

NATIONAL CLINICAL GUIDELINES

THE DIAGNOSIS & MANAGEMENT OF TONSILLITIS IN
ADULTS AND CHILDREN

Ministry of Public Health

P.O. Box 42,

Doha, Qatar

Phone: (+974)4 407 0969

Email: clinicalguidelines@moph.gov.qa

Valid From: 28th July 2019

Date of Next Revision: 28th July 2021



المبادئ الإرشادية السريرية لدولة قطر
NATIONAL CLINICAL GUIDELINES FOR QATAR



وزارة الصحة العامة
Ministry of Public Health
دولة قطر • State of Qatar

Version History

Version	Status	Date	Editor	Description
1.0	Initial Version	14 th December 2016	Guidelines Team	Published version.
2.0	Updated Version	28 th July 2019	Guidelines Team	Updated Published Version.

Citation

Suggested citation style:

Ministry of Public Health Qatar. National Clinical Guideline: The Diagnosis and Management of Tonsillitis in Adults and Children (2019).

Abbreviations

The abbreviations used in this guideline are as follows:

GABHS	Group A beta-haemolytic <i>streptococcus</i>
ASO	Anti-Streptolysin-O
CBC	Complete blood count
RAT	Rapid Antigen Testing
EBV	Epstein-Barr virus
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immunodeficiency Disease

Table of Contents

1	Information About This Guideline	5
1.1	Objective and Purpose of the Guideline	5
1.2	Scope of the Guideline	5
1.3	Editorial Approach.....	5
1.4	Sources of Evidence	6
1.5	Evidence Grading and Recommendations	6
1.6	Guideline Development Group Members.....	7
1.7	National Clinical Guidelines & Pathways Committee Members	8
1.8	Responsibilities of Healthcare Professionals.....	8
2	Tonsillitis Pathway	9
3	Key Recommendations of the Guideline	10
4	Background Information.....	11
4.1	Definition.....	11
4.3	Aetiology	11
4.3	Natural History	12
4.4	Complications.....	12
4.5	Higher Risk Groups.....	12
5	Presentation	13
5.1	Clinical Presentation.....	13
5.2	Indications for Immediate Referral to Hospital.....	13
5.3	Indications for Urgent Referral to an ENT Specialist.....	13
6	History	14
7	Examination.....	14
8	Investigations	15
8.1	Centor Scoring System	15
8.2	FeverPAIN Criteria.....	16
8.3	Rapid Antigen Testing (RAT).....	16
8.4	Throat Cultures	16
9	Differential Diagnosis	17
10	Management	18
10.1	Advice to Patients, Parents and Carers.....	18
10.2	Pharmacological Treatment.....	18
10.2.1	Symptom Control.....	18
10.2.2	Corticosteroid Use	19
10.2.3	Antibiotic Treatment.....	19
10.3	Safety-Netting and Follow-Up.....	20
11	Referral.....	21

11.1 Referral for Elective Tonsillectomy	21
12 Key Considerations for Patient Preferences.....	22
13 Performance Measures	23
14 References.....	24
Appendix: Detailed Description of the Literature Search	26
Acknowledgements	27

1 Information About This Guideline

1.1 Objective and Purpose of the Guideline

The objective and purpose of this guideline is to define the appropriate diagnosis and management of tonsillitis in adults and children aged over 3 years. The objective is to reduce inappropriate prescribing and referral of patients presenting to any provider organisation (i.e. hospitals or clinics) in Qatar. It is intended that the guideline will be used primarily by primary care physicians.

1.2 Scope of the Guideline

This guideline covers the following aspects of care:

- Presentation and management of acute tonsillitis.
- Adults and children aged over 3 years.
- Primary care management.
- Indications for referral for tonsillectomy.

Aspects of care not covered in this guideline are:

- Management of peritonsillar abscess or cellulitis.
- Management of tonsillectomy patients.
- Management of pregnant women.
- Management of immunocompromised patients.
- Children aged less than 3 years.

1.3 Editorial Approach

This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this guideline, has involved the following critical steps:

- Extensive literature search for well reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising healthcare professionals, subject matter experts and patient representatives, from across Qatar.
- Independent review of the guideline by the National Clinical Guidelines & Pathways Committee, appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Whilst the MOPH has sponsored the development of the guideline, the MOPH has not influenced the specific recommendations made within it.

1.4 Sources of Evidence

The professional literature published in the English language has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a clinical editor and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals (i.e. journals that are read and cited most often within their field).
3. Address an aspect of specific importance to the guideline in question.

Further information about the literature search and appraisal process is included in the appendix.

1.5 Evidence Grading and Recommendations

Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritativeness of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
 - Meta-analyses.
 - Randomised controlled trials with meta-analysis.
 - Randomised controlled trials.
 - Systematic reviews.
- **Level 2 (L2):**
 - Observational studies, examples include:
 - Cohort studies with statistical adjustment for potential confounders.
 - Cohort studies without adjustment.
 - Case series with historical or literature controls.
 - Uncontrolled case series.
 - Statements in published articles or textbooks.
- **Level 3 (L3):**
 - Expert opinion.
 - Unpublished data, examples include:
 - Large database analyses.
 - Written protocols or outcomes reports from large practices.

In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A (RGA):** Evidence demonstrates at least moderate certainty of a net benefit from the recommendation.
- **Recommendation Grade B (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C (RGC):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.

1.6 Guideline Development Group Members

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the Clinical Governance Group. The GDG members have reviewed and provided feedback on the draft guideline relating to the topic. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

Guideline Development Group Members		
Name	Title	Organisation
Mr Adel Abazaid	Patient Representative	-
Dr Mariam Al Hitmi	Specialist Family Medicine	PHCC
Dr Abdulla Al Naemi	Senior Consultant, Family Medicine	PHCC
Dr Ghada Al Sulaiti	Head of Paediatric Guideline Committee	Hamad Medical Corp
Dr Amani Hussein Al Yafei	Specialist Family Medicine	PHCC
Dr Amr Elhakeem	Senior Consultant, ENT	Hamad Medical Corp
Dr Shanmugam Ganesan	Senior Consultant, ENT	Hamad Medical Corp
Dr Madeeha Kamal	Senior Consultant, Paediatrics	Hamad Medical Corp
Dr Arif Mahmood	Consultant, Family Medicine	Qatar Petroleum
Dr Stella Major	Associate Professor of Family Medicine	Weill Cornell Medicine - Qatar
Dr Arthur Vidyasagar Samuel	General Practitioner	Aster DM Care

1.7 National Clinical Guidelines & Pathways Committee Members

The following table lists members of the National Clinical Guidelines & Pathways Committee (NCGPC), appointed by the MOPH. The NCGPC members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

