroxime 30 mg/kg/d

First line dosages in adults
- (Amoxycillin 1 - 2 gr bd)
- Amoxycillin / Clavulanic acid 1 gr bd
- Cefuroxime 500 mg bd
- Cefpodoxime 200 mg bd
- (Cefprozil 500 mg bd)

Failure / Step up dosages in adults
- Amoxycillin / Clavulanic acid 2 gr bd
    - 1 gr bd with added amoxicillin
- Cefuroxime 500 – 750 mg tds
- Cefpodoxime 200 mg tds
- (Cefprozil 500 mg tds)

Throat

Acute pharyngotonsillitis (APT)

Causes include:
- Infective
    - Viral most common
        - Adenovirus, Coxsackie A virus, Influenza virus, Parainfluenza virus, Epstein Barr virus
    - Bacteria (5-30%)
        - Group A β-haemolytic *Streptococcus pyogenes* (GABHS)
        - Other
    - Fungi
        - Candida
    - Granulomatous
- Other
    - Irritant

- Reflux
- Tumours
- Auto-immune
- Trauma
- Neuralgias

Most of the time, acute pharyngotonsillitis is of viral origin. However, Group A β-haemolytic *Streptococcus pyogenes* (GABHS) remains the most common bacterial cause. Because of its ability to cause rheumatic fever, glomerulonephritis, and other septic complications it needs to be diagnosed from viral and other aetiologies. Treatment with antibiotics have been shown to prevent the development of rheumatic fever and septic complication, but not the development of glomerulonephritis. Fortunately, there has never been a GABHS isolate that showed resistance to penicllin.

Symptoms of infective pharyngotonsillitis are not specific enough to differentiate between the different infective causes. Symptoms in general include sore throat, sever, dysphagia, and halitosis. Symptoms in favour of acute viral pharyngitis include rhinorrhoea, cough, conjunctivitis, hoarseness, stomatitis, ulcer(s), diarrhoea. Therefore, the question remains how can we diagnose a bacterial pharyngitis and GABHS in particular? We advise using the modified Centor criteria. It can only be applied in patients with recent onset (≤3 days) acute pharyngitis. A score of more than 3-4 points correlates with a bacterial infection, and thus antibiotic use.

Modified Centor criteria

Criteria		**Points**
Age	< 3	0
	3-14	+1
	15-44	0
	> 44	-1
Cough	Present	0
	Absent	+1
Tonsillar exudates / swollen		+1
Temp > 38°C		+1
Anterior cervical lymphadenopathy		+1

Other options to diagnose a possible GABHS include:

- Rapid antigen testing
- Throat swab (PCR as well)
- Nucleic Acid Amplification Techniques (NAATs)

The following link gives a nice overview of subject (https://www.frontiersin.org/journals/cellular-and-infection-microbiology/articles/10.3389/fcimb.2020.563627/full).

Treatment of acute bacterial tonsillitis:

- Penicillin / Amoxicillin
    - Pen VK (30 minutes before meals)
        - 250 mg BD po x 10/7 (<27 kg)
        - 500 mg BD po x 10/7 (>27kg)
    - Amoxicillin
        - Children
            - 50 mg/kg/d in two divided dosages x 10/7 (max 1000 mg)
        - Adults
            - 500-1000 mg BD po x 10/7
- B-lactam allergy
    - Children
        - Azitromycin 10-20 mg/kg/d OD x 5/7
        - Claritrhomycin 15 mg/kg/d in two dosages x 10/7

- Adolescents and adults
    - Azitromycin 500 mg OD po x 3/7
    - Clarithromycin 500 mg BD x 10/7

Acute Laryngitis

- Can either be infective or non-infective
- Infective laryngitis
    - Associated with an upper respiratory tract infection
    - Voice changes, throat pain
    - Spontaneous resolution
    - Voice rest, Steam inhalation, Steroids
    - NO ANTIBIOTICS!

Chronic laryngitis

- Dysphonia for weeks
- Smoking, gastro-oesophageal reflux (GERD), laryngopharyngeal reflux (LPR), and alcohol use are risk factors
- May induce secondary epithelium changes that can be pre-malignant
- Vocal hygiene principles are important
    - Lots of water
    - Avoid caffeine
    - Voice rest
    - Do not whisper or force your voice
    - Do not raise your voice over the background noise
    - Avoid smoking and alcohol
    - Empirical treatment for GERD / LPR
- Needs endoscopy by an ENT

