

Incidence of indications for tonsillectomy and frequency of evidence-based surgery

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Seven in eight tonsillectomies are unnecessary: a 12 year retrospective cohort study of UK children

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Abbreviations:

NHS – National Health Service

Table of Contents Summary

We analyse electronic medical records to determine the proportion of UK tonsillectomies undertaken that are evidence-based and the proportion of eligible children undergoing tonsillectomy

Text: 3031 words

Abstract: 250 words

Contributors' statement

Professor Tom Marshall had the original idea for the research.

Dr Ronan Ryan, Dr Dana Šumilo and Professor Tom Marshall designed the study.

Initial data extraction was carried out by Dr Ronan Ryan and subsequent data extraction by Dr Linda Nichols.

Dr Ronan Ryan, Dr Linda Nichols and Dr Dana Sumilo undertook analysis of the data.

All authors contributed to writing and revising the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Abstract

Background

Neither the incidence of indications for childhood tonsillectomy nor the proportion of tonsillectomies that are evidence-based are known.

Aim

Determine the incidence of indications for tonsillectomy in UK children and the proportion of tonsillectomies meeting evidence-based criteria.

Design & Setting

A retrospective cohort study of electronic medical records of children aged 0-15 years registered with 739 UK general practices contributing to a research database.

Method

Children with recorded indications for tonsillectomy were identified from electronic medical records. Evidence-based indications included documented sore throats of sufficient frequency and severity (Paradise criteria); aphthous stomatitis, pharyngitis and cervical adenitis syndrome (PFAPA); or tonsillar tumour. Other indications were considered non-evidence-based. The numbers of children subsequently undergoing tonsillectomy were then identified. Among children who had undergone tonsillectomy the numbers with evidence-based and non-evidence-based indications for surgery were determined.

Results

We included 1,630,807 children, followed up for 7,200,159 person years between 2005 and 2016. Incidence of evidence-based indications for tonsillectomy was 4.2 per 1000 person years: 13.6% (2,144/15,760) underwent tonsillectomy. Incidence of childhood tonsillectomy was 2.5 per 1000 person years: 11.7% (2,144/18,281) had evidence-based indications, almost all with Paradise criteria. The proportion of evidence-based tonsillectomies was unchanged over 12 years. Most childhood tonsillectomies followed non-evidence-based indications: 5 to 6 sore throats (12.4%) or 2 to 4 sore throats (44.6%) in one year; sleep disordered breathing (12.3%) or obstructive sleep apnoea (3.9%).

Conclusion

In the UK, few children with evidence-based indications undergo tonsillectomy and 32,500 children annually undergo tonsillectomies from which they are unlikely to benefit.

Keywords

Tonsillectomy; evidence-based medicine; children; primary care

How this fits in

Evidence suggests tonsillectomy is effective in children with frequent, documented sore throats but not in less severely affected children and there is insufficient evidence to recommend its use for breathing difficulties.

We found that each year between 2005 and 2016, about 4 in 1000 UK children had sufficient sore throats to meet evidence-based criteria for tonsillectomy but only about one in seven ever had the operation. This suggests tonsillectomy is far from essential.

Over the same time period 2 to 3 in 1000 children underwent tonsillectomy each year of whom one in eight of these met evidence-based criteria, amounting to about 32,500 unnecessary tonsillectomies annually at a cost of £36.9 million.

Introduction

Tonsillectomy is the most common surgical procedure in children. Tonsillectomy rates in Belgium, Finland and Norway are twice the UK rate, but in Spain, Italy and Poland rates are much lower.¹ Childhood tonsillectomy rates in the USA are three times higher than England,^{2,3} rates vary four-fold within New England and seven-fold within England (UK).^{4,5} These variations are hard to explain in terms of need. The National Health Service (NHS) carried out approximately 37,000 childhood tonsillectomies from April 2016 to March 2017 at a cost of £42.0 million.^{2,6}

Complications of tonsillectomy are more common than with other common childhood surgical procedures; 2.7% of children are readmitted within 30 days and 12.4% present to emergency departments often as a result of haemorrhage.⁷ Deaths occur occasionally.⁸ Tonsillectomy may have long-term effects on the frequency of respiratory, infectious and allergic conditions.⁹

Recurrent or chronic sore throat is the most common indication for tonsillectomy in the UK.¹⁰ Evidence indicates tonsillectomy results in modest, short term reductions in recurrent sore throats in severely affected children (aged 3 to 15 years) but is not worthwhile in less severely affected children.^{11,12,13} UK and US evidence-based guidelines therefore suggest offering tonsillectomy for children with ≥ 7 documented sore throats in a year; ≥ 5 yearly in two successive years; or ≥ 3 three yearly in three successive years: the Paradise criteria.^{2,14,15} Sore throats should be characterised by at least one of the following: lymphadenopathy, tonsillar pus, fever, or evidence of Streptococcal infection. As undocumented sore throats have a more benign prognosis, eligibility requires documentation.¹⁶ The evidence base has not fundamentally changed since 2002.^{17,18} Tonsillectomy may also be carried out for tonsillar tumour. It may be effective in aphthous stomatitis, pharyngitis and cervical adenitis syndrome (PFAPA).¹⁹

Other potential indications for tonsillectomy lack convincing evidence. Only uncontrolled studies have evaluated tonsillectomy for recurrent peritonsillar abscess.²⁰

Adenotonsillectomy results in short term improvements in quality of life in children aged 5 to 9 years with polysomnography-confirmed obstructive sleep apnoea.²¹ However its long-term value is debatable, tonsillectomy is unevaluated for snoring and of limited effectiveness for sleep apnoea unconfirmed by polysomnography.¹³ Trials of tonsillectomy for sleep apnoea are ongoing.^{22,23,24} Only very small non-randomized studies have evaluated tonsillectomy for guttate or chronic plaque psoriasis in children.²⁵ Randomized controlled trial evidence does not show tonsillectomy affects clinical remission of glomerulonephritis.²⁶

No previous population wide study has described the epidemiology of potential indications for tonsillectomy or how many of those with different potential indications undergo tonsillectomy. This analysis therefore has three aims: to describe the incidence of potential indications for tonsillectomy in children, to determine the proportion of children undergoing tonsillectomy who met evidence-based criteria and to investigate if there have been changes in the potential indications over time. We hypothesize a mismatch between the evidence base and tonsillectomies performed: 1) most tonsillectomies are undertaken in children who are not eligible; 2) many eligible children do not undergo tonsillectomy.

Methods

Data Source and Study Cohort

This is a retrospective open cohort study of children aged 0 to 15 years, registered with a general practice contributing to The Health Improvement Network (THIN). THIN is a database of anonymized patient records from over 700 UK general practices. It contains information on diagnoses, symptoms, referrals to secondary care, tests and treatments in primary care.²⁷ It is broadly generalizable to the UK population in terms of demographics and medical condition prevalence.^{28,29}

The researchers had complete access to the full THIN database. Data were only included after the date of practice acceptable mortality reporting. This is the date after which patient deregistrations in each practice were recorded consistently, ensuring that the denominator, the registered population, was accurate.³⁰ Children were eligible for inclusion from birth, or if not registered with a THIN practice from birth, then registered for at least three years prior to entry. This allows sufficient time to meet the evidence-based criteria for tonsillectomy. The earliest year of entry to the cohort was set to 2000.

Children who had a tonsillectomy prior to entry in the cohort were excluded. Patients were followed up until the earliest of the following dates: age 16 years; death; leaving the practice (deregistration); last data extraction from the practice; or tonsillectomy.

Exposures

Potential indications for tonsillectomy were identified from clinical coded consultations for sore throat episodes, tonsillar neoplasia, PFAPA, peritonsillar abscess, sleep apnoea, other sleep disordered breathing, glomerulonephritis and guttate and chronic plaque psoriasis. As it is difficult to distinguish new sore throat episodes from ongoing episodes a pragmatic decision was taken to consider any consultation for sore throat (including pharyngitis,

tonsillitis, throat infection, sore throat symptoms) at least 14 days after the previous consultation as a new episode. Code lists are provided in supplementary appendices. Patients were categorized according to potential indications for tonsillectomy.

In initial analysis we were unable to identify any potential indications for some patients who underwent tonsillectomy. This may have occurred because some consultations for sore throats were recorded using a less specific code such as another upper respiratory tract infection. We therefore broadened the definition of a sore throat consultation to include any consultations with a clinical code for upper respiratory tract infection or otitis media. We also conducted a sensitivity analysis, including in our counts of sore throat episodes any consultations where no code for upper respiratory tract infection was used but an oral antibiotic commonly used for sore throat (Penicillin V, Erythromycin or Clarithromycin) was prescribed.