National Clinical Guidelines & Pathways Committee (NCGPC) Members		
Name	Title	Organisation
Ms Huda Amer Al-Katheeri	Chair of the NCGPC, Director of Strategic Planning & Performance Department	Ministry of Public Health
Shk Dr Mohammed Hamad J. Al Thani	Co-Chair of the NCGPC, Director of Public Health	Ministry of Public Health
Prof Anthony Akobeng	Chair Clinical Practice Guidelines Committee	Sidra Medicine
Dr Maryam Ibrahim Al-Heidous	Registration coordinator, QCHP	Ministry of Public Health
Dr Alshaymaa Mohammed A. M. Al-Motawa	Consultant Family Medicine	Qatar Petroleum
Dr Abi Khalil Charbel	Associate Professor of Medicine Consultant Cardiology	Weill Cornell Medicine- Qatar
Dr Paul Dijkstra	Director of Medical Education	Aspetar
Dr Mohamed Elrishi	Consultant Endocrinology and Internal Medicine	Al Ahli Hospital
Dr Dahlia Mustafa Hassan	Consultant Family Medicine	Primary Health Care Corp
Dr Ghassan Youseph Hommos	Consultant Endocrinology	Al Emadi Hospital
Dr Chris Kenny	Executive Director Clinical and Service Development, Office of the Chief Medical Officer	Hamad Medical Corporation
Dr Egon Toft	VP and Dean of College of Medicine	College of Medicine, Qatar University

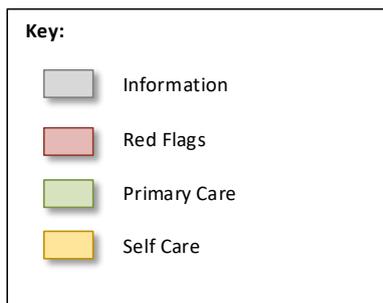
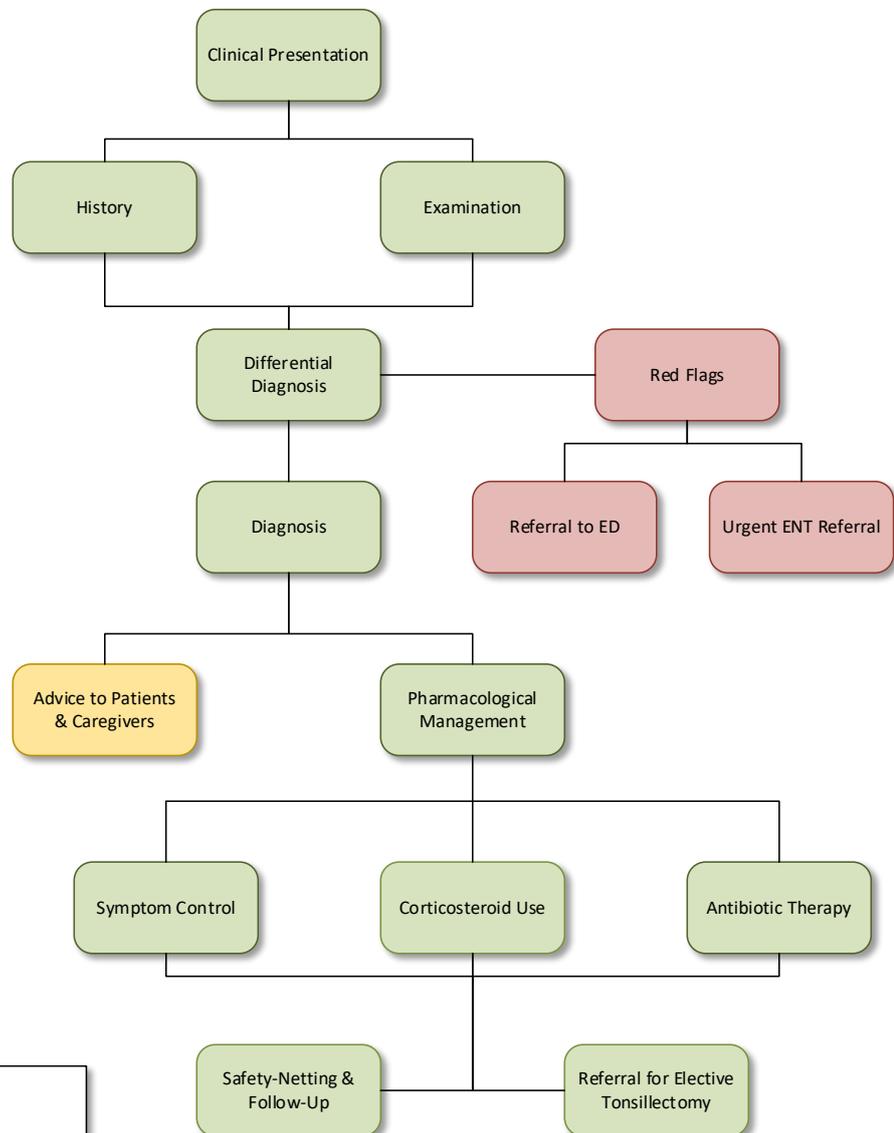
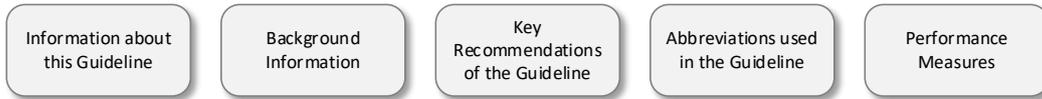
1.8 Responsibilities of Healthcare Professionals

This guideline has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or carers and should consider the individual risks and benefits of any intervention that is contemplated in the patient's care.

2 Tonsillitis Pathway

Click on a box below to see the relevant page of the Pathway.



3 Key Recommendations of the Guideline

The key recommendations of this guideline are as follows:

Care Settings (Section 5):

- Tonsillitis and other causes of sore throat are conditions that should be recognised and managed primarily in a primary care setting **[R-GDG]**.
- Significant complications of tonsillitis, or serious systemic illness, should be managed in secondary care **[R-GDG]**.

Investigation (Section 8):

- The Centor⁹ and FeverPAIN³³ scoring systems can be used to help determine clinically whether an individual will benefit from antibiotic treatment.
- Rapid Antigen Testing and throat swab cultures can be used in selected cases where the clinical history and examination are indicative of bacterial infection^{1,2} **[L2, RGA]**.

Treatment (Section 10):

- Routine treatment of tonsillitis should be symptomatic^{1,3} **[L1, RGA]**
- Antibiotic use should be reserved for those most likely to have any of the following^{1,4,5} **[L1, RGA]**:
 - A bacterial infection.
 - A complication of tonsillitis.
 - Significant risk factors for developing a complication.
- If antibiotic therapy is indicated, a 10 day course of oral phenoxymethylpenicillin (penicillin V is recommended as first-line treatment¹ **[L1, RGA]**.

