

Throat and ear infections in children: URTI in the time of COVID-19

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INTRODUCTION

Upper respiratory tract infection (URTI) accounts for a large proportion of acute presentations in children.¹ The diagnostic labels available to clinicians (eg, tonsillitis and otitis media) are ill-defined, and evidence suggests a poor correlation between individual signs and symptoms and the differentiation between viral and bacterial infection.²

The role of antibiotics in the absence of invasive infection or complications is unclear. Symptom benefit has been shown to be poor in tonsillitis and otitis media. The perceived role of preventing complications is questionable following a dramatic reduction in the rates of suppurative (eg, mastoiditis) and non-suppurative (eg, rheumatic fever) complications of URTI over the past half-century.³

UK National Institute for health and Care Excellence (NICE) guidelines have advocated the use of decision tools (FeverPAIN) and a variety of strategies to maximise the possibility of symptom benefit from antibiotics, however minimal the benefit may be.⁴ While NICE guidelines do not address the issue of using antibiotics to prevent complications by allowing clinician and patient/parent choice to be a factor, the implication is that antibiotics are never mandated purely for the purposes of the prevention of complications.

The lack of clarity regarding the use of antibiotics for URTI (including tonsillitis and otitis media) has led to a large variation in clinical practice. This article explores another approach and the applicability of this in the UK: one of avoiding antibiotic use in low-risk children who have no evidence of invasive infections or complications, directing antibiotic treatment to children who are high risk or have signs of complications. The validity of this approach has become more relevant in

the climate of the COVID-19 pandemic, where clinicians would benefit from a more straightforward model.

WHAT WE KNOW AND DO NOT KNOW ABOUT THROAT AND EAR INFECTIONS IN CHILDREN IN THE UK

The risk environment surrounding ear and throat infections has changed dramatically over the past few decades. Rheumatic fever had a huge impact on childhood morbidity and mortality in the early 20th century. Its rapid and largely unexplained decline prior to the discovery of antibiotic therapy has continued to the point that it has all but completely disappeared from the UK.⁵ Vaccines against some respiratory pathogens such as *Haemophilus influenzae* type B and many strains of *Pneumococcus* have resulted in a further dramatic reduction in invasive infections caused by these bacteria.⁶ The complications are now primarily suppurative complications such as mastoiditis or quinsy, both extremely rare in children (more so in children <5 years), and for which antibiotics offer at best a meagre absolute risk reduction (Numbers needed to treat >4000).⁷ Non-suppurative complications of group A Strep still exist (primarily post-Strep glomerulonephritis) but are so uncommon that it is unknown whether antibiotics offer any protection or if that would be outweighed by harm of antibiotic use.

While many will treat URTI with the aim of reducing symptoms in young children, the evidence has revealed that there is little to gain from antibiotics for uncomplicated URTI (including tonsillitis and otitis media). For tonsillitis, the average symptom reduction is <18 hours⁸ with no benefit once symptoms have persisted >3 days, and there are only certain circumstances under which treatment for otitis media shortens the duration of

discomfort.⁹ Uncomplicated ear or throat infections are self-limiting and resolve without treatment, and for most children, antibiotics will not influence the course of the disease.

Antibiotics are associated with a non-trivial amount of side effects and adverse events in children. These include gastrointestinal symptoms, allergic (or suspected allergic) reactions and gut dysbiosis, which is being increasingly associated with long-term adverse outcomes such as increased risk of atopy and autoimmune-inflammatory conditions.¹⁰

The risks of bacterial, uncomplicated URTI in children, while low are not fully understood. In particular, the significance of scarlet fever is being constantly re-evaluated as new strains of strep emerge and public health assesses the potential harm of these infections.¹¹

