

ACUTE UPPER RESPIRATORY INFECTIONS AND TONSILLECTOMY IN CHILDREN

Introduction

Upper respiratory tract infections (URTIs) are a common cause of illness in childhood and account for a large number of visits to primary care each year [104]. In New Zealand, a number of acute URTIs are considered to be ambulatory sensitive, on the basis that early and appropriate management of these conditions in primary care can significantly reduce the need for hospital admissions [97].

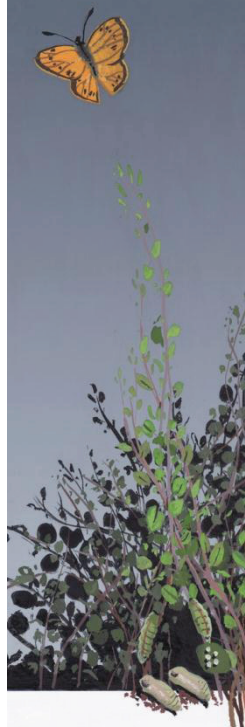
Although they are generally of short duration and limited severity, upper respiratory infection also place a significant burden on secondary care services. The conditions which are most relevant for children [97] are outlined briefly below:

Non Specific URTIs: Non-specific URTIs, including the common cold, produce a variety of symptoms including cough, sore throat, runny nose, fever and malaise. They are usually of viral origin [104]. The available evidence indicates that antibiotic treatment does not alter the course of these illnesses, which are self-limiting in the vast majority of cases, nor is it an effective strategy for preventing complications such as lower respiratory conditions like pneumonia [105].

Acute Pharyngitis and Tonsillitis: While the majority of cases of pharyngitis and tonsillitis are also due to viral infections (and are therefore self-limiting and need only symptomatic treatment), a small number are due to group A streptococcus and may, if untreated, result in acute rheumatic fever [106]. The NZ Rheumatic Fever Guideline [107] recommends assessing all patients presenting with sore throat for the presence or absence of significant risk factors (Māori or Pacific ethnicity, 3–45 years of age, resident in lower socioeconomic areas of the North Island, past history of acute rheumatic fever) and/or clinical findings (temperature $>38^{\circ}\text{C}$, no cough, swollen tender lymph nodes, tonsillar swelling or exudate, age 3–14 years). The Guideline provides an algorithm which, on the basis of the numbers of risk factors and clinical criteria present, can be used to assign patients to one of 3 groups: high risk (indicating that a throat swab should be taken and empiric antibiotics commenced), medium risk (indicating that a throat swab should be taken and antibiotics commenced if the swab is positive) and low risk (indicating that no throat swab should be taken and that treatment should be symptomatic only).

Waiting List Admissions for Tonsillectomy: In New Zealand, a large number of waiting list admissions for tonsillectomy occur each year. While a number are performed for the management of upper airway obstruction/obstructive sleep apnoea, the majority are for the management of recurrent tonsillitis [97]. There has been considerable controversy however, concerning the benefits of tonsillectomy for recurrent throat infections, and internationally tonsillectomy is now a much less frequently performed procedure than it was in the past [108,109]. Several national guidelines and an Australasian position paper recommend the use of the “Paradise Criteria” when determining the indications for tonsillectomy [108,110,111]. These are: seven or more well-documented, adequately treated disabling sore throats due to tonsillitis in the preceding year; OR five or more such episodes in each of the previous two years; OR three or more such episodes in the previous three years [112].

A recent Cochrane review of this issue concluded that for children meeting the Paradise Criteria, having an adenotonsillectomy would result in avoiding, on average, three unpredictable episodes of any type of sore throat over the next year, at a cost of one predictable episode of significant pain, lasting on average five to seven days, in the immediate post-operative period. Less severely affected children would have only one less sore throat of any type in the next year (on average two, rather than three). Further, tonsillectomy is not without risks. The most significant complication is haemorrhage which has been reported in 2–3% of cases and has, on rare occasions, proved fatal [108,113].



The following section uses data from the National Minimum Dataset to review acute and arranged admissions for acute upper respiratory infections in children aged 0–14 years as well as waiting list admissions for tonsillectomy (+/– adenoidectomy). Guidelines and evidence-based reviews, which consider how these conditions might best be prevented or managed, are considered at the end of the section.

Data Sources and Methods

Indicator

1. *Acute and Arranged Hospital Admissions for Acute Upper Respiratory Tract Infections in Children Aged 0–14 Years*

Numerator: National Minimum Dataset: Acute and arranged hospital admissions for children aged 0–14 years with an ICD-10-AM primary diagnosis of Acute Upper Respiratory Tract Infection: Acute Nasopharyngitis (Common Cold) (J00); Acute Sinusitis (J01); Acute Pharyngitis (J02); Acute Tonsillitis (J03); Croup/Acute Laryngitis/Tracheitis (J04, J050); Acute URTI Multiple/Unspecified Sites (J06); Epiglottitis (J051).

Denominator: Statistics NZ Estimated Resident Population (with linear extrapolation being used to calculate denominators between Census years).

2. *Arranged and Waiting List Admissions for Tonsillectomy (+/–Adenoidectomy) in Children Aged 0-14 Years*

Numerator: National Minimum Dataset: Arranged and waiting list admissions for tonsillectomy +/- adenoidectomy (ICD-10-AM Primary Procedure Codes 4178900 or 4178901) in children (0–14 years). Indications for tonsillectomy (ICD-10-AM primary diagnosis codes) included: Chronic Tonsillitis (J350); Hypertrophy of the Tonsils/Adenoids (J351–J353); Sleep Apnoea (G473); Other/Unspecified Chronic Diseases of the Tonsils/Adenoids (J358–J359).

Notes on Interpretation

Note 1: All of the acute upper respiratory tract infections listed above are considered ambulatory sensitive, with the exception of croup/acute laryngitis/tracheitis, where early access to primary care may not prevent a hospitalisation (e.g. children with croup may require hospitalisation for the management of respiratory distress).

Note 2: An acute admission is an unplanned admission occurring on the day of presentation, while an arranged admission (referred to elsewhere in this report as a semi-acute admission) is a non-acute admission with an admission date <7 days after the date the decision was made that the admission was necessary. A waiting list admission is a planned admission, where the admission date is 7+ days after the date the decision was made that the admission was necessary. Because arranged admissions comprise a mix of patients being admitted semi-acutely for the management of medical conditions, and semi-urgently for operative procedures, in this section arranged admissions have been included in both the acute upper respiratory tract infection and tonsillectomy categories. While in a small number of cases, a single child may have appeared in both analyses, in reality the majority of admissions for tonsillectomy were for chronic upper respiratory conditions (e.g. chronic tonsillitis, obstructive sleep apnoea) which were not included in the acute URTI section.

Note 3: **Appendix 3** outlines the limitations of the hospital admission data used. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

Note 3: 95% confidence intervals have been provided for the rate ratios in this section and where appropriate, the terms *significant* or not *significant* have been used to communicate the significance of the observed associations. Tests of statistical significance have not been applied to other data in this section, and thus (unless the terms *significant* or non-*significant* are specifically used) the associations described do not imply statistical significance or non-significance (see **Appendix 2** for further discussion of this issue).

Acute Upper Respiratory Tract Infections

New Zealand Distribution and Trends

New Zealand Distribution by Primary Diagnosis

In New Zealand during 2006–2010, acute upper respiratory tract infections (URTI) of multiple/unspecified sites were the most frequent reason for an admission with an URTI in children, followed by croup/acute laryngitis/tracheitis (**Table 49**).

New Zealand Distribution by Age

In New Zealand during 2006–2010, admissions for acute URTIs were most common in infants and one year olds, with rates tapering off rapidly thereafter (**Figure 30**).