Incidence of potential indications for tonsillectomy

To calculate the annual incidence of evidence-based indications for tonsillectomy we determined the number of children who met at least one evidence-based indication in any given year. Evidence-based indications included: tonsillar neoplasia; PFAPA; ≥ 7 sore throat episodes sore throats in the preceding year, ≥ 5 yearly in the two preceding years, or ≥ 3 yearly in the three preceding years (Paradise criteria for sore throats).¹⁴

Proportion of tonsillectomies that are evidence-based

Indications for tonsillectomy were ranked to determine the strongest indication (based first on strength of evidence then on clinical consensus reflected in current practice) and this was taken to be the true indication for tonsillectomy. Tonsillar neoplasia was considered the strongest indication for tonsillectomy, followed by: PFAPA and Paradise criteria for sore throats. These indications for tonsillectomy were considered to be evidence-based. The next strongest indications were considered sequentially to be obstructive sleep apnoea, other sleep

disordered breathing, peritonsillar abscess; ≥ 5 sore throat episodes recoded in the preceding year but not meeting the Paradise criteria; recurrent sore throat episodes accompanied by guttate or chronic plaque psoriasis, or glomerulonephritis; three to four, two and one sore throat episodes in the preceding year (the weakest indication).

We initially considered tonsillectomy to be indicated for one year after the patient consulted with the indication. In each child who underwent tonsillectomy we also identified the strongest indication at any time prior to surgery based on available patient records. This could overestimate the number of tonsillectomies considered evidence-based if an older child had tonsillectomy for an indication that was not evidence-based but they had a prior history of stronger indications.

Changes to the analysis

In initial analysis, when we considered tonsillectomy to be indicated only one year after the onset of the indication (e.g. up to one year after the seventh sore throat), no apparent indication could be identified for 19.1% (4,406/23,116) of tonsillectomies between 2000 and 2016. When we considered tonsillectomy to be indicated at any time after the indication, the proportion of tonsillectomies with no indication fell to 5.4% (1,246/23,116). Over 10% of tonsillectomies had no identifiable indication in the early years of the cohort (10.2% in 2000 and 2001), but was lower from 2005 onwards. The primary analysis therefore allowed indications at any time prior to tonsillectomy and was confined to 2005 to 2016.

Outcome

The main outcome of interest was tonsillectomy or adenotonsillectomy.

Statistical Analysis

Incidence of potential indications for tonsillectomy

The annual incidence of potential indications for tonsillectomy was calculated as the number of children who met at least one potential indication for tonsillectomy in each year per person

year of follow up. We then determined the annual incidence of evidence-based indications for tonsillectomy to estimate potential annual need for tonsillectomy.

The strongest indication for tonsillectomy was determined for each child in the cohort and the proportion of children undergoing tonsillectomy after this strongest indication was calculated.

Incidence of tonsillectomy and indications for tonsillectomies undertaken

The annual incidence of tonsillectomy was estimated as the number of children undergoing the procedure per person year of follow up. Incidence estimates were directly standardized to the 2015 UK population³¹ to enable comparisons over time: 95% confidence intervals (CIs) were calculated using Poisson approximation.

For each tonsillectomy the strongest potential indication at any time prior to surgery was identified and the proportion of tonsillectomies attributed to each indication determined.

Potential indications were then categorized as evidence-based or not evidence-based and the proportion of evidence-based tonsillectomies calculated. Data were analysed using Stata version 14.³²

Results

During 2005-2016 the cohort included 739 general practices, 1,630,807 children aged 0-15 years, 7,200,159 person years of follow up and 18,281 tonsillectomies (Table 1).

Annual incidence of indications for tonsillectomy

Sore throat consultations declined from 2005 to 2016. Incidence of sore throats meeting Paradise criteria (98.0% of evidence-based indications) was 28% lower in 2016 than 2005. (Table 1). Similarly consultations for 5 to 6 sore throats in a year fell by 27%; for 3 to 4 recurrent sore throats fell by 22%; for 2 to 3 sore throats by 19%; by 13% for a single sore throat. Consultations for peritonsillar abscess also fell by 39%. By contrast consultations for sleep apnoea rose 48% from 2005 to 2016 and those for sleep disordered breathing rose 2%.

Between 2005 and 2016 the average annual incidence of meeting at least one evidence-based indication for tonsillectomy in children was 4.2 per 1,000 person years. A much larger number of children consulted with other potential indications for tonsillectomy which did not meet evidence-based criteria, particularly with one, two, or three to four sore throats in a year. (Table 2)

Frequency of tonsillectomy in children with indications

Few children 13.6% (2,144/15,760) with an evidence-based indication underwent tonsillectomy. Likelihood of undergoing tonsillectomy increased with frequency of sore throat consultations in a single year: 3.2% (5,503/170,687) with 3 to 4 sore throats, 8.9% (2,266/25,420) with 5 to 6 annual sore throats and 13.9% (2,129/15,320) of those meeting Paradise criteria. The vast majority of children consulting with recurrent sore throats did not undergo tonsillectomy however the small proportion that did accounted for most tonsillectomies. (Figure 1) The indications most likely to be followed by tonsillectomy were

sleep apnoea, 22.2% (706/3,185), followed by peritonsillar abscess 14.8% (100/675) and sleep disordered breathing 14.8% (2,246/15,205). (Table 2)

Annual Incidence of tonsillectomy

The crude annual incidence of tonsillectomy was 2.5 per 1000 person years. It followed a broadly similar pattern to the incidence of indications, declining from 2005 to 2011 and then remaining relatively stable (Table 1). Age-adjustment had little effect on trends or rates.

Annual English hospital-reported tonsillectomy rates showed the same temporal pattern as our primary care data.

Indications for tonsillectomies undertaken from 2005 to 2016

From 2005 to 2016 11.7% (2,144/18,281) of tonsillectomies had evidence-based indications, 99.3% of these met the Paradise criteria. Tonsillectomies without an evidence base were mainly for sore throats: five to six (12.4%), two to four (44.7%) or one (9.9%) within a single year. In addition, 3.9% were for sleep apnoea and 12.3% for other sleep disordered breathing.

The proportion of tonsillectomies attributable to Paradise criteria, five or six annual sore throats or to other sleep disordered breathing changed little. The proportion attributable to obstructive sleep apnoea increased fourfold from 1.2% to 5.5%. (Figure 2)

Discussion

Summary of findings

About four in 1,000 children met evidence-based criteria for tonsillectomy annually between 2005 and 2016. The vast majority had recurrent sore throat consultations meeting Paradise criteria. Fewer than one in seven underwent surgery.

Two or three children in 1000 underwent tonsillectomy annually between 2005 and 2016. Fewer than one in eight had evidence-based indications. The proportion did not change over twelve years. In the UK 32,500 of the 37,000 childhood tonsillectomies in 2016 to 2017 were therefore unnecessary. Most (54.5%) tonsillectomies were carried out on the very large numbers of children who consulted with one to four sore throats in a year but the vast majority of these children do not undergo tonsillectomy. The mismatch between children meeting evidence-based criteria and those undergoing tonsillectomy is shown in Figure 3.

Strengths and limitations

Our findings are obtained from a very large dataset reflecting current UK clinical practice over 12 years and captures both free NHS and private tonsillectomies. Our tonsillectomy rates correlated closely with childhood tonsillectomy rates reported in England Hospital Episode Statistics ($r = 0.896$).

We identified likely indications for 95.2% of tonsillectomies from clinically coded consultations. Consultations in primary care are 15 times more common than in emergency departments and upper respiratory infections is uncommon in the latter therefore primary care records will miss few relevant consultations.^{33,34}

Paradise criteria require specific documentation of sore throats and their clinical features. Our broad (sensitive) definition of a sore throat, counting any upper respiratory tract infection consultation as a sore throat episode, may overestimate the frequency of evidence-based

indications. In sensitivity analyses we investigated the effect of using an even broader (more sensitive) include any consultation without a clinical code where antibiotics consistent with a sore throat episode were prescribed (Penicillin V, Erythromycin or Clarithromycin). This increased the number of evidence-based tonsillectomies to 17.5%. We then used a narrower (more specific) definition of a sore throat, including only those clinically coded as sore throat episodes. This reduced the proportion of evidence-based tonsillectomies to 4.4%, reduced the proportion of tonsillectomies attributable to sore throat to 70.9% and increased the proportion without an identifiable indication to 11.1%. Under all scenarios only a minority of tonsillectomies were evidence based and even with the narrowest definition of sore throat, only a minority (32.0%) of children meeting Paradise criteria underwent tonsillectomy.