Elective Tonsillectomy (Section 11):

- Watchful waiting rather than tonsillectomy is a reasonable management approach where the severity of symptoms or frequency of episodes is unclear¹ **[L1, RGA]**.
- Tonsillectomy should be considered for adults and children when the following apply^{1,6,7} **[L1, RGA]**:
 - Sore throats are due to acute tonsillitis.
 - The episodes of sore throat are disabling and prevent normal functioning.
 - Seven or more well documented, clinically significant, adequately treated sore throats in the preceding year; or:
 - Five or more such episodes in each of the preceding two years; or
 - Three or more such episodes in each of the preceding three years.
 - Enlarged tonsils which are suspected to be causing obstruction of the airway **AND** have a serious effect on health and wellbeing e.g. sleep apnoea in children.
 - Suspicion of malignancy.

4 Background Information

4.1 Definition

Tonsillitis is a term used to describe^{4,8-10}:

- An acute infection and inflammation of the palatine tonsils.
- Acute pharyngitis, tonsillitis or acute exudative tonsillitis may all cause inflammation of the throat and therefore these are considered together under the collective term of 'sore throat'.

4.3 Aetiology

Tonsillitis can be caused by either bacterial or viral infection. The most common bacterial cause is Group A beta-haemolytic *streptococcus* (GABHS) also known as *Streptococcus pyogenes* (*S. pyogenes*), which causes 15-30% of sore throats in children and 10% in adults⁶.

- Common causes of tonsillitis include⁶:
 - Rhinovirus.
 - Coronavirus.
 - Parainfluenza virus.
 - Influenza types A and B.
 - Adenovirus.
 - Herpes simplex virus type 1.
 - Epstein-Barr virus.
 - Cytomegalovirus.
 - Coxsackie viruses.
 - Haemophilus influenzae (*H. influenzae*) (non typeable).
 - Group C and G *streptococcus*.
- Rare causes of tonsillitis include^{6,8}:
 - HIV.
 - *Neisseria gonorrhoeae* (*N. gonorrhoeae*).
 - *Neisseria meningitidis* (*N. meningitidis*).
 - *Corynebacterium diphtheria* (*C. diphtheria*).
 - *Chlamydia pneumoniae* (*C. pneumoniae*).
 - *Mycoplasma pneumoniae* (*M. pneumoniae*).
 - *Candida* species.
- Non-infectious causes of sore throat and/or tonsillitis include^{1,7}:
 - Gastro-oesophageal reflux.
 - Physical or chemical irritation, e.g. from a nasogastric tube, chronic irritation from smoking.
 - Stevens-Johnson syndrome.
 - Kawasaki disease.
 - Oral mucositis secondary to radiotherapy or chemotherapy, which may become secondarily infected:
 - Haematological disorders, such as leukaemia, aplastic anaemia.
 - Medication side effects e.g. cytotoxic drugs, carbimazole, and sulfasalazine.
 - Tonsillar cancer.

4.3 Natural History

For the majority of patients, the following apply^{11,12}:

- If caused by a viral or bacterial infection, symptoms resolve within:
 - 3 days in 40% of patients.
 - 1 week in 85% of patients.
- Symptoms of Infectious Mononucleosis (Glandular Fever) usually resolve within 1-2 weeks although mild cases may resolve within days, however lethargy may continue for months or years in rare cases.

4.4 Complications

Possible complications of tonsillitis can be classified as suppurative or non-suppurative.

Suppurative complications include^{6,9-11,13-18}:

- Peritonsillar cellulitis or abscess (also known as quinsy) presents a risk of airway compromise, aspiration of pus from the abscess, or death due to vascular involvement.
- Parapharyngeal abscess – may compromise the airway or cause rupture of the carotid artery.
- Retropharyngeal abscess – common in young children, rare in adults. May compromise the airway.
- Suppurative cervical lymphadenitis.
- Otitis media.
- Mastoiditis.
- Acute rhinosinusitis.
- Metastatic infection, e.g. brain abscess, endocarditis, meningitis, or liver abscess.
- Streptococcal toxic shock syndrome.

Non-suppurative complications^{11,13,15}:

- Rheumatic fever.
- Post-streptococcal glomerulonephritis.

4.5 Higher Risk Groups

Patients at higher risk of developing tonsillitis include^{8,19}:

- Children aged 5-10 years.
- Young adults aged 15-25 years.
- Patients with comorbidities.

5 Presentation

5.1 Clinical Presentation

Typical presenting features of tonsillitis include^{4,8}:

- Fever.
- Headache.
- Malaise.
- Nausea and occasionally vomiting – especially in children.
- Severe throat pain.
- White spots on the tonsils.
- Enlarged lymph nodes:
 - Commonly anterior cervical nodes (jugulodigastric in particular).
 - May also occur in the abdomen, particularly in children.
- Nasal features suggest a viral aetiology such as the common cold.
- Hepatosplenomegaly in Epstein-Barr viral infection.

5.2 Indications for Immediate Referral to Hospital

It is important to recognise serious illness by looking for the following symptoms and signs, and ensure they are assessed and managed immediately in an appropriate secondary care setting^{9,10}[R-GDG].

Immediate referral to hospital is warranted for the following presentations^{1,6,9,10,20}:

- A sore throat with any of the following:
 - Stridor or respiratory distress.
 - Progressive difficulty swallowing or drooling.
 - Increasing pain.
 - Severe systemic symptoms e.g. haemodynamic instability.
- Suspected severe suppurative complications which carry a risk of airway compromise or rupture of the abscess:
 - Peritonsillar cellulitis or abscess (quinsy).
 - Parapharyngeal abscess.
 - Retropharyngeal abscess.
- Dehydration or reluctance to take any fluids.
- Immunosuppression.
- Embedded foreign body.
- Suspected Kawasaki disease.
- Suspected diphtheria – characteristic tonsillar or pharyngeal membrane.

5.3 Indications for Urgent Referral to an ENT Specialist

The following features should prompt an urgent referral to a specialist for evaluation^{3,8-10,21-24}:

- An unexplained, persistent sore or painful throat for ≥ 3 weeks.
- Red and/or white patches; ulceration or swelling of the oral/pharyngeal mucosa for ≥ 3 weeks.
- Difficulty swallowing for more than 3 weeks.
- Oral mucositis.
- Suspected malignancy.
- Unilateral enlarged tonsil.

6 History

Adults and children presenting with symptoms that suggest tonsillitis, should be offered a clinical assessment^{9,10}.

Ask specifically about the following^{1,4,6,9,10,14,20}:

- Frequency and duration of sore throats. Note whether the frequency of episodes is increasing or decreasing:
 - Patients with very frequent infections may need earlier intervention.
- Severity – as indicated by the degree of interference with day-to-day functioning e.g. repeated absence from school.
- Difficulty swallowing.
- Reluctance to take fluids.
- Presence of fever during episodes.
- Duration of symptoms.
- Snoring or clinical evidence of obstructive sleep apnoea.
- Presence of other symptoms that may indicate a particular aetiology, e.g. hepatosplenomegaly, rash, etc.
- Take into account other medical conditions and medication which may suggest an increased susceptibility to infection and lower the threshold for treatment.
- Contact with known cases of Group A streptococcal disease.