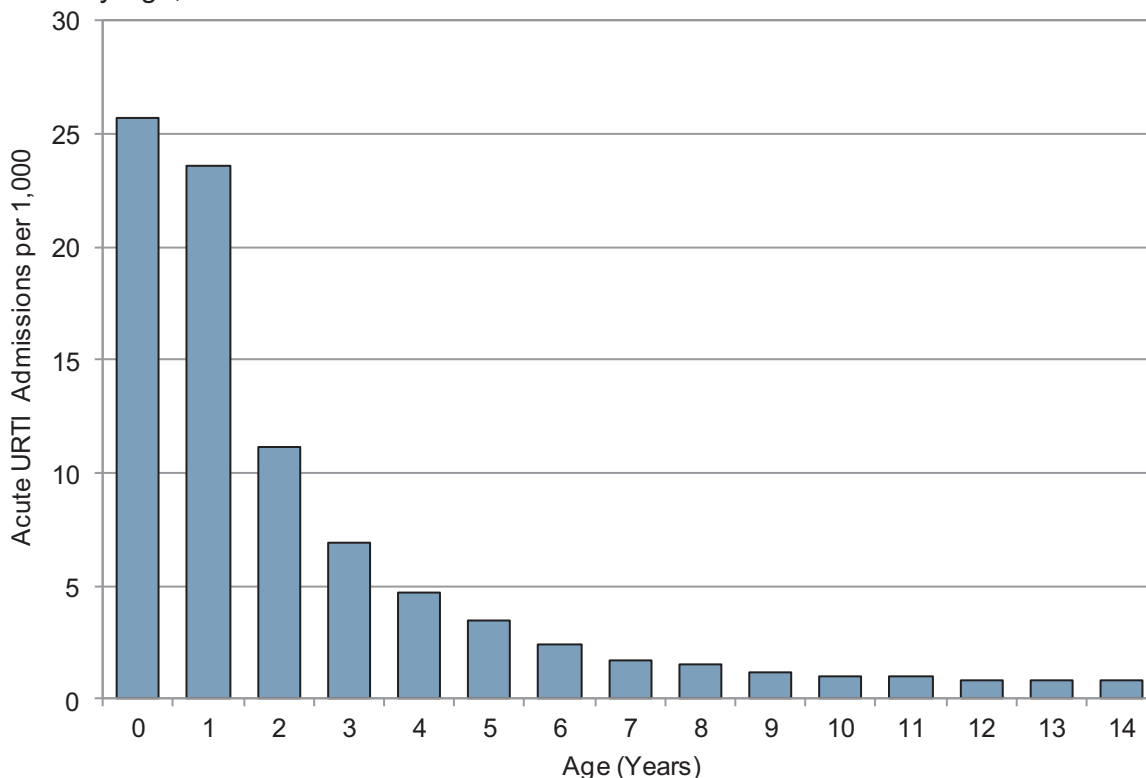


Table 49. Acute and Arranged Hospital Admissions for Acute URTIs in Children Aged 0–14 Years by Primary Diagnosis, New Zealand 2006–2010

Primary Diagnosis	Number: Total 2006–2010	Number: Annual Average	Rate per 1,000	Percent (%)
Acute Upper Respiratory Tract Infections				
New Zealand 0–14 Years				
Acute URTI Multiple/Unspecified Sites	15,172	3,034.4	3.40	59.6
Croup / Acute Laryngitis / Tracheitis	5,735	1,147.0	1.28	22.5
Acute Tonsillitis	2,907	581.4	0.65	11.4
Acute Pharyngitis	1,332	266.4	0.30	5.2
Acute Nasopharyngitis (Common Cold)	156	31.2	0.03	0.6
Acute Sinusitis	127	25.4	0.03	0.5
Epiglottitis	17	3.4	<0.01	0.1
Total	25,446	5,089.2	5.70	100.0

Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population

Figure 30. Acute and Arranged Hospital Admissions for Acute URTIs in Children 0–14 Years by Age, New Zealand 2006–2010



Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population

New Zealand Distribution by Ethnicity, NZDep Index Decile and Gender

In New Zealand during 2006–2010, hospital admissions for acute URTIs were *significantly* higher for males, Pacific > Māori > European > Asian/Indian children and those living in average-to-more deprived (NZDep decile 4–10) areas (**Table 50**). Similar ethnic differences were seen during 2000–2010 (**Figure 31**).

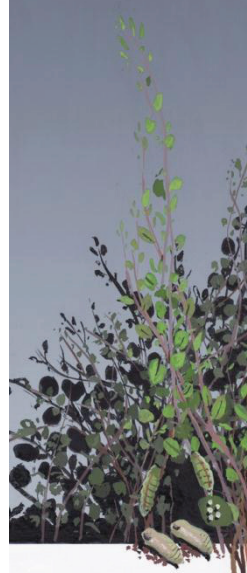
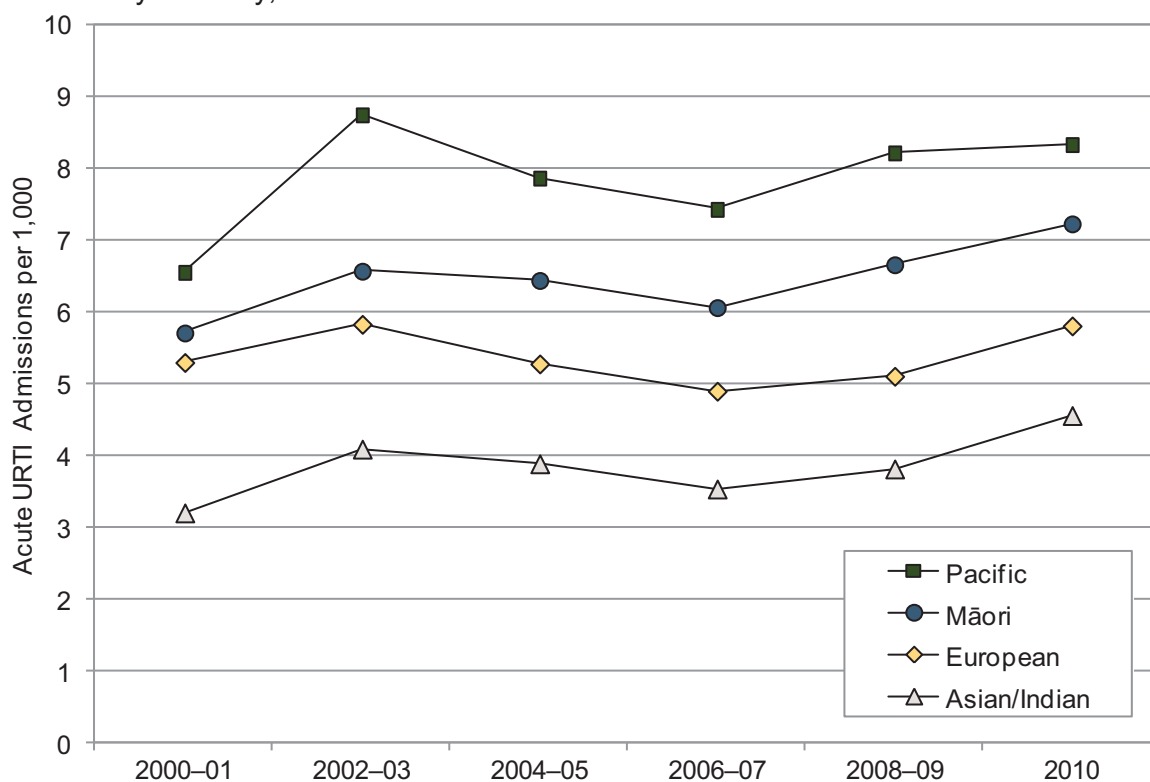


Table 50. Acute and Arranged Hospital Admissions for Acute URTIs in Children Aged 0–14 Years by Ethnicity, NZ Deprivation Index Decile and Gender, New Zealand 2006–2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
Acute Upper Respiratory Tract Infections 0–14 Years							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	3.65	1.00		Decile 1–2	3.50	1.00	
Decile 2	3.35	0.92	0.85–0.99	Decile 3–4	4.23	1.21	1.15–1.27
Decile 3	3.92	1.07	1.00–1.15	Decile 5–6	5.51	1.57	1.50–1.65
Decile 4	4.52	1.24	1.16–1.32	Decile 7–8	6.54	1.87	1.79–1.95
Decile 5	5.20	1.42	1.33–1.52	Decile 9–10	8.03	2.29	2.20–2.39
Decile 6	5.77	1.58	1.49–1.68	Prioritised Ethnicity			
Decile 7	6.07	1.66	1.56–1.77	European	5.15	1.00	
Decile 8	6.93	1.90	1.79–2.02	Māori	6.53	1.27	1.23–1.30
Decile 9	8.12	2.22	2.10–2.36	Pacific	7.92	1.54	1.48–1.60
Decile 10	7.96	2.18	2.06–2.31	Asian/Indian	3.87	0.75	0.71–0.79
Gender							
Female	4.93	1.00					
Male	6.44	1.31	1.27–1.34				

Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: Rate is per 1,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

Figure 31. Acute and Arranged Hospital Admissions for Acute URTIs in Children Aged 0–14 Years by Ethnicity, New Zealand 2000–2010



Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: Ethnicity is Level 1 Prioritised.