For sore throat related indications we initially intended to consider tonsillectomy to be indicated for only one year after the patient last consulted for the indication. But median time from indication to tonsillectomy was 356 days and applying a one year time limit for indications meant we were unable to identify any indications for an additional 13% of tonsillectomies. We therefore identified the best ever indication rather than indications within the year prior to tonsillectomy, this may overestimate the frequency of evidence-based indications.

Some may consider there is sufficient evidence to support tonsillectomy for other indications. Children affected by recurrent otitis media may benefit modestly from adenotonsillectomy although it is unclear if tonsillectomy adds to the benefits of adenoidectomy.³⁵ Tonsillectomy may be beneficial for sleep apnoea confirmed by polysomnography in five to nine year olds, for peritonsillar abscess or for psoriasis.^{19,20,25} Others conclude the evidence does not support tonsillectomy in PFAPA.³⁶ But a combination of evidence-based indications, or breathing related indications or peritonsillar abscess accounts for only 28.4% of tonsillectomies.

Furthermore, most children with any of these indications do not undergo tonsillectomy. Using

a broader definition of eligibility for treatment increases the proportion of tonsillectomies that can be considered indicated, but decreases the proportion of eligible children who undergo surgery.

Comparison to literature

This is the first ever study to estimate the incidence of evidence-based indications for tonsillectomy in children and the proportion of affected children who undergo the procedure. It is the first study to comprehensively estimate the proportion of tonsillectomies that are evidence-based. A study in 23, self-selected, UK general practices found a quarter of 237 tonsillectomies in the late 1990s met evidence-based criteria.³⁷ A larger analysis suggested <1% of tonsillectomy patients in 2008 met Paradise criteria.³⁸ However this study probably underestimated eligibility as it required sore throats to be precisely coded in general practice records.

Although others report rising hospital admissions for peritonsillar abscess, we found primary care consultations for peritonsillar abscess and for recurrent sore throat consistently declined over the same period.³⁹ This suggests a changing pattern of presentation rather than an increase in incidence.

We found UK tonsillectomy rates changed little from 2005 to 2016, with a slight decline in the years to 2011, followed by a modest increase. By comparison, in Germany childhood tonsillectomy rates decreased by 17.3% from 2010 to 2013 but rates remain twice those in the UK.⁴⁰ We found an increasing propensity for sleep apnoea consultations to result in tonsillectomy: sleep apnoea consultations increased by about half but tonsillectomies for obstructive sleep apnoea increased four-fold. Overall our attribution of indications for childhood tonsillectomy – 78.5% sore throat, 16.2% obstructive symptoms and 0.5% peritonsillar abscess – is comparable to a national UK audit – 83.3%, 14.7% and 0.4%

respectively.¹⁰ Fewer tonsillectomies could be attributed to sleep apnoea than the 25% suggested by UK professional bodies⁴¹ or the two thirds reported from the USA.^{42,43}

We found guideline discordant (overtreatment alongside possible under treatment) clinical management of recurrent sore throat in the UK to be stable over many years. Overtreatment is an increasingly recognized phenomenon.^{44,45} Guideline discordant clinical management has been observed in relation to both statins and depression and in the USA has increased in relation to back pain and headache.^{46,47,48,49}

Implications for practice and research

We await the results of current trials of tonsillectomy for obstructive sleep disordered breathing.^{22,23,24} High quality randomized controlled trials are also needed to evaluate tonsillectomy for peritonsillar abscess, guttate and chronic plaque psoriasis. The frequency of indications for tonsillectomy and evidence-based tonsillectomies should be investigated in countries with higher and lower tonsillectomy rates than the UK.

Our findings have some practical implications for UK clinical practice. Because they are undertaken on children who do not benefit, most tonsillectomies may cause more harm than good. This is ethically dubious and cannot be a good use of resources. Most children meeting evidence based criteria do not undergo tonsillectomy, therefore it cannot be considered a necessity. We should already inform parents of the likely effectiveness of tonsillectomy. We can now also inform them that most children with either recurrent sore throats or sleep apnoea do not undergo tonsillectomy.

Additional information**Ethical approval:**

All research using anonymised patient records from THIN has prior approval from the NHS South-East Multi-centre Research Ethics Committee subject to independent scientific review.

This study received THIN Scientific Review Committee approval (reference 15-003).

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Competing interests:

The authors have indicated they have no relevant financial relationships to disclose.

The authors have no potential conflicts of interest to disclose.

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Data sharing

Data sharing: the full dataset will be made available to researchers on request from the corresponding author. Individual consent was not obtained but the presented data are anonymized and risk of identification is low.

Patient and lay involvement

Patients and lay people were not involved in the design of this study or the development of the research question.

Tables and figures

Table 1: Characteristics of the study population from 2005 to 2016

| | Year | | | | | | | | | | | |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Number of practices | 556 | 577 | 603 | 643 | 654 | 648 | 649 | 662 | 644 | 609 | 545 | 451 |
| Number of children | 590,724 | 622,505 | 651,308 | 694,342 | 720,955 | 724,153 | 730,833 | 753,756 | 746,245 | 705,936 | 643,183 | 530,462 |
| Person years | 524,613 | 560,254 | 586,007 | 614,620 | 646,898 | 649,855 | 661,183 | 674,169 | 662,071 | 617,813 | 544,197 | 458,480 |
| Mean age (years) | 7.9 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 |
| No. of males | 307,925 | 323,551 | 337,702 | 358,948 | 371,608 | 372,224 | 374,953 | 386,071 | 381,930 | 361,168 | 328,770 | 271,135 |
| (%) | (52.1) | (52.0) | (51.9) | (51.7) | (51.5) | (51.4) | (51.3) | (51.2) | (51.2) | (51.2) | (51.1) | (51.1) |
| Townsend quintile † (%) | | | | | | | | | | | | |
| Least deprived 1 | 24.4 | 24.8 | 24.8 | 24.2 | 24.1 | 24.0 | 23.4 | 22.6 | 21.9 | 21.3 | 20.5 | 18.6 |
| 2 | 19.2 | 19.2 | 19.2 | 19.5 | 19.6 | 19.5 | 19.4 | 18.9 | 18.5 | 18.4 | 18.3 | 17.4 |
| 3 | 19.2 | 19.0 | 19.1 | 19.4 | 19.6 | 19.6 | 19.7 | 19.6 | 19.5 | 19.7 | 19.4 | 19.0 |
| 4 | 17.2 | 17.1 | 17.0 | 17.0 | 17.2 | 17.2 | 17.3 | 17.6 | 17.8 | 17.7 | 17.8 | 17.4 |
| Most deprived 5 | 12.6 | 12.3 | 12.5 | 12.5 | 12.6 | 12.6 | 12.6 | 13.0 | 13.1 | 13.2 | 13.4 | 13.9 |
| Not known | 7.4 | 7.6 | 7.4 | 7.5 | 6.9 | 7.3 | 7.7 | 8.4 | 9.1 | 9.8 | 10.7 | 13.8 |
| No. of children with Evidence Based Indications* | 2,359 | 2,483 | 2,587 | 2,689 | 2,699 | 2,722 | 2,768 | 2,864 | 2,948 | 2,692 | 2,155 | 1,494 |
| (per 1,000 Person Years) | (4.5) | (4.4) | (4.4) | (4.4) | (4.2) | (4.2) | (4.2) | (4.2) | (4.5) | (4.4) | (4.0) | (3.3) |
| No. of Tonsillectomies | 1,555 | 1,551 | 1,648 | 1,620 | 1,599 | 1,564 | 1,468 | 1,581 | 1,698 | 1,598 | 1,275 | 1,124 |
| (per 1,000 Person Years) | (3.0) | (2.8) | (2.8) | (2.6) | (2.5) | (2.4) | (2.2) | (2.3) | (2.6) | (2.6) | (2.3) | (2.5) |

* A child who consults with an evidence-based indication can be eligible for tonsillectomy in more than one calendar year if the indication crossed the calendar year. The total number of children consulting with evidence based indications over 12 years is therefore smaller than the sum of the number for each year. † Townsend score is an area based measure of deprivation.