7 Examination

General examination is recommended in all patients and should be extended according to symptoms and signs^{9,10,25}.

At a minimum, examination should look for the following^{4,9,10,25}:

- Signs of dehydration.
- Rashes.
- Enlarged erythematous tonsils or pharynx – with or without exudate.
- Peritonsillar cellulitis or abscess (quinsy).
- Enlarged cervical lymph nodes.
- Hepatosplenomegaly.
- Changes of the oral mucosa and tongue indicative of cancerous change.

If acute epiglottitis is suspected, do not examine the throat with a tongue depressor^{9,10}.

8 Investigations

Distinguishing between a viral and bacterial aetiology is one of the main considerations in the diagnosis and management of tonsillitis²⁵, as a diagnosis of an infection with Group A beta-haemolytic *streptococcus* (GABHS) may warrant antibiotic use^{9,10}.

Possible investigations include throat cultures or *Rapid Antigen Testing*^{9,10}. However, neither is able to differentiate between carrier states and an active infection²⁶. The asymptomatic carrier rate for GABHS is up to 40%. Such carriers have low infectivity and are not at risk of developing complications [3,31].

Anti-Streptolysin-O (ASO) titres, CBC and peripheral film; or *Monospot* testing, are not routinely recommended⁹. Use only if Infectious Mononucleosis is suspected [R-GDG].

Features indicative of a viral sore throat include^{4,6}:

- Coryzal symptoms.
- Throat pain.
- Fever.
- Malaise.
- Headache.
- Cough.
- The pharynx may look normal or show a mild amount of erythema and oedema.

Features indicative of a streptococcal sore throat include^{6,9,10,12,23,27–30}:

- Pharyngeal pain.
- Odynophagia.
- Headache.
- High temperature.
- Nausea, vomiting, and abdominal pain are common in children.
- A patchy whitish exudate present on the tonsils. The uvula is often oedematous.
- The cervical lymph nodes may be enlarged and tender.
- Infection with certain strains of streptococci produces a rash characteristic of scarlet fever.

8.1 Centor Scoring System

The Centor scoring system is recommended to help categorise a patient's risk for GABHS infection and aid the decision to prescribe antibiotics⁹.

Under the Centor system one point is awarded for each of the following²⁸:

- Tonsillar exudate.
- Tender anterior cervical lymph nodes.
- History of fever.
- Absence of cough.

Interpretation of scores^{7–9,20,25,28,31}:

- Score of 3-4 suggests a 40-60% likelihood of GABHS.
- Score of 1-2 indicates infection with GABHS is unlikely.

NB: Although the Centor score can aid management, it is not a diagnostic tool^{25,28}[L2]. The score is also not valid for children younger than age 3 years^{25,28}[L2]. Likelihood of GABHS also depends on age, local prevalence, and seasonal variation^{25,28}[L2]. The Centor scoring system may result in high antibiotic use due to its low specificity for bacterial infection^{28,32}[L2].

8.2 FeverPAIN Criteria

The FeverPAIN scoring system is also recommended to help categorise a patient's risk for GABHS infection and aid the decision to prescribe antibiotics. It is important to note that this tool cannot be solely used to make an accurate diagnosis and is only considered to guide the physician in the assessment of the case. Thus, further examination and testing are required to confirm the diagnosis³³.

Under the FeverPAIN system one point is awarded for each of the following³³:

- **Fever** (during previous 24 hours).
- **Purulence** (pus or follicles on tonsils).
- **Attend rapidly** (within 3 days after onset of symptoms).
- **Inflamed tonsils** (Severely).
- **No cough or coryza** (inflammation of mucus membranes in the nose).

Interpretation of scores³³:

A higher score indicates the increased likelihood of streptococcus infection.

- Score of 0-1: 13-18% probability of streptococcus identification.
- Score of 2-3: 34-40% probability of streptococcus identification.
- Score of 4-5: 62-65% probability of streptococcus identification.

8.3 Rapid Antigen Testing (RAT)

Rapid Antigen Testing is a point-of-care test to detect bacterial causes^{9,34}[L2, RGA]:

- Used to help distinguish between viral and bacterial causes of tonsillitis when clinical picture is not clear.
- Can produce results within 10 minutes.
- Can aid in reducing antibiotic prescription, tonsillectomy procedures and the spread of GABHS.

8.4 Throat Cultures

Throat cultures^{9,34,35}[L2, RGA]:

- Should **not** be routinely carried out in primary care for the management of sore throat where a viral cause is strongly suspected.
- In children, throat cultures may be used where bacterial and viral causes cannot be differentiated clinically.
- They may be used to establish aetiology of recurrent severe episodes in adults when considering referral for tonsillectomy.
- A positive throat culture for GABHS makes the diagnosis of a streptococcal sore throat more likely, but is not diagnostic of an acute infection.
- A negative culture does not rule out GABHS.
- Results will vary according to technique, culture site, and culture conditions.
- If patient has started antibiotics prior to diagnosis, cultures may remain positive for a short period of time.

9 Differential Diagnosis

The differential diagnosis of a sore throat includes the following:

- Infectious mononucleosis (Glandular Fever)^{6,9,12,23,27–29}:
 - Most often caused by Epstein-Barr virus (EBV).
 - A fever of 38-39°C (100.4°F – 102.2°F) is usually present.
 - Cervical lymphadenopathy is symmetrical.
 - Tonsils are enlarged.
 - The pharynx may be erythematous with exudate.
 - May present with hepatosplenomegaly, jaundice, and rashes.
 - There is usually moderate bradycardia.
 - Often unable to swallow.
 - Atypical lymphocytosis.
- Scarlet fever^{6,27}:
 - Caused by a streptococcal infection.
 - Associated with characteristic erythematous rash which later desquamates.
 - Tongue is initially covered with a white coat – enlarged red papillae (strawberry tongue) may be seen.
- Acute herpetic pharyngitis⁶:
 - Primary infection with herpes simplex virus may present as acute sore throat.
 - Pain is moderate to severe.
 - Possible cervical lymphadenopathy, fever, and exudate.
 - May see vesicles and shallow ulcers on the palate with gingivostomatitis.
- Acute rhinosinusitis^{8,35}:
 - Rhinorrhoea.
 - Sneezing.
 - Facial pain.
 - Dry cough.
- Epiglottitis^{5,6,9,36,37}:
 - Alteration in voice.
 - Severe sore throat.
 - Severe dysphagia.
 - Stridor.
 - Drooling.
 - Children prefer to sit leaning forward, but adults may sit erect.
- Cancer^{3,21,38,39}:
 - Persistent sore throat.
 - Vague discomfort on swallowing.
 - Neck mass due to cervical node metastases.
 - Progressive dysphagia.
 - In oropharyngeal cancer, an ulcer is usually visible on examination.
 - Unilateral tonsillar enlargement without symptoms of acute infection is a possible sign of malignancy.
- Less common causes which may be serious or life threatening^{2,6,40,41}:
 - Kawasaki disease:
 - Most cases in children under age 4 years.