South Island Distribution and Trends

South Island Distribution by Primary Diagnosis

During 2006–2010, acute upper respiratory tract infections of multiple/unspecified sites were the most frequent reasons for an URTI admission in each of the South Island DHBs, followed by croup/acute laryngitis/tracheitis (**Table 51** and **Table 52**).

Table 51. Acute and Arranged Hospital Admissions for Acute URTI in Children Aged 0–14 Years by Primary Diagnosis, Nelson Marlborough, South Canterbury, Canterbury and the West Coast 2006–2010

Primary Diagnosis	Number: Total 2006– 2010	Number: Annual Average	Rate per 1,000	Percent (%)
Acute Upper Respiratory Tract Infections				
Nelson Marlborough 0–14 Years				
Acute URTI Multiple/Unspecified Sites	391	78.2	3.03	56.1
Croup / Acute Laryngitis / Tracheitis	207	41.4	1.60	29.7
Acute Tonsillitis	64	12.8	0.50	9.2
Acute Pharyngitis	27	5.4	0.21	3.9
Acute Nasopharyngitis (Common Cold)	6	1.2	0.05	0.9
Acute Sinusitis	<3	s	s	s
Total Nelson Marlborough	697	139.4	5.40	100.0
South Canterbury 0–14 Years				
Acute URTI Multiple/Unspecified Sites	90	18.0	1.74	45.7
Croup / Acute Laryngitis / Tracheitis	71	14.2	1.37	36.0
Acute Tonsillitis	17	3.4	0.33	8.6
Acute Pharyngitis	14	2.8	0.27	7.1
Acute Nasopharyngitis (Common Cold)	4	0.8	0.08	2.0
Acute Sinusitis	<3	s	s	s
Total South Canterbury	197	39.4	3.81	100.0
Canterbury 0–14 Years				
Acute URTI Multiple/Unspecified Sites	2,394	478.8	4.99	68.9
Croup / Acute Laryngitis / Tracheitis	658	131.6	1.37	18.9
Acute Tonsillitis	244	48.8	0.51	7.0
Acute Pharyngitis	144	28.8	0.30	4.1
Acute Nasopharyngitis (Common Cold)	28	5.6	0.06	0.8
Acute Sinusitis	5	1.0	0.01	0.1
Total Canterbury	3,473	694.6	7.24	100.0
West Coast 0–14 Years				
Acute URTI Multiple/Unspecified Sites	88	17.6	2.79	58.7
Croup / Acute Laryngitis / Tracheitis	39	7.8	1.24	26.0
Acute Tonsillitis	19	3.8	0.60	12.7
Acute Pharyngitis	<3	s	s	s
Acute Nasopharyngitis (Common Cold)	<3	s	s	s
Acute Sinusitis	<3	s	s	s
Total West Coast	150	30.0	4.76	100.0

Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.



Table 52. Acute and Arranged Hospital Admissions for Acute URTI in Children Aged 0–14 Years by Primary Diagnosis, Otago and Southland 2006–2010

Primary Diagnosis	Number: Total 2006– 2010	Number: Annual Average	Rate per 1,000	Percent (%)
Acute Upper Respiratory Tract Infections				
Otago 0–14 Years				
Acute URTI Multiple/Unspecified Sites	528	105.6	3.29	59.4
Croup / Acute Laryngitis / Tracheitis	187	37.4	1.17	21.0
Acute Tonsillitis	118	23.6	0.74	13.3
Acute Pharyngitis	38	7.6	0.24	4.27
Acute Sinusitis	15	3.0	0.09	1.69
Acute Nasopharyngitis (Common Cold)	3	0.6	0.02	0.34
Total Otago	889	177.8	5.54	100.0
Southland 0–14 Years				
Acute URTI Multiple/Unspecified Sites	406	81.2	3.73	56.9
Croup / Acute Laryngitis / Tracheitis	167	33.4	1.54	23.4
Acute Tonsillitis	114	22.8	1.05	16.0
Acute Pharyngitis	20	4.0	0.18	2.80
Acute Sinusitis	5	1.0	0.05	0.70
Acute Nasopharyngitis (Common Cold)	<3	s	s	s
Total Southland	714	142.8	6.56	100.0

Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: s: suppressed due to small numbers.

South Island DHBs vs. New Zealand

In the West Coast and South Canterbury during 2006–2010, hospital admissions for URTI in children were *significantly* lower than the New Zealand rate, while in Canterbury and Southland admissions were *significantly* higher. In Nelson Marlborough and Otago, rates were not *significantly* different from the New Zealand rate (**Table 53**).

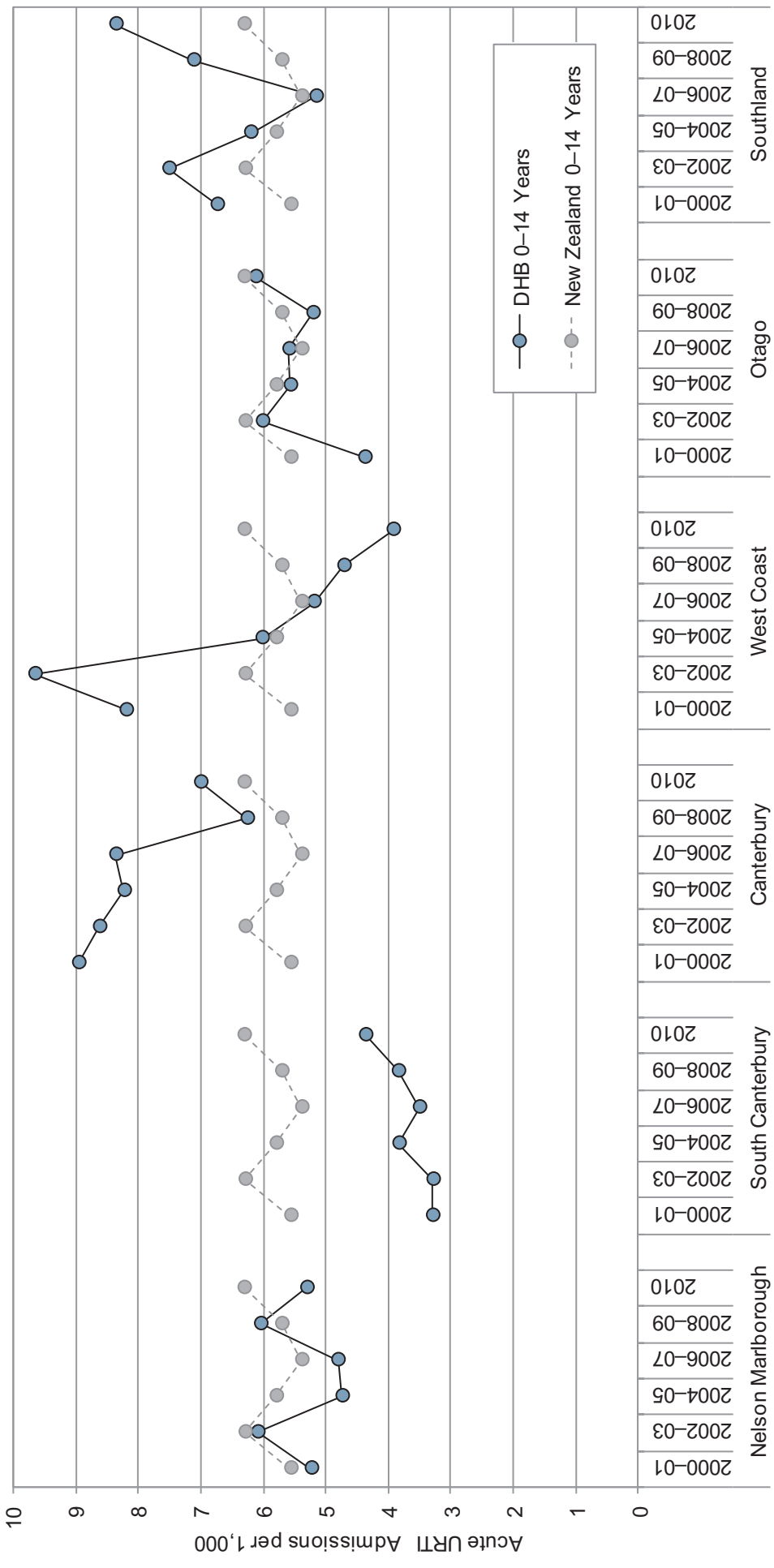
Table 53. Acute and Arranged Hospital Admissions for Acute URTI in Children Aged 0–14 Years, South Island DHBs vs. New Zealand 2006–2010