Table 2: Numbers of children with potential indications for tonsillectomy, annual incidence of potential indications and the proportions of these children undergoing tonsillectomy (2005 to 2016)

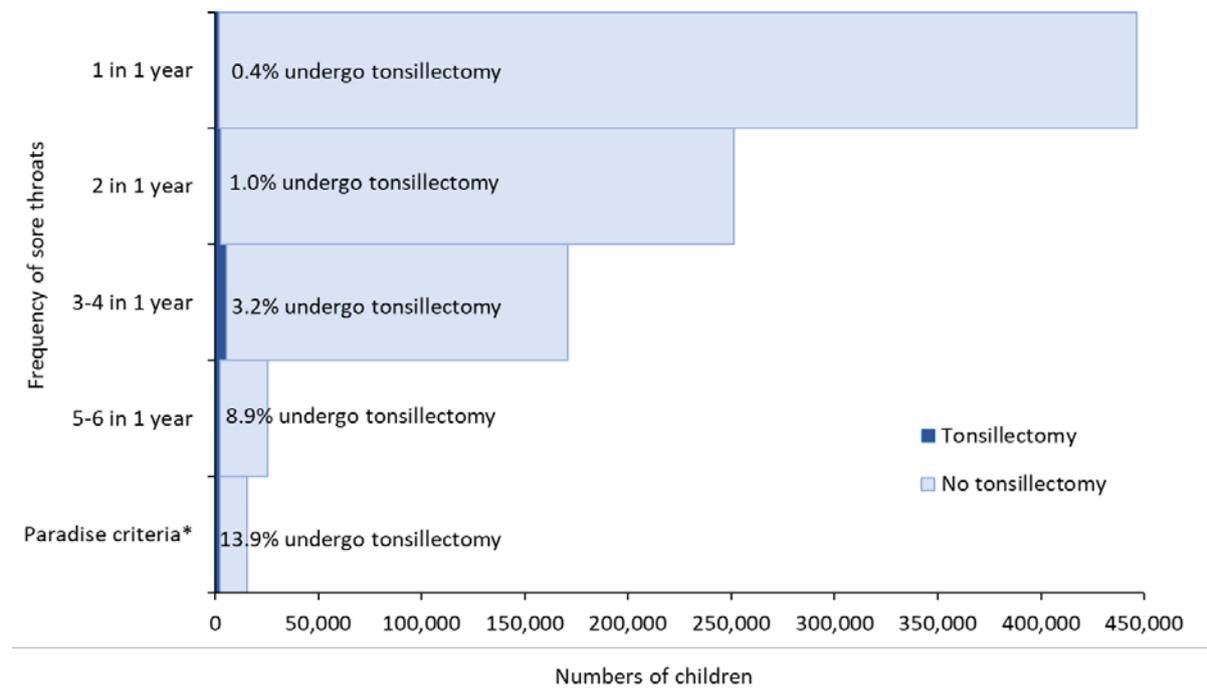
| Recorded indication for tonsillectomy* | | Number with this indication | Proportion with this indication undergoing tonsillectomy (%) | Proportion of all tonsillectomies attributable to this indication (%) | Average annual incidence of this indication (per 100,000 Person Years) |
|--|--|-----------------------------|--|---|--|
| Evidence-based | Tonsillar tumour | 5 | 0.0 | 0.0 | 0.2 |
| | Aphthous stomatitis, pharyngitis and cervical adenitis syndrome (PFAPA) | 435 | 3.4 | 0.1 | 8.5 |
| | Paradise criteria‡ | 15,320 | 13.9 | 11.6 | 412.8 |
| Non evidence-based | Obstructive sleep apnoea | 3,185 | 22.2 | 3.9 | 65.9 |
| | Other sleep disordered breathing | 15,205 | 14.8 | 12.3 | 369.9 |
| | Peritonsillar abscess | 675 | 14.8 | 0.5 | 14.9 |
| | Recurrent sore throats: 5 to 6 in one year† | 25,420 | 8.9 | 12.4 | 840.4 |
| | Recurrent sore throats: 2 to 4 in one year with guttate or chronic plaque psoriasis† | 939 | 3.7 | 0.2 | 21.3 |
| | Recurrent sore throats: 2 to 4 in one year with glomerulonephritis† | 148 | 4.7 | 0.0 | 3.5 |
| | Recurrent sore throats: 3 to 4 in one year† | 170,687 | 3.2 | 30.1 | 5,869.1 |
| | Recurrent sore throats: 2 in one year† | 251,247 | 1.0 | 14.3 | 12,321.6 |
| | Recurrent sore throats: 1 in one year† | 446,275 | 0.4 | 9.9 | 27,896.5 |
| | No indication identified | 701,266 | 0.1 | 4.7 | n/a |
| Total | | 1,630,807 | 1.1 | 100.0 | n/a |

*If a child met criteria for several indications, the indication higher in the hierarchy would be counted.

†Broad definition of sore throat: includes consultations for any upper respiratory tract infection or otitis media

‡Paradise criteria: Recurrent sore throats or upper respiratory tract infections: ≥7 a year; ≥5 yearly for two years; ≥3 yearly for three years

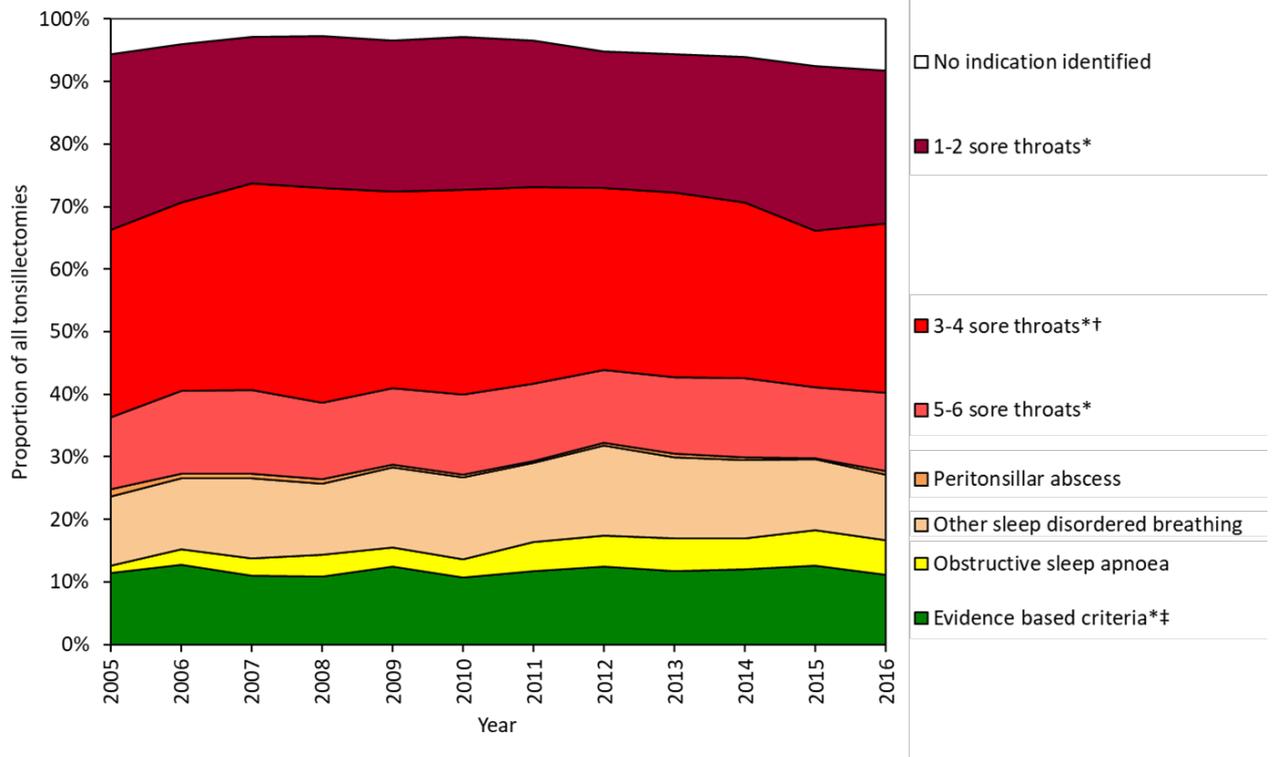
Figure 1: Numbers of children consulting for sore throats† and numbers undergoing tonsillectomy (2005 to 2016).