- Usually present with fever.
- Associated with conjunctivitis, changes to the lips and oral cavity and rash e.g. desquamation of extremities.
- HIV/AIDS.
- Gonococcal pharyngitis.
- Chlamydial pharyngitis.
- Yersinial pharyngitis.
- Mycoplasmal pharyngitis.
- Diphtheria.

10 Management

If symptoms and signs are consistent with tonsillitis, management primarily consists of advice, appropriate pharmacological treatment and safety-netting^{9,10,33} [**L1, RGA**].

10.1 Advice to Patients, Parents and Carers

Provide the following information and advice to patients, parents and/or carers^{8,9,33} [**L2, RGA**]:

- The usual natural history of the illness, including average total length of illness – 1 week.
- That recurrent sore throat is a treatable condition.
- The different treatment options available.
- How to relieve symptoms and manage pain at home.
- An information leaflet should also be provided.

10.2 Pharmacological Treatment

Tonsillitis is primarily managed through symptom control^{9,10,33}. Antibiotics should only be used in severe cases where the practitioner is concerned about the clinical condition of the patient or if a bacterial cause is suspected, especially Group A beta haemolytic streptococcal infection (GABHS) in children^{9,10,33}.

10.2.1 Symptom Control

In children^{7,9,10} [**L1, RGA**]:

- An adequate dose of paracetamol should be used as first-line treatment for pain relief.
- Ibuprofen may be used in addition to or as an alternative to paracetamol.
- Ibuprofen should be used with caution in children with, or at risk, of dehydration.
- Aspirin should not be used in children aged less than 16 years, due to the risk of Reye's Syndrome.

In adults^{9,10}:

- Ibuprofen is recommended for relief of fever, headache, and throat pain in adults with sore throat [**L1, RGA**]:
 - Ibuprofen has been shown to be superior to paracetamol and aspirin in reducing throat pain as early as 1 hour post dose [**L1**].
- Paracetamol may be used as an alternative to ibuprofen in cases of intolerance [**L1**].
- Ibuprofen should not be routinely given to adults with, or at risk of dehydration due to concerns regarding renal toxicity, although this is rare [**L1, RGA**].

10.2.2 Corticosteroid Use

Corticosteroids are not recommended for the treatment of sore throat due to the lack of evidence of their long-term safety and risks of recurrent treatment³³[L2, RGC]. Some studies claim that a single low dose of corticosteroids can decrease the sore throat pain in adults, however, the cumulative effect and adverse events among patients with recurrent episodes need further investigation⁴².

In patients with acute infectious mononucleosis (glandular fever) requiring hospitalisation, corticosteroids may have a role when pain and swelling threaten the airway or where there is very severe dysphagia^{9,10,33}[L1, RGA].

10.2.3 Antibiotic Treatment

Antibiotics should only be used if GABHS is suspected or confirmed; or in severe cases where the practitioner is concerned about the clinical condition of the patient [3]. Unnecessary prescribing for minor self-limiting illness should be avoided, due to the risks of emerging antibiotic resistance [1,3].

Antibiotics should NOT be used for^{8,9,13,28,33}[L1, RGA]:

- Patients with a Centor score of <3 or FeverPAIN score <3.
- Symptomatic relief in sore throat.
- Prophylaxis for recurrent sore throat.

Delayed prescribing strategy^{7-9,20,31,33}[L1, RGA]:

- Consider in patients where differentiation between viral and bacterial infection is difficult, investigations are awaited or inconclusive and where it is felt safe not to prescribe immediately.
- Provide a prescription with instructions to the patient but, to only use it if symptoms do not settle after 2-3 days or worsen within 2-3 days.
- Provide advice about the need for review if symptoms worsen despite using the delayed prescription.

Immediate antibiotic prescribing is indicated for patients in whom any of the following apply^{8,9,28,33}[L1, RGA]:

- A Centor score of 3 or 4 or a FeverPAIN score of 4 or 5.
- Systemically very unwell.
- Symptoms and signs suggestive of serious illness and/or complications, e.g. peritonsillar cellulitis or abscess.
- Such patients should be referred immediately and receive antibiotics in secondary care (see *Section 5.2*).
- There is a high risk of serious complications due to pre-existing co-morbidity, including:
 - Valvular heart disease, significant lung, renal, liver, or neuromuscular disease.
 - Immunosuppression.
 - Cystic fibrosis.
 - The patient has an acute cough and is older than age 65 years and two or more of the following apply, or older than age 80 years and one or more of the following apply:
 - Hospitalised in the previous year.
 - Has diabetes mellitus.
 - History of congestive heart failure.
 - Current use of systemic glucocorticoids.

A low threshold for prescribing an antibiotic should be maintained in the following patient groups^{7-9,20,31,33}**[L1, RGA]**:

- At risk of severe infection, e.g. diabetes or immunocompromised.
- At risk of immunosuppression, e.g. on disease modifying anti-rheumatic drugs (DMARDs) or carbimazole.
- History of rheumatic fever.

Choice of antibiotic:

- First-line treatment^{7,9,33,43}**[L1, RGA]**:
 - Use oral phenoxymethylpenicillin (penicillin V) for 5-10 days depending on the severity of the case and whether the patient has recurrent infection or not.
 - Ampicillin-based antibiotics can be used for 10 days, as alternatives to penicillin V as first line treatment, however there is a risk of rash when used in the presence of infectious mononucleosis (glandular fever).
 - Consider a single dose of intramuscular benzylthine penicillin for patients with proven GABHS infection with poor compliance to treatment, however do not use without monitored administration of a test dose.
- If allergic to penicillin, consider one of the following treatments for 5 days^{7,9,33}**[L1, RGA]**:
 - A macrolide.
 - First generation cephalosporin (10% risk of cross-reaction in penicillin-allergic patients).

Advise the patient to expect improvement in symptoms within 48-72 hours. Advise the patient to contact their primary care physician, if symptoms have not improved after 72 hours **[R-GDG]**. Emphasise the importance of completing the full course of antibiotics^{9,33,35}**[L1, RGA]**.

Close contacts of patients with acute invasive Group A streptococcal tonsillitis should also be treated with antibiotics if they have symptoms of localised infection which may include⁴⁴**[L3, RGA]**:

- Sore throat.
- Fever.
- Skin infection.