DHB	Number: Total 2006– 2010	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI
Acute Upper Respiratory Tract Infections 0–14 Years					
Nelson Marlborough	697	139.4	5.40	0.95	0.88–1.02
West Coast	150	30.0	4.76	0.83	0.71–0.98
Canterbury	3,473	694.6	7.24	1.27	1.23–1.32
South Canterbury	197	39.4	3.81	0.67	0.58–0.77
Otago	889	177.8	5.54	0.97	0.91–1.04
Southland	714	142.8	6.56	1.15	1.07–1.24
New Zealand	25,446	5,089.2	5.70	1.00	

Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population

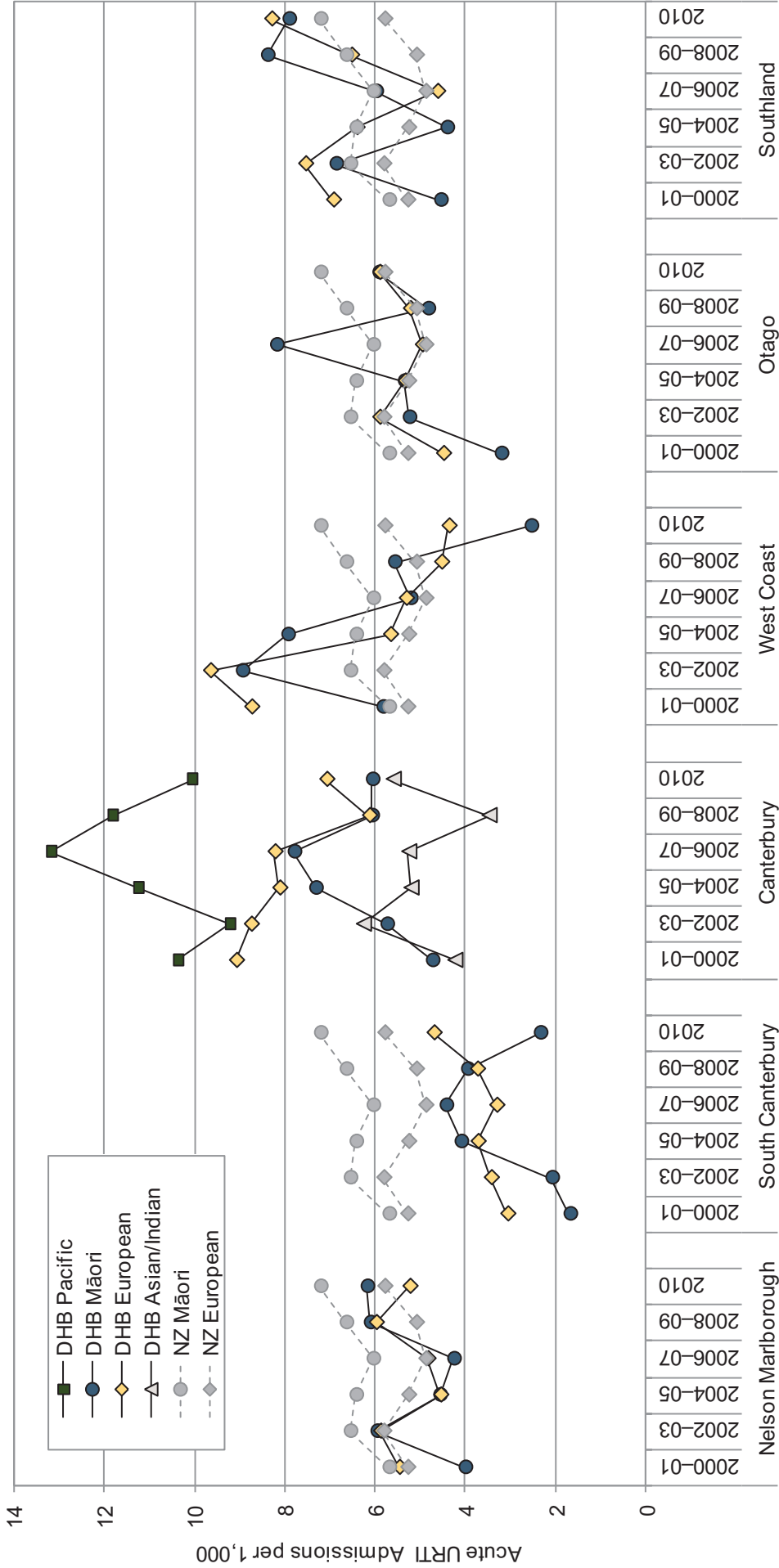


Figure 32. Acute and Arranged Hospital Admissions for Acute URTI in Children Aged 0–14 Years, South Island DHBs vs. New Zealand 2000–2010



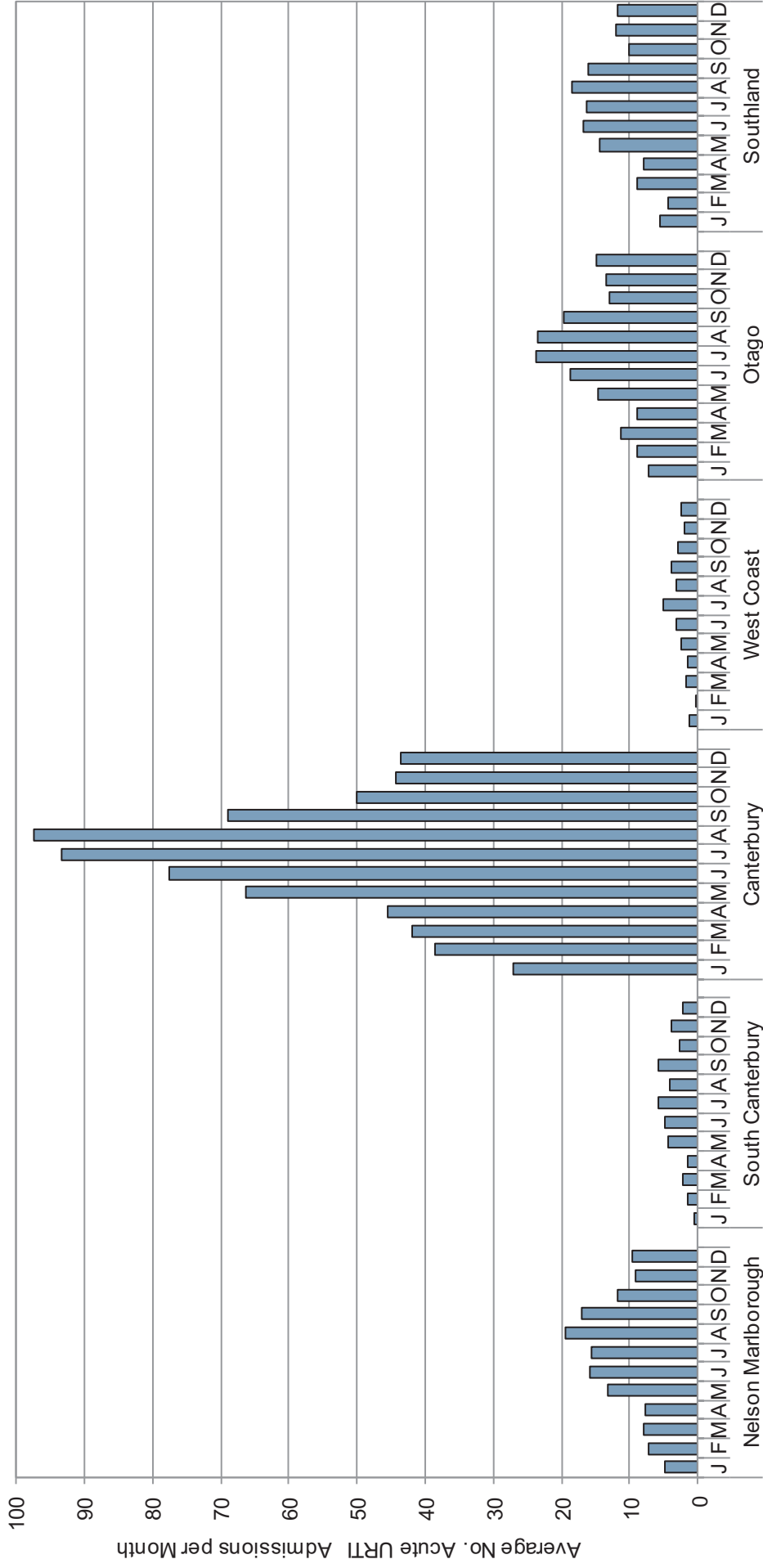
Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population

Figure 33. Acute and Arranged Hospital Admissions for Acute URTI in Children Aged 0–14 Years by Ethnicity, South Island DHBs vs. New Zealand 2000–2010



Source: Numerator: National Minimum Dataset (Acute and arranged admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: Ethnicity is Level 1 Prioritised.