†Broad definition of sore throat: includes consultations for any upper respiratory tract infection or otitis media

* Paradise criteria: Recurrent sore throats or upper respiratory tract infections: ≥ 7 a year; ≥ 5 yearly for two years; ≥ 3 yearly for three years

Figure 2: Percentages of tonsillectomies due to different indications 2005-2016

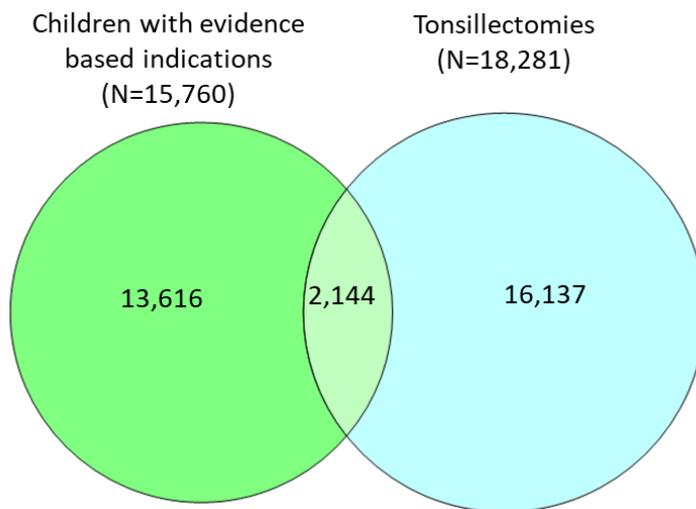


* Broad definition of sore throat: includes consultations for any upper respiratory tract infection or otitis media
 † 3-4 sore throats include children with guttate, chronic plaque psoriasis and glomerulonephritis with recurrent sore throats (these, however accounted only for 0.5% of all children in this group of recurrent sore throats who had tonsillectomy)

Paradise criteria: Recurrent sore throats or upper respiratory tract infections: ≥ 7 a year; ≥ 5 yearly for two years; ≥ 3 yearly for three years

‡ Evidence-based criteria include Paradise criteria, PFAPA and tonsillar tumour (the last two accounted for 0.7% of all tonsillectomies meeting evidence-based criteria)

Figure 3: Relationship between number of children meeting evidence-based criteria (Paradise criteria, PFAPA or tonsillar tumour) for tonsillectomy and numbers of children undergoing tonsillectomy from to 2005-2016



Appendices: Clinical code lists

Appendix 1: Read code list for neoplastic growths of the tonsil

| Code | Description |
|---------|--|
| B016.00 | Malignant neoplasm of lingual tonsil |
| B060.00 | Malignant neoplasm of tonsil |
| B060000 | Malignant neoplasm of faucial tonsil |
| B060100 | Malignant neoplasm of palatine tonsil |
| B060200 | Malignant neoplasm of overlapping lesion of tonsil |
| B060z00 | Malignant neoplasm tonsil NOS |
| B061.00 | Malignant neoplasm of tonsillar fossa |
| B062.00 | Malignant neoplasm of tonsillar pillar |
| B062300 | Malignant neoplasm of palatopharyngeal arch |
| B062z00 | Malignant neoplasm of tonsillar fossa NOS |
| B071100 | Malignant neoplasm of pharyngeal tonsil |
| B072000 | Malignant neoplasm of pharyngeal recess |
| B701300 | Benign neoplasm of lingual tonsil |
| B705.00 | Benign neoplasm of tonsil |
| B706000 | Benign neoplasm of tonsillar fossa |
| B706100 | Benign neoplasm of anterior tonsillar pillar |
| B706200 | Benign neoplasm of posterior tonsillar pillar |
| B706500 | Benign neoplasm of oropharyngeal wall |
| B707000 | Benign neoplasm of nasopharyngeal roof |
| B707100 | Benign neoplasm of pharyngeal tonsil |
| B707200 | Benign neoplasm of pharyngeal recess |
| B707300 | Benign neoplasm of nasopharyngeal floor |
| B708300 | Benign neoplasm of posterior hypopharyngeal wall |

Appendix 2: Read code list for PFAPA

| Code | Description |
|---------|-------------------------------|
| 133E.00 | Aphthous stomatitis |
| A784.11 | Aphthous fever |
| J082100 | Major aphthous ulceration |
| J082200 | Recurrent aphthous ulceration |
| J082400 | Aphthous stomatitis |

Appendix 3: Read code list for sore throat and other upper respiratory tract infections

| Code | Description |
|---------|---|
| 1C9..00 | Sore throat symptom |
| 1C9..11 | Throat soreness |
| 1C92.00 | Has a sore throat |
| 1C93.00 | Persistent sore throat |
| 1C9Z.00 | Sore throat symptom NOS |
| 1CB..00 | Throat symptom NOS |
| 1CB3.00 | Throat pain |
| 1CB3.11 | Pain in throat |
| 1CB5.00 | Throat irritation |
| 1CBZ.00 | Throat symptom NOS |
| 2DB6.00 | O/E - follicular tonsillitis |
| 2DC2.00 | O/E - granular pharyngitis |
| 2DC3.00 | Inflamed throat |
| A34..00 | Streptococcal sore throat and scarlatina |
| A340.00 | Streptococcal sore throat |
| A340000 | Streptococcal angina |
| A340200 | Streptococcal pharyngitis |
| A340300 | Streptococcal tonsillitis |
| A340z00 | Streptococcal sore throat NOS |
| A34z.00 | Streptococcal sore throat with scarlatina NOS |
| A383000 | Fusobacterial necrotising tonsillitis |
| A552.00 | Postmeasles otitis media |
| AA12.00 | Vincent's pharyngitis |
| AA1z.11 | Vincent's laryngitis |
| AA1z.12 | Vincent's tonsillitis |
| F510000 | Acute otitis media with effusion |
| F510011 | Acute secretory otitis media |
| F510100 | Acute serous otitis media |
| F510200 | Acute mucoid otitis media |
| F510300 | Acute sanguinous otitis media |
| F510400 | Acute allergic serous otitis media |
| F510500 | Acute allergic mucoid otitis media |
| F510600 | Acute allergic sanguinous otitis media |
| F511.00 | Chronic otitis media with effusion, serous |
| F511.11 | Chronic secretory otitis media, serous |

| Code | Description |
|---------|--|
| F511100 | Serosanguinous chronic otitis media |
| F511z00 | Chronic serous otitis media NOS |
| F512.00 | Chronic otitis media with effusion, mucoid |
| F512.12 | Chronic secretory otitis media, mucoid |
| F512100 | Mucosanguinous chronic otitis media |
| F512z00 | Chronic mucoid otitis media NOS |
| F513.00 | Chronic otitis media with effusion, other |
| F513000 | Chronic allergic otitis media |
| F513100 | Chronic otitis media with effusion, purulent |
| F513111 | Chronic secretory otitis media, purulent |
| F514000 | Allergic otitis media NOS |
| F514100 | Serous otitis media NOS |
| F514200 | Catarrhal otitis media NOS |
| F514300 | Mucoid otitis media NOS |
| F518.00 | Chronic otitis media with effusion, unspecified |
| F52..00 | Suppurative and unspecified otitis media |
| F520.00 | Acute suppurative otitis media |
| F520000 | Acute suppurative otitis media tympanic membrane intact |
| F520100 | Acute suppurative otitis media tympanic membrane ruptured |
| F520300 | Acute suppurative otitis media due to disease EC |
| F520z00 | Acute suppurative otitis media NOS |
| F521.00 | Chronic suppurative otitis media, tubotympanic |
| F522.00 | Chronic suppurative otitis media, atticofurcal |
| F523.00 | Chronic suppurative otitis media NOS |
| F524.00 | Purulent otitis media NOS |
| F524000 | Bilateral suppurative otitis media |
| F525.00 | Recurrent acute otitis media |
| F526.00 | Acute left otitis media |
| F527.00 | Acute right otitis media |
| F528.00 | Acute bilateral otitis media |
| F52z.00 | Otitis media NOS |
| FyuP200 | [X]Other chronic suppurative otitis media |
| FyuP300 | [X]Otitis media in bacterial diseases classified elsewhere |
| FyuP400 | [X]Otitis media in viral diseases classified elsewhere |
| H00..00 | Acute nasopharyngitis |
| H00..11 | Common cold |
| H00..12 | Coryza - acute |
| H00..13 | Febrile cold |
| H00..14 | Nasal catarrh - acute |
| H00..15 | Pyrexial cold |
| H00..16 | Rhinitis - acute |
| H01..00 | Acute sinusitis |
| H01..11 | Sinusitis |