10.3 Safety-Netting and Follow-Up

Advise the patient, parent or carer, to follow-up with their usual primary care physician if they do not improve **[R-GDG]**.

They should also be advised to seek urgent medical attention if they develop any of the following symptoms^{8,9,31,35,45}**[L1, RGA]**:

- Any difficulty breathing.
- Stridor.
- Drooling.
- Severe pain.
- Dysphagia.
- Inability to take fluids.

11 Referral

Refer to *Sections 4.2* and *4.3* for indications for immediate and urgent referral to secondary care.

11.1 Referral for Elective Tonsillectomy

Tonsillectomy should only be considered for adults and children when the following apply^{4,9,46}[**L1, RGA**]:

- Sore throats are due to acute tonsillitis.
- The episodes of sore throat are disabling and prevent normal functioning e.g. causing repeated absence from school.
- Seven or more well documented, clinically significant, adequately treated sore throats in the preceding year; or:
 - Five or more such episodes in each of the preceding two years; or
 - Three or more such episodes in each of the preceding three years.
- Enlarged tonsils which are suspected to be causing obstruction of the airway **AND** have a serious effect on health and wellbeing e.g. sleep apnoea in children.
- Suspicion of malignancy.

NB: Watchful waiting is more appropriate than tonsillectomy for children with mild sore throats⁹[**L1, RGA**].

If in doubt as to whether tonsillectomy would be beneficial, a 6-month period of watchful waiting is recommended to firmly establish the pattern of symptoms and allow the patient to consider fully the implications of the operation⁹.

Before a referral to secondary care is made, ensure the following have been performed^{9,46}:

- Explain the difference between bacterial and viral sore throats.
- Advise that there is no guarantee that tonsillectomy will prevent all sore throats in the future.
- Consider the impact of recurrent tonsillitis on the patient's quality of life and ability to work or go to school.
- Documentation of significant symptoms.
- Discussion of the benefits and risks of tonsillectomy compared to watchful waiting with the patient and/or carer.

12 Key Considerations for Patient Preferences

Patient preferences refer to patient perspectives, beliefs, expectations, and goals for health and life, and to the steps employed by individuals in assessing the potential benefits, harms, costs, and limitations of the management options in relation to one another. Patients may have preferences when it comes to defining their problems, identifying the range of management options and selecting or ranking the outcomes used to compare these options.

It is important for healthcare professionals to develop an understanding of the patient as an individual and the unique way in which each person experiences a condition and its impact on their life.

The following recommendations are therefore made for physicians and other healthcare professionals regarding general principles of patient care in Qatar:

- **Respect Patients:** Treat patients with respect, kindness, dignity, courtesy and honesty. Ensure that the environment is conducive to discussion and that the patient's privacy is respected, particularly when discussing sensitive, personal issues. Ask the patient how they wish to be addressed and ensure that their choice is respected and used.
- **Maintain Confidentiality:** Respect the patient's right to confidentiality and avoid disclosing or sharing patients' information without their informed consent. In this context, students and anyone not directly involved in the delivery of care should first be introduced to the patient before starting consultations or meetings, and let the patient decide if they want them to stay.
- **Clarify Third-Party Involvement:** Clarify with the patient at the first point of contact whether and how they like their partner, family members or carers to be involved in key decisions about their care or management and review this regularly. If the patient agrees, share information with their partner, family members or carers.
- **Obtain Informed Consent:** Obtain and document informed consent from patients, in accordance with MOPH policy and guidance.
- **Encourage Shared Decision Making:** Ensure that patients are involved in decision making about their own care, or their dependent's care, and that factors that could impact the patient's participation in their own consultation and care including physical or learning disabilities, sight, speech or hearing impairments and problems with understanding, reading or speaking English are addressed.
- **Disclose Medical Errors:** Disclose errors when they occur and show empathy to patients.
- **Ensure Effective Communication:** Explore ways to improve communication including using pictures, symbols or involving an interpreter or family members. Avoid using medical jargon. Use words the patient will understand and confirm understanding by asking questions.
- **Ensure Continuity of Care:** Provide clear and timely sharing of patient information between healthcare professionals especially at the point of any transitions in care.

13 Performance Measures

A list of performance measures is given in the table below. Healthcare organisations are encouraged to monitor service performance using the indicator definitions below.

Number	Numerator	Denominator
T01	Number of patients with a documented Centor Score or FeverPAIN Score.	All patients with a recorded diagnosis of tonsillitis.
T02	Number of patients referred to an ENT Specialist who meet the criteria for referral.	All patients with a recorded diagnosis of tonsillitis.
T03	Number of patients prescribed phenoxymethylpenicillin as first line treatment.	All patients with a recorded diagnosis of tonsillitis without a recorded allergy to penicillin.

Table 13.1: Performance Measures.