Figure 34. Average Number of Acute and Arranged Hospital Admissions for Acute URTI in Children Aged 0–14 Years by Month, the South Island DHBs 2006–2010



Source: National Minimum Dataset (Acute and arranged admissions only)

South Island Trends

In Canterbury and the West Coast during 2000–2010, hospital admissions for URTI in children declined, while in South Canterbury admissions increased. In contrast, rates in Nelson Marlborough, Otago and Southland fluctuated from year to year (**Figure 32**).

South Island Distribution by Ethnicity

In Canterbury during 2000–2010, hospital admissions for URTI were higher for Pacific > European > Asian/Indian children, although differences for Māori children were more variable. In the other South Island DHBs, no consistent differences were seen between Māori and European children (**Figure 33**).

South Island Distribution by Season

In the South Island during 2006–2010, hospital admissions for URTI in children were highest during the cooler months (**Figure 34**).

Tonsillectomy

New Zealand Distribution and Trends

New Zealand Distribution by Primary Diagnosis

In New Zealand during 2006–2010, chronic tonsillitis was the most frequent primary diagnosis in children admitted to hospital for tonsillectomy +/- adenoidectomy, accounting for 60.1% of all admissions in this category. Hypertrophy of the tonsils/adenoids was the second leading diagnosis, followed by sleep apnoea (**Table 54**).

New Zealand Trends

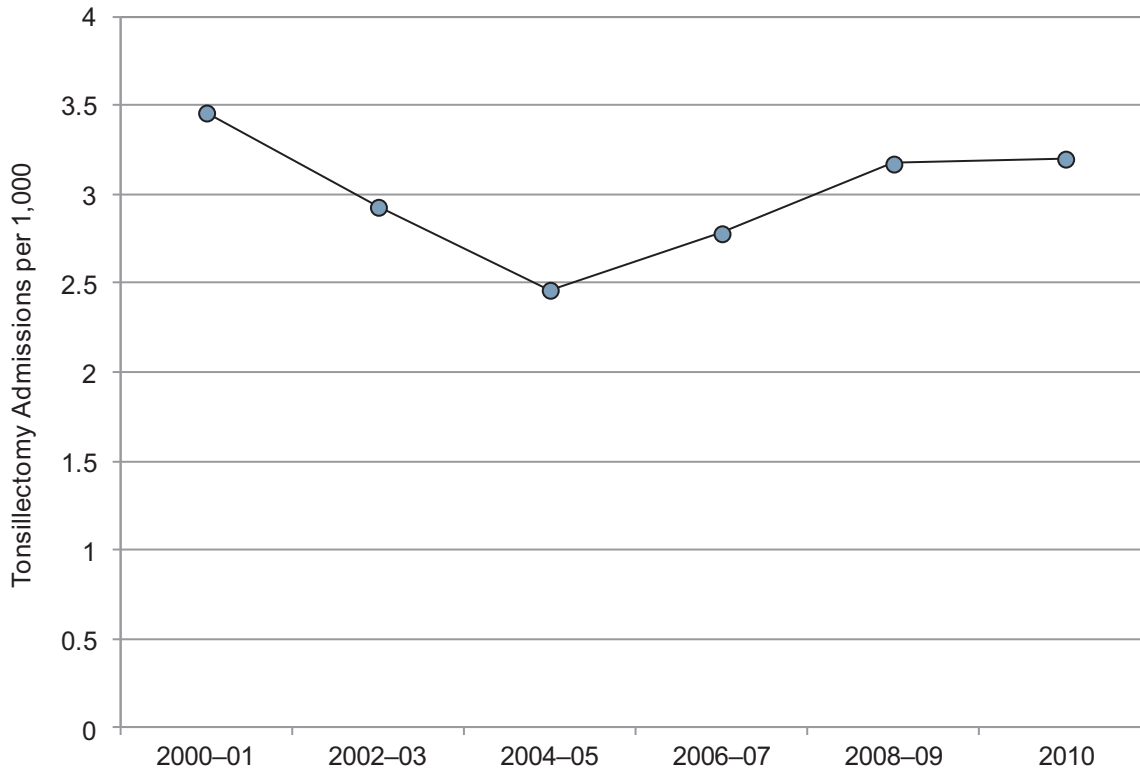
In New Zealand, arranged/waiting list admissions for tonsillectomy +/- adenoidectomy in children decreased during the early 2000s. Admission rates reached their lowest point in 2004–05, before increasing again (**Figure 35**).

Table 54. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children Aged 0–14 Years by Primary Diagnosis, New Zealand 2006–2010

Primary Diagnosis	Number: Total 2006–2010	Number: Annual Average	Rate per 1,000	Percent (%)
New Zealand				
Tonsillectomy +/- Adenoidectomy 0–14 Years				
Chronic Tonsillitis	8,102	1,620.4	1.82	60.1
Hypertrophy Tonsils/Adenoids	3,276	655.2	0.73	24.3
Sleep Apnoea	1,517	303.4	0.34	11.2
Acute Tonsillitis	128	25.6	0.03	0.9
Otitis Media	97	19.4	0.02	0.7
Other / Unspecified Chronic Diseases Tonsils/Adenoids	58	11.6	0.01	0.4
Peritonsillar Abscess	5	1.0	<0.01	<0.1
Perforation/Other Disorders Tympanic Membrane	4	0.8	<0.01	<0.1
Other Diagnoses	301	60.2	0.07	2.2
New Zealand Total	13,488	2,697.6	3.02	100.0

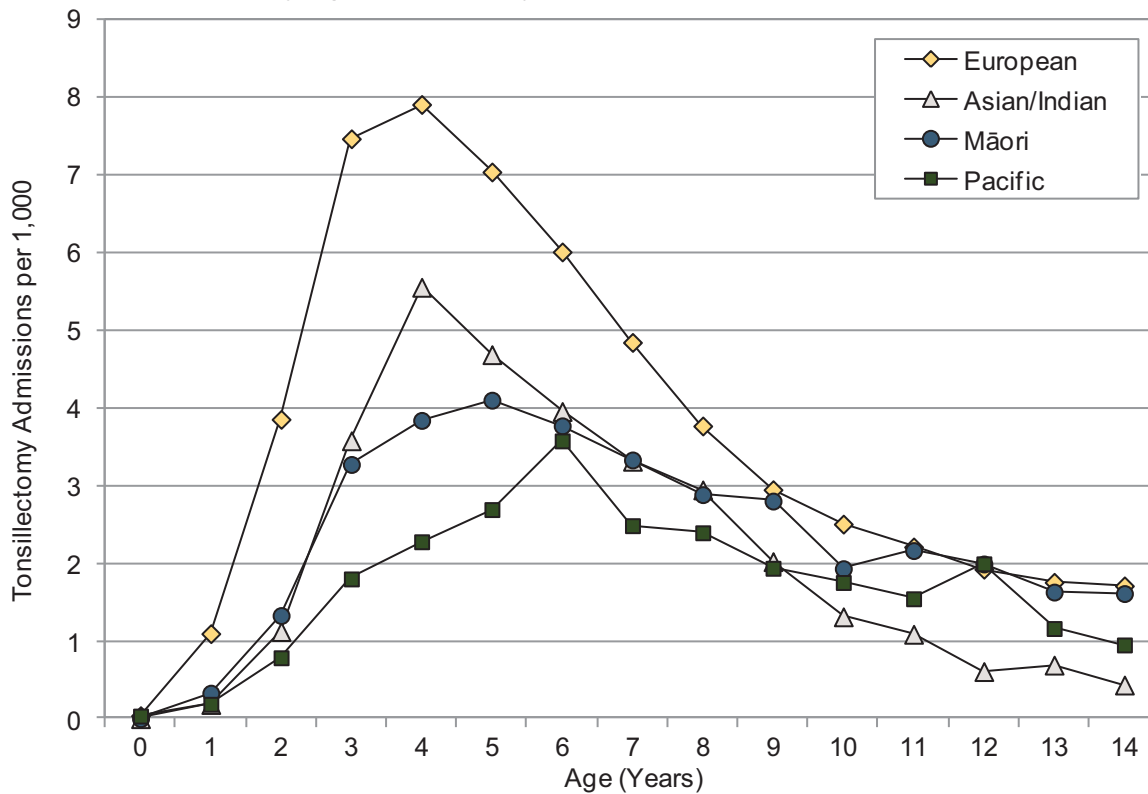
Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population