| Code | Description |
|---------|----------------------------------|
| H010.00 | Acute maxillary sinusitis |
| H010.11 | Antritis - acute |
| H011.00 | Acute frontal sinusitis |
| H012.00 | Acute ethmoidal sinusitis |
| H013.00 | Acute sphenoidal sinusitis |
| H014.00 | Acute rhinosinusitis |
| H01y.00 | Other acute sinusitis |
| H01y000 | Acute pansinusitis |
| H01yz00 | Other acute sinusitis NOS |
| H01z.00 | Acute sinusitis NOS |
| H02..00 | Acute pharyngitis |
| H02..11 | Sore throat NOS |
| H02..12 | Viral sore throat NOS |
| H02..13 | Throat infection - pharyngitis |
| H020.00 | Acute gangrenous pharyngitis |
| H021.00 | Acute phlegmonous pharyngitis |
| H022.00 | Acute ulcerative pharyngitis |
| H023.00 | Acute bacterial pharyngitis |
| H023000 | Acute pneumococcal pharyngitis |
| H023100 | Acute staphylococcal pharyngitis |
| H023z00 | Acute bacterial pharyngitis NOS |
| H024.00 | Acute viral pharyngitis |
| H025.00 | Allergic pharyngitis |
| H02z.00 | Acute pharyngitis NOS |
| H03..00 | Acute tonsillitis |
| H03..11 | Throat infection - tonsillitis |
| H03..12 | Tonsillitis |
| H030.00 | Acute erythematous tonsillitis |
| H031.00 | Acute follicular tonsillitis |
| H032.00 | Acute ulcerative tonsillitis |
| H033.00 | Acute catarrhal tonsillitis |
| H034.00 | Acute gangrenous tonsillitis |
| H035.00 | Acute bacterial tonsillitis |
| H035000 | Acute pneumococcal tonsillitis |
| H035100 | Acute staphylococcal tonsillitis |
| H035z00 | Acute bacterial tonsillitis NOS |
| H036.00 | Acute viral tonsillitis |
| H037.00 | Recurrent acute tonsillitis |
| H03z.00 | Acute tonsillitis NOS |
| H04..00 | Acute laryngitis and tracheitis |
| H040.00 | Acute laryngitis |
| H040000 | Acute oedematous laryngitis |
| H040100 | Acute ulcerative laryngitis |

| Code | Description |
|---------|--|
| H040200 | Acute catarrhal laryngitis |
| H040300 | Acute phlegmonous laryngitis |
| H040400 | Acute haemophilus influenzae laryngitis |
| H040500 | Acute pneumococcal laryngitis |
| H040600 | Acute suppurative laryngitis |
| H040w00 | Acute viral laryngitis unspecified |
| H040x00 | Acute bacterial laryngitis unspecified |
| H040z00 | Acute laryngitis NOS |
| H041.00 | Acute tracheitis |
| H041000 | Acute tracheitis without obstruction |
| H041100 | Acute tracheitis with obstruction |
| H041z00 | Acute tracheitis NOS |
| H042.00 | Acute laryngotracheitis |
| H042.11 | Laryngotracheitis |
| H042000 | Acute laryngotracheitis without obstruction |
| H042100 | Acute laryngotracheitis with obstruction |
| H042z00 | Acute laryngotracheitis NOS |
| H043.00 | Acute epiglottitis (non strep) |
| H043.11 | Viral epiglottitis |
| H043000 | Acute epiglottitis without obstruction |
| H043100 | Acute epiglottitis with obstruction |
| H043200 | Acute obstructive laryngitis |
| H043211 | Croup |
| H043z00 | Acute epiglottitis NOS |
| H044.00 | Croup |
| H04z.00 | Acute laryngitis and tracheitis NOS |
| H05..00 | Other acute upper respiratory infections |
| H050.00 | Acute laryngopharyngitis |
| H051.00 | Acute upper respiratory tract infection |
| H052.00 | Pharyngotracheitis |
| H053.00 | Tracheopharyngitis |
| H054.00 | Recurrent upper respiratory tract infection |
| H055.00 | Pharyngolaryngitis |
| H05y.00 | Other upper respiratory infections of multiple sites |
| H05z.00 | Upper respiratory infection NOS |
| H05z.11 | Upper respiratory tract infection NOS |
| H05z.12 | Viral upper respiratory tract infection NOS |
| H12..00 | Chronic pharyngitis and nasopharyngitis |
| H121.00 | Chronic pharyngitis |
| H121.11 | Sore throat - chronic |
| H121000 | Simple chronic pharyngitis |
| H121100 | Atrophic pharyngitis |
| H121200 | Granular pharyngitis |

| Code | Description |
|---------|--|
| H121300 | Hypertrophic pharyngitis |
| H121400 | Pharyngitis keratosa |
| H121500 | Pharyngitis sicca |
| H121600 | Chronic follicular pharyngitis |
| H121z00 | Chronic pharyngitis NOS |
| H122.00 | Chronic nasopharyngitis |
| H12z.00 | Chronic pharyngitis and nasopharyngitis NOS |
| H13..00 | Chronic sinusitis |
| H13..11 | Chronic rhinosinusitis |
| H130.00 | Chronic maxillary sinusitis |
| H130.11 | Antritis - chronic |
| H130.12 | Maxillary sinusitis |
| H131.00 | Chronic frontal sinusitis |
| H131.11 | Frontal sinusitis |
| H132.00 | Chronic ethmoidal sinusitis |
| H133.00 | Chronic sphenoidal sinusitis |
| H134.00 | Fistula of nasal sinus |
| H135.00 | Recurrent sinusitis |
| H13y.00 | Other chronic sinusitis |
| H13y000 | Chronic pansinusitis |
| H13y100 | Pansinusitis |
| H13yz00 | Other chronic sinusitis NOS |
| H13z.00 | Chronic sinusitis NOS |
| H14..00 | Chronic tonsil and adenoid disease |
| H14..11 | Adenoid disease - chronic |
| H14..12 | Tonsil disease - chronic |
| H140.00 | Chronic tonsillitis |
| H140.11 | Chronic adenoiditis |
| H142.00 | Adenoid vegetations |
| H143.00 | Chronic adenotonsillitis |
| H14y.00 | Other chronic diseases of tonsils and adenoids |
| H14y000 | Calculus of tonsil |
| H14y011 | Amygdalolith |
| H14y012 | Tonsillolith |
| H14y100 | Cicatrix of tonsil |
| H14y200 | Cicatrix of adenoid |
| H14y300 | Tonsillar tag |
| H14y400 | Tonsil ulcer |
| H14y500 | Caseous tonsillitis |
| H14y600 | Lingular tonsillitis |
| H14y700 | Cyst of tonsil |
| H14y711 | Tonsillar cyst |
| H14yz00 | Other chronic diseases of tonsils and adenoids NOS |

| Code | Description |
|---------|--|
| H14z.00 | Chronic tonsil and adenoid disease NOS |
| H14z000 | Chronic tonsil disease NOS |
| H14z100 | Chronic adenoid disease NOS |
| H15..00 | Peritonsillar abscess - quinsy |
| H15..11 | Quinsy |
| H16..00 | Chronic laryngitis and laryngotracheitis |
| H160.00 | Chronic laryngitis |
| H160000 | Chronic simple laryngitis |
| H160100 | Chronic catarrhal laryngitis |
| H160200 | Chronic hypertrophic laryngitis |
| H160300 | Chronic atrophic laryngitis |
| H160400 | Laryngitis sicca |
| H160500 | Congested larynx |
| H160z00 | Chronic laryngitis NOS |
| H161.00 | Chronic laryngotracheitis |
| H16z.00 | Chronic laryngitis NOS |
| H1y..00 | Other specified diseases of upper respiratory tract |
| H1y2.00 | Other pharyngeal disease NEC |
| H1y2.11 | Other nasopharyngeal disease NEC |
| H1y2000 | Pharyngeal disease unspecified |
| H1y2200 | Parapharyngeal abscess |
| H1y2300 | Retropharyngeal abscess |
| H1y2600 | Pharynx or nasopharynx abscess |
| H1y2z00 | Other pharyngeal disease NOS |
| H1yz.00 | Other upper respiratory tract diseases NOS |
| H1yzz00 | Other upper respiratory tract disease NOS |
| H271000 | Influenza with laryngitis |
| H271100 | Influenza with pharyngitis |
| Hyu0.00 | [X]Acute upper respiratory infections |
| Hyu0000 | [X]Other acute sinusitis |
| Hyu0100 | [X]Acute pharyngitis due to other specified organisms |
| Hyu0200 | [X]Acute tonsillitis due to other specified organisms |
| Hyu0300 | [X]Other acute upper respiratory infections/multiple sites |
| Hyu2.00 | [X]Other diseases of the upper respiratory tract |
| Hyu2200 | [X]Other chronic sinusitis |
| Hyu2500 | [X]Other chronic diseases of tonsils and adenoids |
| Hyu2800 | [X]Other abscess of pharynx |
| Hyu2900 | [X]Other diseases of pharynx |
| Hyu2A00 | [X]Other specified diseases of upper respiratory tract |
| R041.00 | [D]Throat pain |
| R041.11 | [D]Throat discomfort |