UK GUIDELINES VERSUS OTHER GUIDELINES

In September 2019, the UK's NICE withdrew their guidance on antibiotics for respiratory illnesses⁴ preferring instead to concentrate on disease-specific prescribing guidelines for sinusitis, sore throat, otitis media and cough. For otitis media in children, the default option is to not prescribe antibiotics, highlighting that both viral and bacterial infections are self-limiting in nature. The decision to provide watchful waiting, a delayed prescription or an immediate prescription for AOM is essentially made on whether the child has systematic features of illness (although these are not defined), is less than 2 years old with bilateral otitis media or has an obvious complication. The NICE feverish illness in children guideline¹² is noted as a means to assess and manage a child. For a child presenting with a sore throat, NICE advise the use of FeverPAIN or CENTOR in decision making. The cost-analysis of this approach is not clear, but it is recognised that even those with a CENTOR score of 3 and 4, for example,¹³ are only associated with a 32%–56% likelihood of isolating streptococcus, which in itself does not indicate that the child will obtain symptom benefit from antibiotics. The Guideline Development Group (GDG) highlighted that 'FeverPAIN criteria had not been tested in populations under 3 years' and that 'Centor criteria were developed in an adult population'. The GDG also felt children under 3 years are unlikely to present with sore throat alone, but this presents a challenge for the practitioner who is convinced that a child's symptomatology is derived from their throat. The absence of a cough, the presence of a fever and any lymphadenopathy would give this child a score of 3 even without any exudate. While no guidance should be ultimately prescriptive, the guideline repeatedly uses the word 'consider' allowing flexibility and meaning (especially in young infants) that antibiotics are relatively easy to justify, while at the same time are not mandated. Given clinicians' beliefs and parental expectations it is no wonder there is huge variation in practice. This often leaves parents confused and frustrated as a different

Box 1 RCH Melbourne clinical practice guideline for sore throat (May 2019)

1. Most children with sore throat do not need antibiotics.
2. With the exception of scarlet fever type rash, there are no clinical features alone that reliably discriminate between group A streptococcal (GAS) and viral pharyngitis.
3. Antibiotic therapy is *only* recommended for a high-risk group of children to prevent non-suppurative complications of GAS infection.

approach may be used dependant on the clinician they see.

DISCUSSION

There is a degree of momentum in practice that occasionally requires a seismic event to drive a change in approach, to one that is more suited to a clinical problem that has significantly evolved. The evidence that antibiotics have little symptomatic benefit across the various phenotypes of uncomplicated URTI in children has been accruing steadily over the past three decades. Despite this, the hope that by giving antibiotics, clinicians will reduce symptoms in such cases continues to be a significant factor in decision making and is entrenched in UK guidance. At the same time, the background risk of complications of URTI has decreased dramatically, and there is a general lack of evidence that prescribing antibiotics for URTI reduces these complications.

Other areas with similar demographics and epidemiology have produced a very different approach. The Royal Children's Hospital, Melbourne, simply states the following (box 1):

Such an approach has significant benefits for antibiotic guardianship and the reduction of decision fatigue in clinicians as well as the potential to influence health seeking behaviour (figure 1)

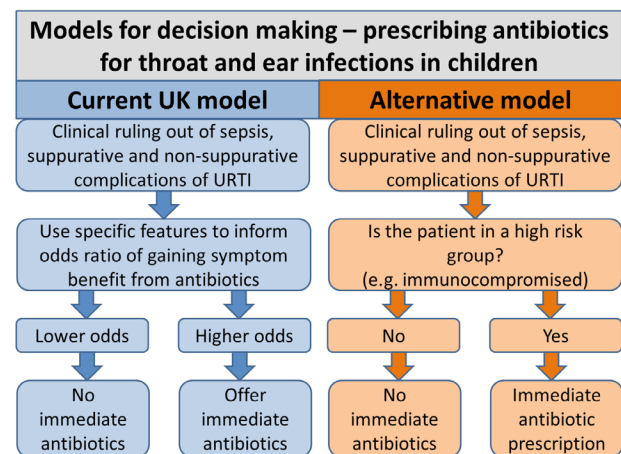


Figure 1 Models for decision making in upper respiratory tract infection (URTI) in children.