14 References

1. Breathnach S. *Erythema Multiforme, Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis*. In: *Rooks' Textbook of Dermatology*. Vol 4. 8th ed. (Burns T, Breathnach S, Cox N, Griffiths C, eds.). Oxford: Wiley-Blackwell; 2013.
2. Saulsbury F. *Kawasaki Syndrome In: Principles and Practice of Infectious Diseases*. 7th ed. (Mandell GL, Bennett JE, Dolin R, eds.). Philadelphia, PA: Churchill Livingstone/Elsevier; 2010.
3. Franco A, Har-EL G. *Cancer of the Head and Neck*. In: *Essentials of Otolaryngology*. (Lucente FE, Har-El G, eds.). Philadelphia: Lippincott Williams & Wilkins; 2003. <http://books.google.com/books?id=f5VsAAAAMAAJ>. Accessed March 19, 2019.
4. British Association of Otorhinolaryngologists (BAO). Indications for Tonsillectomy: Position Paper ENT UK 2009.
5. Guldred L-A, Lyhne D, Becker BC. Acute epiglottitis: epidemiology, clinical presentation, management and outcome. *J Laryngol Otol*. 2008;122(8):818-823. doi:10.1017/S0022215107000473
6. Caserta M, Flores A. *Pharyngitis*. In: *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 7th ed. (Mandell GL, Bennett JE, Dolin R, eds.). Philadelphia, PA: Churchill Livingstone/Elsevier; 2010.
7. *British National Formulary: 68 (BNF 68)*. Joint, F. C., British Medical Association., & Royal Pharmaceutical Society; 2014.
8. Centre for Clinical Practice at NICE (UK). Respiratory Tract Infections - Antibiotic Prescribing: Prescribing of Antibiotics for Self-Limiting Respiratory Tract Infections in Adults and Children in Primary Care. London: National Institute for Health and Clinical Excellence (UK); 2008. <http://www.ncbi.nlm.nih.gov/books/NBK53632/>. Accessed March 13, 2019.
9. Scottish Intercollegiate Guidelines Network. *Management of Sore Throat and Indications for Tonsillectomy: A National Clinical Guideline*. Edinburgh: Scottish Intercollegiate Guidelines Network; 2010.
10. Bochner RE, Gangar M, Belamarich PF. A Clinical Approach to Tonsillitis, Tonsillar Hypertrophy, and Peritonsillar and Retropharyngeal Abscesses. *Pediatr Rev*. 2017;38(2):81-92. doi:10.1542/pir.2016-0072
11. Kenealy T. Sore throat. *BMJ Clin Evid*. 2011;2011.
12. Epstein M, Rickinson A. Epstein-Barr Virus. In: *Diseases of the Head and Neck, Nose and Throat*. Oxford: Oxford University Press; 2010.
13. Spinks A, Glasziou PP, Del Mar CB. Antibiotics for sore throat. *Cochrane Database Syst Rev*. 2013;(11):CD000023. doi:10.1002/14651858.CD000023.pub4
14. Swift A. Infective Diseases of the Head and Neck. In: *Diseases of the Head and Neck, Nose and Throat*. London: Arnold; 1998.
15. Ruoff K, Bisno A. *Classification of Streptococci*. In: *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 7th ed. (Mandell GL, Bennett JE, Dolin R, eds.). Philadelphia, PA: Churchill Livingstone/Elsevier; 2010.
16. Drake-Lee A. *Clinical Otorhinolaryngology*. Edinburgh; New York: Churchill Livingstone; 1996.
17. Shah S, Har-EL G. *Throat Pain*. In: *Essentials of Otolaryngology*. (Lucente FE, Har-El G, eds.). Philadelphia: Lippincott Williams & Wilkins; 2003. <http://books.google.com/books?id=f5VsAAAAMAAJ>. Accessed March 19, 2019.
18. Ludman H, Bradley PJ, Ludman H, eds. *ABC of Ear, Nose and Throat*. 5th ed. London: Blackwell Pub. : BMJ Books; 2007.
19. MeRec. Managing Sore Throats (MeReC Bulletin). <http://www.neli.org.uk/integratedcrd.nsf/48d5221409c499bd8025755b00628190/db1c769b612c96e48025724a00480995?OpenDocument>. Published 2006. Accessed March 19, 2019.
20. National Institute for Health and Clinical Excellence. Referral Advice: A guide to appropriate referral from general to specialist services. 2001. <http://www.nice.org.uk/media/94D/BE/Referraladvice.pdf>.
21. Jones A. Tumors of the Hypopharynx. In: *Diseases of the Head and Neck, Nose and Throat*. London: Arnold; 1998.
22. Dhillon. The Throat. In: *Ear, Nose and Throat and Head and Neck Surgery: An Illustrated Colour Text*. 4th ed. London: Elsevier; 2013.
23. Johannsen E, Kaye K. Epstein-Barr Virus (Infectious Mononucleosis, Epstein-Barr Virus-Associated Malignant Disease, and Other Diseases). In: *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 7th ed. (Mandell GL, Bennett JE, Dolin R, eds.). Philadelphia, PA: Churchill Livingstone/Elsevier; 2010.

24. National Collaborating Centre for Primary Care. Referral guidelines for suspected cancer in adults and children. Part two, chapters 13-21 (full NICE guideline). Clinical guideline 27. 2005.
25. Ebell MH, Smith MA, Barry HC, Ives K, Carey M. The rational clinical examination. Does this patient have strep throat? *JAMA*. 2000;284(22):2912-2918.
26. Sheeler RD, Little P. Rapid streptococcal testing for sore throat and antibiotic resistance. *Clin Microbiol Infect*. 2006;12:3-7. doi:10.1111/j.1469-0691.2006.01656.x
27. Stevens D. *Streptococci and Enterococci*. In: *Oxford Textbook of Medicine*. 5th ed. (Warrell DA, Cox TM, Firth JD, eds.). Oxford ; New York: Oxford University Press; 2010.
28. Centor RM., Witherspoon JM, Dalton HP, Brody CE, Link K. The Diagnosis of Strep Throat in Adults in the Emergency Room. *Med Decis Making*. 1981;1(3):239-246. doi:10.1177/0272989X8100100304
29. Fisher RG, Boyce TG, Correa AG. Infectious Mononucleosis and Mononucleosis-like Syndromes. *Moffet's Pediatric Infectious Diseases: A Problem-Oriented Approach*. Fifth edition. Philadelphia: Wolters Kluwer; 2017.
30. Barnes S, Pavan-Langston D, Azar D. *Microbial Conjunctivitis*. In: *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 7th ed. (Mandell GL, Bennett JE, Dolin R, eds.). Philadelphia, PA: Churchill Livingstone/Elsevier; 2010.
31. Royal College of Paediatrics and Child Health (RCPCH). Management of acute and recurring sore throat and indications for tonsillectomy. 2000.
32. Little P, Stuart B, Hobbs FDR, et al. Predictors of suppurative complications for acute sore throat in primary care: prospective clinical cohort study. *BMJ*. 2013;347:f6867. doi:10.1136/bmj.f6867
33. Sore Throat (Acute): Antimicrobial Prescribing. NICE guideline [NG84]. January 2018. <https://www.nice.org.uk/guidance/ng84/chapter/Recommendations>.
34. Point-of-Care Diagnostic Testing in Primary Care for Strep A Infection in Sore Throat. Medtech Innovation Briefing[MIB145]. May 2018. <https://www.nice.org.uk/advice/mib145/chapter/Specialist-commentators>.
35. Short S, Bashir H, Marshall P, Miller N. Respiratory Illness in Children and Adults, Diagnosis and Treatment of. September 2017. <https://www.icsi.org/guideline/respiratory-illness/>. Accessed March 13, 2019.
36. Crook D. *Haemophilus Influenzae*. In: *Oxford Textbook of Medicine*. 5th ed. (Warrell DA, Cox TM, Firth J, eds.). Oxford ; New York: Oxford University Press; 2010.
37. Burns J, Hendley J. *Epiglottitis* In: *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 7th ed. (Mandell GL, Bennett JE, Dolin R, eds.). Philadelphia, PA: Churchill Livingstone/Elsevier; 2010.
38. Manni J. Diagnostic Methods in Head and Neck Oncology. In: *Diseases of the Head and Neck, Nose and Throat*. London: Arnold; 1998.
39. Tan GC, Stalling M, Al-Rawabdeh S, Kahwash BM, Alkhoury RF, Kahwash SB. The spectrum of pathological findings of tonsils in children: A clinicopathological review. *Malays J Pathol*. 2018;40(1):11-26.
40. Berry S. Ophthalmologic Manifestations of Kawasaki Disease: Overview, Ophthalmologic Presentation, Diagnostic Considerations. Medscape. <https://emedicine.medscape.com/article/1197545-overview>. Published 2017. Accessed March 19, 2019.
41. McCrindle B. *Kawasaki Disease*. In: *Oxford Textbook of Medicine*. 5th ed. (Warrell DA, Cox TM, Firth J, eds.). Oxford ; New York: Oxford University Press; 2010.
42. Sadeghirad B, Siemieniuk RAC, Brignardello-Petersen R, et al. Corticosteroids for treatment of sore throat: systematic review and meta-analysis of randomised trials. *BMJ*. 2017;358:j3887. doi:10.1136/bmj.j3887
43. Rojas-Ramírez C, Kramer-Urrutia T, Cifuentes L. Is a short-course antibiotic treatment effective for streptococcal tonsillopharyngitis in children? *Medwave*. 2017;17(Suppl1):e6873-e6873. doi:10.5867/medwave.2017.6873
44. Health Protection Agency, Group A Streptococcus Working Group. Interim UK guidelines for management of close community contacts of invasive group A streptococcal disease. *Commun Dis Public Health*. 2004;7(4):354-361.
45. The National Institute for Health and Care Excellence (NICE). Feverish illness in children—assessment and initial management in children younger than 5 years. 2017. <http://ep.bmj.com/content/98/6/232.abstract>.
46. Royal College of Surgeons (RCS). Commissioning Guide-Tonsillectomy. 2016. <https://www.rcseng.ac.uk/library-and-publications/rcs-publications/docs/tonsillectomy-commissioning-guide/>. Accessed March 19, 2019.