Appendix 4: Read code list for peritonsillar abscess

| Code | Description |
|------|-------------|
|------|-------------|

| | |
|---------|-------------------------------------|
| 2DB5.00 | O/E - tonsils - quinsy present |
| 2DB5.11 | O/E - quinsy present |
| 7423200 | Incision of retropharyngeal abscess |
| 7426100 | Drainage of retropharyngeal abscess |
| 7531100 | Drainage of peritonsillar abscess |
| 7531111 | Drainage of quinsy |
| H15..00 | Peritonsillar abscess - quinsy |
| H15..11 | Quinsy |
| H1y2200 | Parapharyngeal abscess |
| H1y2300 | Retropharyngeal abscess |

Appendix 5: Read code list for obstructive sleep apnoea

| Code | Description |
|---------|---|
| 8724.00 | CPAP - Continuous positive airways pressure |
| 8725.00 | Bi-level positive airways pressure therapy |
| 8A43.00 | Apnoea alarm monitoring |
| Fy03.00 | Sleep apnoea |
| Fy03.11 | Obstructive sleep apnoea |
| Fy04.00 | Sleep-related respiratory failure |
| H5B..00 | Sleep apnoea |
| H5B0.00 | Obstructive sleep apnoea |
| Q31y000 | Perinatal apnoeic spells NOS |
| Q31y600 | Apnoea of newborn |
| Q31y611 | Neonatal apnoeic attack |
| Qyu3800 | [X]Other apnoea of newborn |
| R005100 | [D]Insomnia with sleep apnoea |
| R005300 | [D]Hypersomnia with sleep apnoea |
| R005311 | [D]Sleep apnoea syndrome |
| R005312 | [D]Syndrome sleep apnoea |
| R060200 | [D]Orthopnoea |
| R060400 | [D]Apnoea |
| Z6M..00 | Positive pressure therapy |
| Z6M1.00 | Continuous positive airways pressure |
| Z6M1.11 | CPAP - Continuous positive airways pressure |
| Z6M1.12 | Continuous positive airways pressure therapy |
| Z6M1.13 | CPAP - Continuous positive airways pressure therapy |
| Z6M1100 | Intermittent CPAP |
| Z6M1200 | Continuous CPAP |
| Z6M1300 | Periodic CPAP |
| Z6M2.00 | Intermittent positive pressure breathing therapy |
| Z6M2.11 | IPPB - Intermittent positive pressure breathing therapy |
| Z6M3.11 | BIPAP - Biphasic pressure airway support |
| Z6M3.12 | Bi-level positive airways pressure therapy |
| Z6M3.13 | BIPAB - Bi-level positive airways pressure therapy |

Appendix 6: Read code list for guttate and chronic plaque psoriasis

| Code | Description |
|---------|---------------------------------|
| M16..00 | Psoriasis and similar disorders |
| M160.00 | Psoriatic arthropathy |

| Code | Description |
|---------|--|
| M160.11 | Psoriatic arthritis |
| M160000 | Psoriasis spondylitica |
| M160100 | Distal interphalangeal psoriatic arthropathy |
| M160200 | Arthritis mutilans |
| M160z00 | Psoriatic arthropathy NOS |
| M161.00 | Other psoriasis |
| M161000 | Psoriasis unspecified |
| M161100 | Psoriasis annularis |
| M161200 | Psoriasis circinata |
| M161300 | Psoriasis diffusa |
| M161400 | Psoriasis discoidea |
| M161500 | Psoriasis geographica |
| M161600 | Guttate psoriasis |
| M161700 | Psoriasis gyrata |
| M161800 | Psoriasis inveterata |
| M161900 | Psoriasis ostracea |
| M161A00 | Psoriasis palmaris |
| M161B00 | Psoriasis plantaris |
| M161C00 | Psoriasis punctata |
| M161D00 | Pustular psoriasis |
| M161E00 | Psoriasis universalis |
| M161F00 | Psoriasis vulgaris |
| M161F11 | Chronic large plaque psoriasis |
| M161H00 | Erythrodermic psoriasis |
| M161J00 | Flexural psoriasis |
| M161z00 | Psoriasis NOS |
| M166.00 | Palmoplantar pustular psoriasis |
| M16y.00 | Other psoriasis and similar disorders |
| M16y000 | Scalp psoriasis |
| M16z.00 | Psoriasis and similar disorders NOS |

Appendix 7: Read code list for glomerulonephritis

| Code | Description |
|---------|--|
| K00..00 | Acute glomerulonephritis |
| K00..11 | Acute nephritis |
| K00..12 | Bright's disease |
| K00..13 | AGN - Acute glomerulonephritis |
| K000.00 | Acute proliferative glomerulonephritis |
| K000000 | Shunt nephritis |
| K000100 | Crescentic glomerulonephritis |
| K000111 | CGN - Crescentic glomerulonephritis |
| K001.00 | Acute nephritis with lesions of necrotising glomerulitis |
| K00y.00 | Other acute glomerulonephritis |
| K00y000 | Acute glomerulonephritis in diseases EC |

| Code | Description |
|---------|---|
| K00y100 | Acute exudative nephritis |
| K00y200 | Acute focal nephritis |
| K00y300 | Acute diffuse nephritis |
| K00y400 | Acute radiation nephritis |
| K00yz00 | Other acute glomerulonephritis NOS |
| K00z.00 | Acute glomerulonephritis NOS |
| K01..00 | Nephrotic syndrome |
| K010.00 | Nephrotic syndrome with proliferative glomerulonephritis |
| K011.00 | Nephrotic syndrome with membranous glomerulonephritis |
| K012.00 | Nephrotic syndrome+membranoproliferative glomerulonephritis |
| K013.00 | Nephrotic syndrome with minimal change glomerulonephritis |
| K013.11 | Lipoid nephrosis |
| K013.12 | Steroid sensitive nephrotic syndrome |
| K014.00 | Nephrotic syndrome, minor glomerular abnormality |
| K015.00 | Nephrotic syndrome, focal and segmental glomerular lesions |
| K016.00 | Nephrotic syndrome, diffuse membranous glomerulonephritis |
| K017.00 | Nephrotic syn difus mesangial prolifertiv glomerulonephritis |
| K018.00 | Nephrotic syn,difus endocapillary proliftv glomerulonephritis |
| K019.00 | Nephrotic syn,diffuse mesangiocapillary glomerulonephritis |
| K01A.00 | Nephrotic syndrome, dense deposit disease |
| K01B.00 | Nephrotic syndrome, diffuse crescentic glomerulonephritis |
| K01w.00 | Congenital nephrotic syndrome |
| K01w000 | Finnish nephrosis syndrome |
| K01w011 | Microcystic type congenital nephrotic syndrome |
| K01w012 | Congenital Finnish nephrosis |
| K01w100 | Drash syndrome |
| K01w111 | Nephrotic syndrome with pseudohermaphroditism |
| K01w112 | Wilms' tumor + nephrotic syndrome + pseudohermaphroditism |
| K01w200 | Congenital nephrotic syndrome with focal glomerulosclerosis |
| K01wz00 | Congenital nephrotic syndrome NOS |
| K01x.00 | Nephrotic syndrome in diseases EC |
| K01x000 | Nephrotic syndrome in amyloidosis |
| K01x100 | Nephrotic syndrome in diabetes mellitus |
| K01x111 | Kimmelstiel - Wilson disease |
| K01x200 | Nephrotic syndrome in malaria |
| K01x300 | Nephrotic syndrome in polyarteritis nodosa |
| K01x400 | Nephrotic syndrome in systemic lupus erythematosus |
| K01x411 | Lupus nephritis |
| K01xz00 | Nephrotic syndrome in diseases EC NOS |
| K01y.00 | Nephrotic syndrome with other pathological kidney lesions |
| K01z.00 | Nephrotic syndrome NOS |
| K0A..00 | Glomerular disease |
| K0A0.00 | Acute nephritic syndrome |