A more recent development has potentially provided the impetus for a wholesale change in approach to the management of URTI in children in the UK. The COVID-19 pandemic has had a profound effect both on health seeking behaviour and clinical practice. For the first time in the history of the NHS, the public was directed to not seek a medical assessment for cough and fever in the absence of 'severe difficulty breathing' or risk factors. This means that all children with uncomplicated URTI and no risk factors have been advised against seeking a face-to-face clinical assessment. At the same time, there was an early move to stop examining the throats of children presenting with presumed URTI. This change in practice was driven by the low yield of useful clinical information balanced against the infection risk to staff. The acceptability of ceasing the routine examination of a child's throat unless deemed absolutely necessary, itself indicates a profession that has come to realise that in the absence of signs of complications, the appearance of the throat should not change the clinical decision.

We propose that the UK NICE guideline committee considers a move to a binary approach similar to the Children's Hospital Melbourne sore throat guideline. This would require a consensus on what constitutes a high-risk paediatric patient. Such a move could have a huge impact on antibiotic prescriptions and a similar impact on health-seeking behaviour in the future.

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REFERENCES

- 1 Sands R, Shanmugavadivel D, Stephenson T, *et al*. Medical problems presenting to paediatric emergency departments: 10 years on. *Emerg Med J* 2012;29:379–82.
- 2 Georgalas CC, Tolley NS, Narula PA. Tonsillitis. *BMJ Clin Evid* 2014;2014. [Epub ahead of print: 22 Jul 2014].
- 3 Markowitz M. Rheumatic fever – a half-century perspective. *Pediatrics* 1998;102:272–4.
- 4 Respiratory tract infections (self-limiting): prescribing antibiotics. National Institute of health and care excellence CG69. Available: <https://www.nice.org.uk/guidance/cg69/resources/2019-exceptional-surveillance-of-respiratory-tract-infections-self-limiting-prescribing-antibiotics-nice-guideline-cg69-6906867373/chapter/Surveillance-decision?tab=evidence>
- 5 Sharland M, Kendall H, Yeates D, *et al*. Antibiotic prescribing in general practice and hospital admissions for peritonsillar abscess, mastoiditis, and rheumatic fever in children: time trend analysis. *BMJ* 2005;331:328–9.
- 6 Martin NG, Sadarangani M, Pollard AJ, *et al*. Hospital admission rates for meningitis and septicemia caused by Haemophilus influenzae, Neisseria meningitidis, and Streptococcus pneumoniae in children in England over five decades: a population-based observational study. *Lancet Infect Dis* 2014;14:397–405.
- 7 Petersen I, Johnson AM, Islam A, *et al*. Protective effect of antibiotics against serious complications of common respiratory tract infections: retrospective cohort study with the UK general practice research database. *BMJ* 2007;335:982.
- 8 Spinks A, Glasziou PP, Del Mar CB, *et al*. Antibiotics for sore throat. *Cochrane Database Syst Rev* 2013;139.
- 9 Venekamp RP, Sanders SL, Glasziou PP, *et al*. Antibiotics for acute otitis media in children. *Cochrane Database Syst Rev* 2015;303.
- 10 Mitre E, Susi A, Kropp LE, *et al*. Association between use of acid-suppressive medications and antibiotics during infancy and allergic diseases in early childhood. *JAMA Pediatr* 2018;172:e180315.
- 11 Lynskey NN, Jauneikaite E, Li HK, *et al*. Emergence of dominant toxigenic MIT1 Streptococcus pyogenes clone during increased scarlet fever activity in England: a population-based molecular epidemiological study. *Lancet Infect Dis* 2019;19:1209–18.
- 12 Feverish illness in children guidance NG 143. Available: <https://www.nice.org.uk/guidance/ng143>
- 13 CENTOR Criteria. Respiratory tract infections (self-limiting): prescribing antibiotics CG69. Available: <https://www.nice.org.uk/guidance/ng84/chapter/terms-used-in-the-guideline#centor-criteria>