Figure 35. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children Aged 0-14 Years, New Zealand 2000-2010



Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population

Figure 36. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children 0-14 Years by Age and Ethnicity, New Zealand 2006-2010



Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: Ethnicity is Level 1 Prioritised

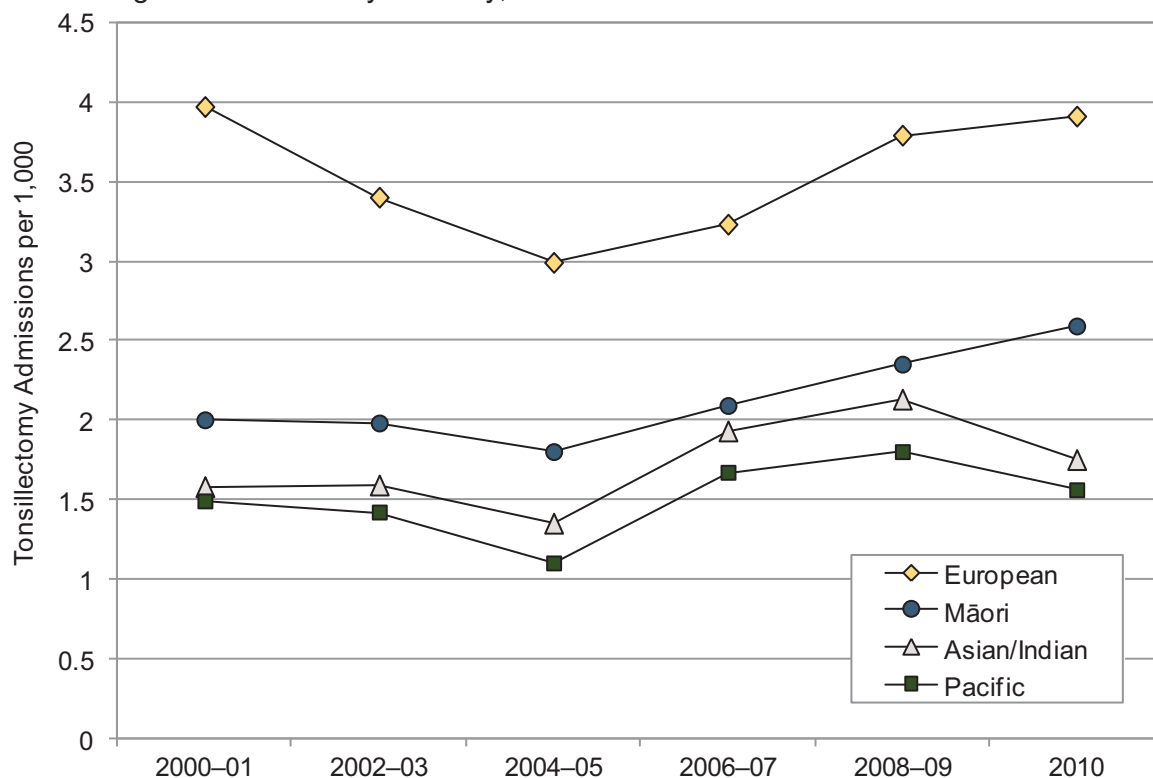


Table 55. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children Aged 0–14 Years by Ethnicity, NZ Deprivation Index Decile and Gender, New Zealand 2006–2010

Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
New Zealand							
Tonsillectomy +/- Adenoidectomy							
NZ Deprivation Index Decile				NZ Deprivation Index Quintile			
Decile 1	2.04	1.00		Decile 1–2	2.17	1.00	
Decile 2	2.30	1.13	1.03–1.23	Decile 3–4	2.61	1.21	1.13–1.28
Decile 3	2.47	1.21	1.11–1.33	Decile 5–6	3.59	1.65	1.56–1.75
Decile 4	2.74	1.34	1.23–1.46	Decile 7–8	3.56	1.64	1.55–1.74
Decile 5	3.56	1.74	1.60–1.89	Decile 9–10	3.12	1.44	1.36–1.52
Decile 6	3.61	1.77	1.63–1.92	Prioritised Ethnicity			
Decile 7	3.56	1.74	1.60–1.89	European	3.59	1.00	
Decile 8	3.57	1.75	1.61–1.89	Māori	2.30	0.64	0.61–0.67
Decile 9	3.78	1.85	1.71–2.01	Pacific	1.70	0.47	0.44–0.51
Decile 10	2.56	1.25	1.15–1.36	Asian/Indian	1.97	0.55	0.51–0.59
Gender							
Female	3.01	1.00					
Male	3.03	1.00	0.97–1.04				

Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: Rate is per 1,000; Ethnicity is Level 1 Prioritised; Decile is NZDep2001.

Figure 37. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children Aged 0–14 Years by Ethnicity, New Zealand 2000–2010



Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: Ethnicity is Level 1 Prioritised.

New Zealand Distribution by Age and Ethnicity

In New Zealand during 2006–2010, arranged/waiting list admissions for tonsillectomy +/- adenoidectomy increased during the pre-school years, to reach their highest point at four years of age in European and Asian/Indian children, at five years of age in Māori children, and at six years of age in Pacific children. During the preschool years, admission rates were generally higher for European > Asian/Indian and Māori > Pacific children, while after ten years of age, admissions were generally higher for European and Māori > Pacific > Asian/Indian children (**Figure 36**).

New Zealand Distribution by Ethnicity, NZDep Index Decile and Gender

In New Zealand during 2006–2010, arranged/waiting list admissions for tonsillectomy were *significantly* higher for European > Māori > Asian/Indian and Pacific children, and were *significantly* lower for those living in the least deprived (NZDep decile 1) areas (**Table 55**). Similar ethnic differences were seen during 2000–2010 (**Figure 37**).

South Island Distribution and Trends

South Island DHBs vs. New Zealand

In Nelson Marlborough and Canterbury during 2006–2010, arranged/waiting list admissions for tonsillectomy +/- adenoidectomy in children were *significantly* lower than the New Zealand rate, while in South Canterbury and Otago rates were *significantly* higher. Rates in the West Coast and Southland were similar to the New Zealand rate (**Table 56**).

Table 56. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children Aged 0–14 Years, South Island DHBs vs. New Zealand 2006–2010

DHB	Number: Total 2006– 2010	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI
Tonsillectomy +/- Adenoidectomy					
Nelson Marlborough	288	57.6	2.23	0.74	0.66–0.83
West Coast	99	19.8	3.14	1.04	0.85–1.27
Canterbury	1,342	268.4	2.80	0.93	0.88–0.98
South Canterbury	273	54.6	5.27	1.75	1.55–1.97
Otago	661	132.2	4.12	1.36	1.26–1.47
Southland	311	62.2	2.86	0.95	0.85–1.06
New Zealand	13,488	2,697.6	3.02	1.00	

Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population

South Island Distribution by Primary Diagnosis

In each of the South Island DHBs during 2006–2010, chronic tonsillitis was the most frequent primary diagnosis in children admitted to hospital for tonsillectomy +/- adenoidectomy, followed by hypertrophy of the tonsils/adenoids (**Table 57**).