| Code | Description |
|---------|---|
| K0A0000 | Acute nephritic syndrome, minor glomerular abnormality |
| K0A0100 | Acute nephritic syndrome, focal+segmental glomerular lesions |
| K0A0200 | Acute nephritic syn, diffuse membranous glomerulonephritis |
| K0A0300 | Acut neph syn, diffuse mesangial proliferative glomnephritis |
| K0A0400 | Ac neph syn difus endocaply proliferative glomerulonephritis |
| K0A0500 | Acute neph syn, diffuse mesangiocapillary glomerulonephritis |
| K0A0600 | Acute nephritic syndrome, dense deposit disease |
| K0A0700 | Acute nephrotic syndrm diffuse crescentic glomerulonephritis |
| K0A1.00 | Rapidly progressive nephritic syndrome |
| K0A1000 | Rapid progres neph syndrome, minor glomerular abnormality |
| K0A1100 | Rapid progres nephritic syn focal+segmental glomerulr lesion |
| K0A1200 | Rapid progres neph syn diffuse membranous glomerulonephritis |
| K0A1300 | Rpd prog neph syn df mesangial proliferatv glomerulonephritis |
| K0A1400 | Rapid progres neph syn df endocapillary prolifv glomnephritis |
| K0A1500 | Rapid prog neph syn df mesangiocapillary glomerulonephritis |
| K0A1600 | Rapid progressive nephritic syndrome, dense deposit disease |
| K0A1700 | Rapid progres nephritic syn df crescentic glomerulonephritis |
| K0A2.00 | Recurrent and persistent haematuria |
| K0A2000 | Recurrent+persistnt haematuria minor glomerular abnormality |
| K0A2100 | Recur+persist haematuria, focal+segmental glomerular lesions |
| K0A2200 | Recur+persist haematuria difus membranous glomerulonephritis |
| K0A2300 | Recur+persist haemuria df mesangial prolif glomerulnephritis |
| K0A2400 | Recur+persist haemuria df endocaply prolifrtv glomeruloneph |
| K0A2500 | Recur+persist hmuria df mesangiocapillary glomerulonephritis |
| K0A2600 | Recurrent and persistent haematuria, dense deposit disease |
| K0A2700 | Recur+persist haematuria difus crescentic glomerulonephritis |
| K0A2800 | IgA nephropathy |
| K0A3.00 | Chronic nephritic syndrome |
| K0A3000 | Chronic nephritic syndrome, minor glomerular abnormality |
| K0A3100 | Chronic nephritic syndrm focal+segmental glomerular lesions |
| K0A3200 | Chron nephritic syndrom difuse membranous glomerulonephritis |
| K0A3300 | Chron neph syn difus mesangial prolifrtiv glomerulonephritis |
| K0A3400 | Chron neph syn difuse endocap proliferativ glomerulonephritis |
| K0A3500 | Chronic neph syn difus mesangiocapillary glomerulonephritis |
| K0A3600 | Chronic nephritic syndrome, dense deposit disease |
| K0A3700 | Chronic nephritic syn diffuse crescentic glomerulonephritis |
| K0A4.00 | Isolated proteinuria with specified morphological lesion |
| K0A4000 | Isolatd proteinur specfd morphlgcl lesion min glom abnrm |
| K0A4100 | Isolatd proteinur/specifd morphlgcl les foc+seg glom lesn |
| K0A4200 | Isolatd proteinur/specfd morphlgcl les df membrn glomneph |
| K0A4300 | Isoldt prteinur/spcfd morph lesn df mesngl prolif glomneph |
| K0A4400 | Isolt prteinur/spcfd morph les df endocap prolif glomneph |
| K0A4500 | Isoldt prteinur+specfd morph les df mesangiocap glomneph |

| Code | Description |
|---------|--|
| K0A4600 | Isolatd proteinur spcfd morph lesion dense deposit diseas |
| K0A4700 | Isol proteinur specfd morph lesion df crescentic glomneph |
| K0A4W00 | Isolated proteinuria, with unspecified morpholog changes |
| K0A4X00 | Isolated proteinuria, with oth specif morpholog changes |
| K0A5.00 | Hereditary nephropathy not elsewhere classified |
| K0A5000 | Hereditary nephropathy NEC, minor glomerular abnormality |
| K0A5100 | Hereditary nephropathy NEC,focal+segmnt glomerular lesion |
| K0A5200 | Hereditry nephropathy NEC,difus membran glomerulnephritis |
| K0A5300 | Heredtry nephrpthy NEC difus mesangial prolif glomnephrit |
| K0A5400 | Heredtry nephrpthy NEC difus endocapil prolif glomnephrit |
| K0A5500 | [X]Heredtry nephrpthy NEC difus mesangiocapilry glomneph |
| K0A5600 | Hereditary nephropathy, NEC, dense deposit disease |
| K0A5700 | Hereditary nephropathy,NEC,difus crescentic glomnephritis |
| K0A5X00 | Hereditary nephropathy, unspecif morphological changes |
| K0A6.00 | Glomerular disorders in neoplastic diseases |
| K0A7.00 | Glom disordr in blood diseas+disordr involvg imun mechansm |
| K0A8.00 | Rapidly progressive glomerulonephritis |
| K0A9.00 | Cytomegalovirus-induced glomerulonephritis |
| Kyu0.00 | [X]Glomerular diseases |
| Kyu0000 | [X]Glomerular disorders in infectious+parasitic diseases CE |
| Kyu0100 | [X]Glomerular disorders in neoplastic diseases CE |
| Kyu0200 | [X]Glomerulr disordrs/bld dis+disordr inv immune mechansm CE |
| Kyu0300 | [X]Glomerular disorders in diabetes mellitus |
| Kyu0400 | [X]Glomerulr disordr/oth endocrine,nutritnl+metabolic dis CE |
| Kyu0500 | [X]Glomerular disorders/systemic disorders/connectiv tissue CE |
| Kyu0600 | [X]Glomerular disorders in other diseases CE |
| Kyu0700 | [X]Rapidly progressive nephritic syndrome, other |
| Kyu0800 | [X]Unspecif nephritic syndr, minor glomerular abnormality |
| Kyu0900 | [X]Unsp nephrit synd, diff mesang prolif glomerulonephritis |
| Kyu0A00 | [X]Unsp nephrit synd, diff endocap prolif glomerulonephritis |
| Kyu0B00 | [X]Unspecified nephritic syndrome, dense deposit disease |
| Kyu0C00 | [X]Unspecif nephrit synd, diff concentric glomerulonephritis |
| Kyu0D00 | [X]Isolated proteinuria, with oth specif morpholog changes |
| Kyu0E00 | [X]Isolated proteinuria, with unspecified morpholog changes |
| Kyu0F00 | [X]Hereditary nephropathy, unspecif morphological changes |
| SP08b00 | De novo glomerulonephritis |

Appendix 8: Read code list for other sleep disordered breathing

| Code | Description |
|---------|-----------------------------|
| 1C7..00 | Snoring symptoms |
| 1C72.00 | Snores |
| 1C7Z.00 | Snoring symptom NOS |
| 2DB..11 | O/E - tonsils enlarged |
| 2DB3.00 | O/E - tonsils mod. enlarged |

| | |
|---------|---|
| 2DB4.00 | O/E - tonsils grossly enlarged |
| 3148.00 | Sleep studies |
| 38Da.00 | Berlin questionnaire for sleep apnoea |
| 7065800 | Sleep studies |
| 7065A00 | Sleep studies NEC |
| 7527800 | Injection snoreplasty |
| 7527900 | Radiofrequency somnoplasty |
| 7P1B000 | Polysomnography |
| 9b9Y.00 | Sleep studies - specialty |
| H141.00 | Tonsil and/or adenoid hypertrophy |
| H141.11 | Adenoid hypertrophy |
| H141.12 | Enlargement of tonsil or adenoid |
| H141000 | Hypertrophy of tonsils and adenoids |
| H141100 | Hypertrophy of tonsils alone |
| H141200 | Hypertrophy of adenoids alone |
| H141z00 | Hypertrophy of tonsils and adenoids NOS |
| H1yz200 | Upper airway resistance syndrome |
| R060B00 | [D]Snoring |

Appendix 9: Read code list for tonsillectomy and adenotonsillectomy

| Code | Description |
|---------|--|
| 7530.00 | Excision of tonsil |
| 7530.11 | Tonsillectomy |
| 7530000 | Dissection tonsillectomy |
| 7530100 | Guillotine tonsillectomy |
| 7530200 | Bilateral laser tonsillectomy |
| 7530300 | Other bilateral tonsillectomy |
| 7530400 | Excision of remnant of tonsil |
| 7530500 | Excision of lingual tonsil |
| 7530600 | Tonsillectomy and adenoidectomy |
| 7530700 | Other unilateral tonsillectomy |
| 7530800 | Dissection tonsillectomy and adenoidectomy |
| 7530900 | Guillotine tonsillectomy and adenoidectomy |
| 7530A00 | Bilateral dissection tonsillectomy |
| 7530B00 | Bilateral guillotine tonsillectomy |
| 7530C00 | Coblation tonsillectomy |
| 7530D00 | Bilateral coblation tonsillectomy |
| 7530y00 | Other specified excision of tonsil |
| 7530z00 | Excision of tonsil NOS |