Appendix: Detailed Description of the Literature Search

All existing references were evaluated and where necessary and applicable, the latest version of the specific manuscript was used to update the guideline and replace the older reference. The search for clinical practice guidelines on tonsillitis diagnosis and/or management was performed in the *PubMed* database and websites of relevant organisations and societies. The present guideline is primarily based on UK NICE guidelines and the Scottish Intercollegiate Guidelines Network and is supplemented with other relevant studies.

The included publications were identified using the term “tonsillitis” and specified with the following terms in combinations:

guidelines, disease, tonsils, sore throat, diagnosis, treatment, emergency, referral, antibiotic, recurrent tonsillitis, antibiotic sensitivity, corticosteroids, paracetamol, ibuprofen, group A streptococcus, rapid antigen test, scoring system.

Furthermore, to investigate any emerging evidence, the literature has been searched as described in the below mentioned diagram:

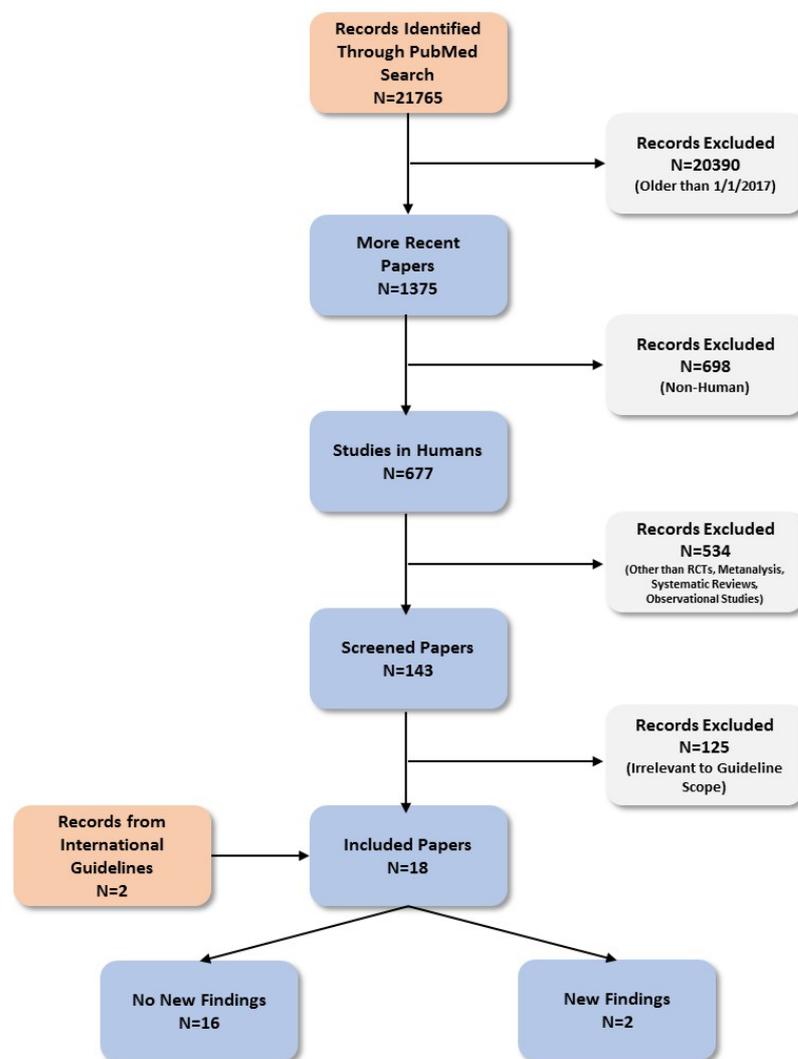


Fig A.1: Literature search results and application of exclusion criteria.

Acknowledgements

The following individuals are recognised for their contribution to the successful development of the National Clinical Guideline.

MOPH National Clinical Guidelines Team:

- **Ms Huda Amer Al-Katheeri**, *Director of Strategic Planning & Performance Dept, MOPH.*
- **Dr Rasmeh Ali Salameh Al Huneiti**, *Guideline & Standardisation Specialist, MOPH.*
- **Dr Bushra Saeed**, *Quality Improvement Coordinator, MOPH.*
- **Dr Mehmood Syed**, *Project Clinical Lead.*
- **Dr Samuel Abegunde**, *Physician Executive.*
- **Dr Natalia Siomava**, *Senior Medical Writer.*
- **Ms Rouba Hoteit**, *Medical Writer.*



Please use the following email address to provide feedback on this guideline:

clinicalguidelines@moph.gov.qa

©Ministry of Public Health of the State Qatar 2020. All copyrights reserved. This covers both electronic and print media as well as derivative works in all languages and in all media of expression now known or later developed.

The content of the Ministry of Public Health (MOPH) National Clinical Guidelines (NCGs) and their derivative products are made available for personal and educational use only. The MOPH does not authorize commercial use of this content, as such the content shall in no way be used for the promotion of any third-party commercial company, its products or services.

Full or part of the NCGs, Pathways or relevant Patient Information Leaflets shall not be translated or reproduced in any form without written permission from the MOPH. To obtain such permission please email: ClinicalGuidelines@moph.gov.qa. To benefit from the latest updates and additional sources of information, the MOPH recommends using the online link to the relevant NCG document.

The MOPH agrees that any distribution of the NCGs, Pathways and relevant Patient Information Leaflets, will include the above copyright notice and appropriate citation