South Island Trends

In Nelson Marlborough and South Canterbury, arranged/waiting list admissions for tonsillectomy +/- adenoidectomy in children fluctuated during the early-mid 2000s, but increased rapidly after 2006–07. In Canterbury admissions declined during the early-2000s, reached their lowest point in 2002–03 and then gradually increased again, while in the West Coast rates exhibited an overall downward trend. In Otago, admissions increased rapidly during the mid-late 2000s, while in Southland, admissions decreased during the early 2000s, but increased again after 2004–05 (**Figure 38**).

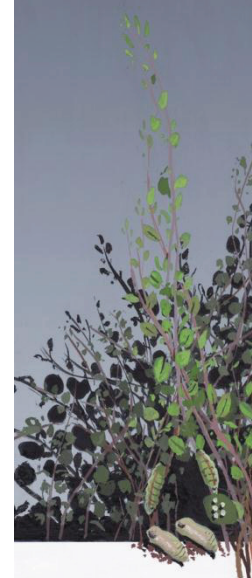
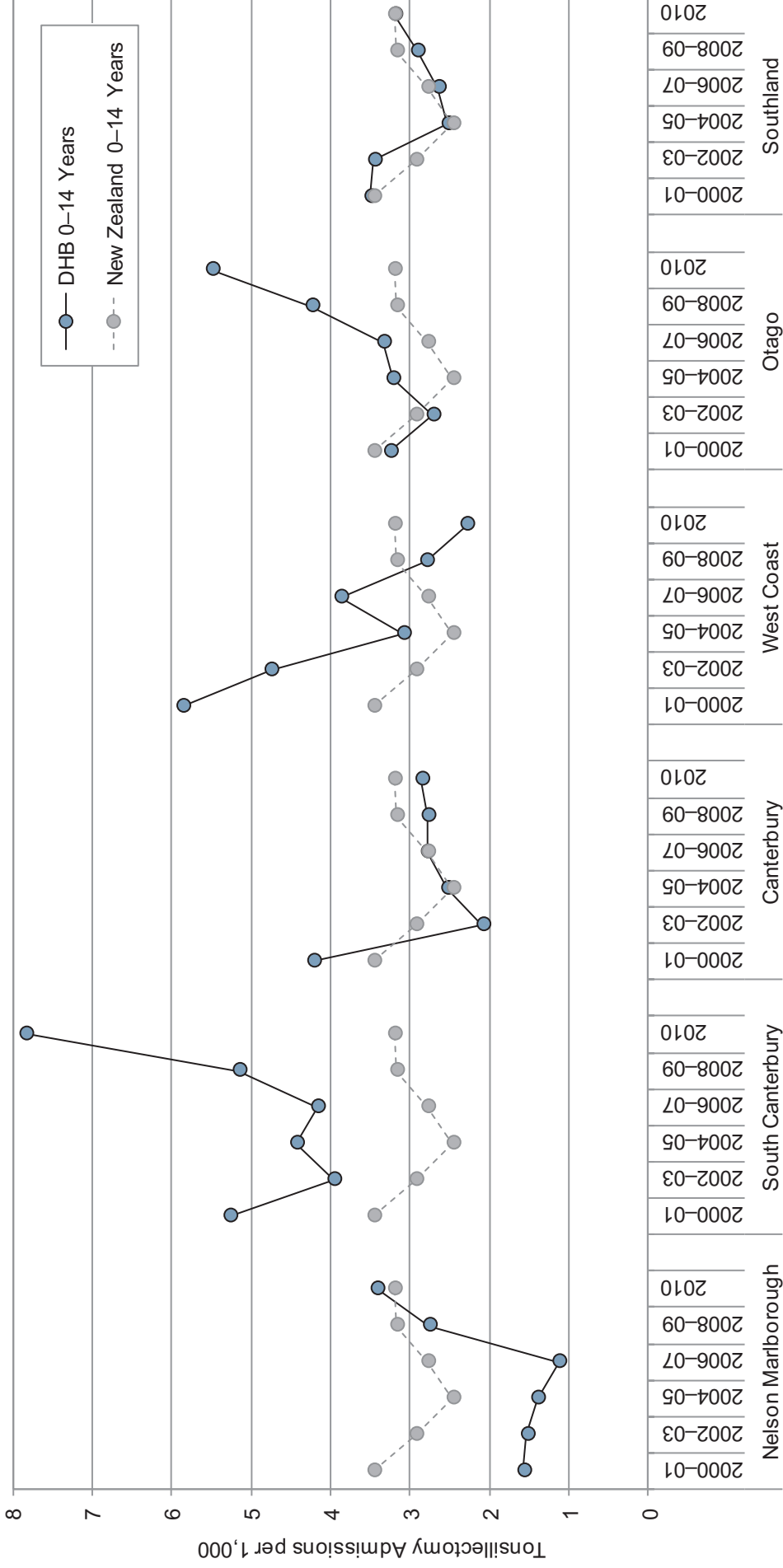


Table 57. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children Aged 0–14 Years by Primary Diagnosis, South Island DHBs 2006–2010

Primary Diagnosis	Number: Total 2006–2010	Number: Annual Average	Rate per 1,000	Percent (%)
Tonsillectomy +/- Adenoidectomy				
Nelson Marlborough				
Chronic Tonsillitis	161	32.2	1.25	55.9
Hypertrophy Tonsils/Adenoids	107	21.4	0.83	37.2
Sleep Apnoea	13	2.6	0.10	4.5
Other Diagnoses	7	1.4	0.05	2.4
Nelson Marlborough Total	288	57.6	2.23	100.0
South Canterbury				
Chronic Tonsillitis	253	50.6	4.89	92.7
Hypertrophy Tonsils/Adenoids	12	2.4	0.23	4.4
Other Diagnoses	8	1.6	0.15	2.9
South Canterbury Total	273	54.6	5.27	100.0
Canterbury				
Chronic Tonsillitis	698	139.6	1.45	52.0
Hypertrophy Tonsils/Adenoids	341	68.2	0.71	25.4
Sleep Apnoea	262	52.4	0.55	19.5
Otitis Media	21	4.2	0.04	1.6
Acute Tonsillitis	7	1.4	0.01	0.5
Other Diagnoses	13	2.6	0.03	1.0
Canterbury Total	1,342	268.4	2.80	100.0
West Coast				
Chronic Tonsillitis	65	13.0	2.06	65.7
Hypertrophy Tonsils/Adenoids	23	4.6	0.73	23.2
Sleep Apnoea	11	2.2	0.35	11.1
West Coast Total	99	19.8	3.14	100.0
Otago				
Chronic Tonsillitis	450	90.0	2.81	68.1
Hypertrophy Tonsils/Adenoids	101	20.2	0.63	15.3
Sleep Apnoea	62	12.4	0.39	9.4
Otitis Media	3	0.6	0.02	0.5
Other Diagnoses	45	9.0	0.28	6.8
Otago Total	661	132.2	4.12	100.0
Southland				
Chronic Tonsillitis	156	31.2	1.43	50.2
Hypertrophy Tonsils/Adenoids	101	20.2	0.93	32.5
Sleep Apnoea	36	7.2	0.33	11.6
Otitis Media	4	0.8	0.04	1.3
Other Diagnoses	14	2.8	0.13	4.5
Southland Total	311	62.2	2.86	100.0