Laryngotracheobronchitis / Croup

- Typically presents between ages 6 months – 6 years and is preceded by a viral URTI
- Keeping the child and the parent calm
- Steroids
    - Oral / IV / nebs
    - Oral and IV equally effective
        - Oral prednisolone 1mg/kg
        - Oral dexamethasone 0.15mg/kg
        - IV / IM dexamethasone 0.6mg/kg
    - Low vs high dose studies have been equivocal
- Adrenaline
    - Nebs
    - Remember potential rebound swelling, therefore children should be observed for at least 3-4 hours
- Humidified air
    - Heliox
- Securing the airway
    - Intubation vs tracheostomy (only in cases of Grade 3-4 stridor where there is concern of acute airway compromise)

Supraglottitis / Epiglottitis

- Cephalosporin, steroids, HIB vaccine

Anaphylaxis guideline of South Africa:

EMERGENCY MANAGEMENT OF ADULT & CHILD ANAPHYLAXIS

1 RECOGNIZE THE SUDDEN ONSET OF EITHER:

AFSA ALLSA

EXPOSURE TO KNOWN OR UNKNOWN ALLERGEN

- **SKIN/MUCOSAL INVOLVEMENT** (rash, swelling) **AND ANY OF:**
- **RESPIRATORY COMPROMISE** (dyspnoea, wheeze), **OR**
- **CARDIOVASCULAR DYSFUNCTION, OR**
- **SEVERE GASTROINTESTINAL SYMPTOMS** (abdominal pain, repetitive vomiting)

AFTER EXPOSURE TO KNOWN ALLERGEN

- **RESPIRATORY DIFFICULTY** (stridor, voice change, wheeze, hypoxaemia, distress)

AND/OR:

- **CARDIOVASCULAR DYSFUNCTION** (shock, hypotension, syncope, collapse)

(No need for skin or mucous membrane involvement)

2 IMMEDIATE TREATMENT:

⊘ REMOVE EXPOSURE
ⓘ CALL FOR HELP

ADRENALINE

1mg/ml (1:1000) - 0.01mg/kg IM (Max 0,5ml IM) anterolat aspect of thigh
Repeat every 5-15 minutes if no improvement or use an **auto-injector**
<6yrs - 0,15ml IM; 6-12 yrs - 0,3ml IM; >12 yrs - 0,5ml IM

3 ASSESS VITAL SIGNS: OXYGEN - MONITORS - IV ACCESS

High flow oxygen, maintain patent airway (Intubate/Cricothyrotomy if necessary)
High flow IV line, BP, Sats, ECG monitoring
Lie patient supine with legs elevated if hypotensive

4 ADJUNCTIVE TREATMENT IF NECESSARY

H1 ANTIHISTAMINE
Promethazine
2-6 yrs - 6,25mg IM or slow IV
6-12 yrs - 12,5mg IM or slow IV
>12 yrs - 25mg IM or slow IV
(Avoid if <2yrs old and low BP)

CRYSTALLOID
(e.g. Ringers/Balsol)
Rapid infusion of 20ml/kg (max 1-2 litres)
Repeat IV infusion as necessary
Adrenaline infusion (0,1 - 1 ug/kg/min)
ONLY if unresponsive to IM adrenaline & fluids

NEBULISED BRONCHODILATORS
Every 15-20 mins if severe bronchospasm
Salbutamol 5mg
WITH
Ipratropium 0,5mg

H2 RECEPTOR ANTAGONIST
Cimetidine
IM or Slow IV
5mg/kg (Max - 300mg)
Diluted in 20ml over 2 min

CORTICOSTEROIDS
Hydrocortisone
IM or Slow IV
<1 yr - 25mg; 1-6 yrs - 50mg;
6-12 yrs - 100mg; >12 yrs - 200mg

GLUCAGON
20ug/kg (Max 1-2mg)
IM or slow IV every 5 mins if unresponsive to adrenaline (Look out for vomiting and hyperglycaemia)

RISK REDUCTION STRATEGIES

- Only discharge patient if clinically stable 4-6 hours after resuscitation (may need longer if at risk of biphasic reaction)
- Provide a written anaphylaxis emergency action plan, including how to administer IM adrenaline
- Refer to specialist for investigation and management
- Provide patient eduction (www.allergyfoundation.co.za) and medic-alert bracelet

FAQ's:

When is it appropriate to initiate treatment for Anaphylaxis?
Treat anaphylaxis at diagnosis with IMI adrenaline even if severe respiratory or cardiovascular symptoms are not (yet) present.
Why are Antihistamines considered adjunctive treatment?
H1-antihistamines may relieve itching and urticaria but do not prevent or relieve life-threatening symptoms of anaphylaxis. Antihistamines should not be used alone, or instead of adrenaline, for anaphylaxis.

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Ref: Cardona et al. World allergy organization anaphylaxis guidance. WAOJ;13(10):2020.