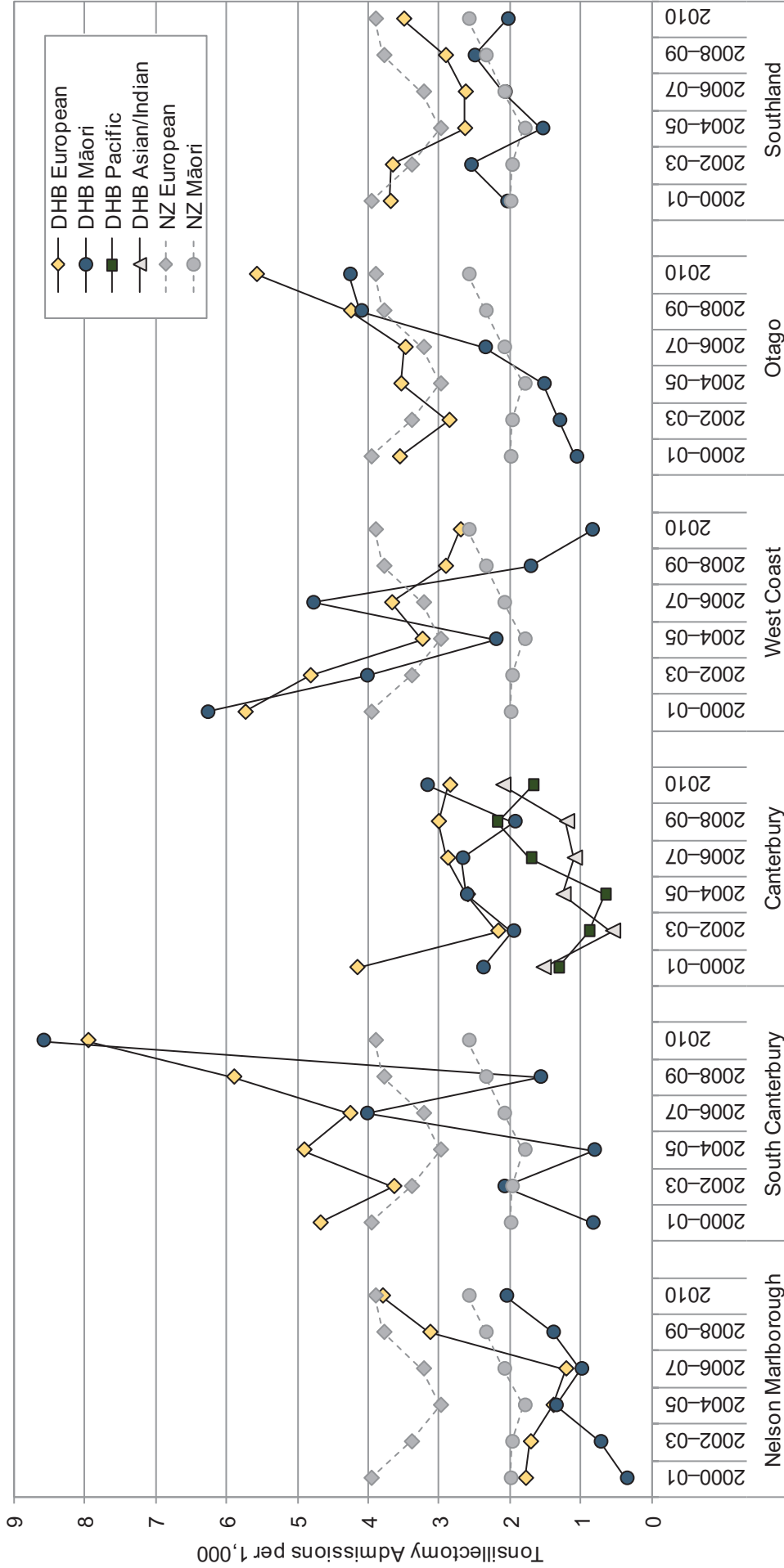
Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population

Figure 38. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoideotomy in Children Aged 0-14 Years, South Island DHBs vs. New Zealand 2000-2010



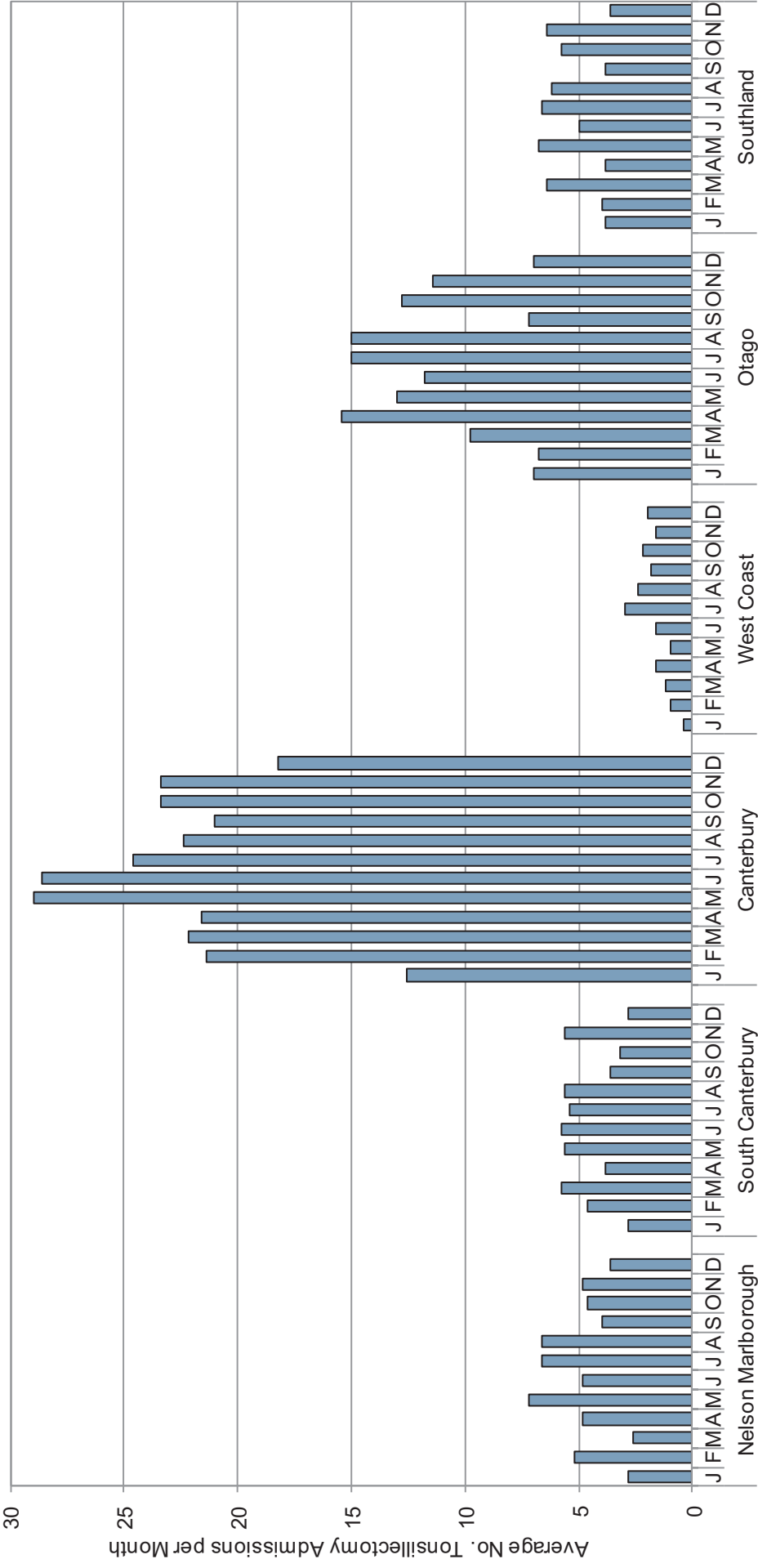
Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population

Figure 39. Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children Aged 0–14 Years by Ethnicity, South Island DHBs vs. New Zealand 2000–2010



Source: Numerator: National Minimum Dataset (Arranged and waiting list admissions only); Denominator: Statistics NZ Estimated Resident Population. Note: Ethnicity is Level 1 Prioritised.

Figure 40. Average Number of Arranged/Waiting List Admissions for Tonsillectomy +/- Adenoidectomy in Children 0-14 Years by Month, South Island DHBs 2006-2010



Source: National Minimum Dataset (Arranged and waiting list admissions only)

South Island Distribution by Ethnicity

In Canterbury during 2000–2010, arranged/waiting list admissions for tonsillectomy +/- adenoidectomy were generally higher for European and Māori children than for Pacific and Asian/Indian children, while in Nelson Marlborough, South Canterbury, Otago and Southland, rates were generally higher for European than for Māori children. In the West Coast however, ethnic differences were less consistent (**Figure 39**).

South Island Distribution by Season

In the South Island during 2006–2010, no consistent seasonal patterns were evident in arranged/waiting list admissions for tonsillectomy +/- adenoidectomy in children, although admissions were lower in December and January in most DHBs (**Figure 40**).

Summary

Acute Upper Respiratory Infections

In New Zealand during 2006–2010, acute upper respiratory tract infections (URTI) of multiple/unspecified sites were the most frequent reason for an URTI admission in children, followed by croup/acute laryngitis/tracheitis. When broken down by age, URTI admissions were most common in infants and one year olds, with rates tapering off rapidly thereafter. Rates were also *significantly* higher for males, for Pacific > Māori > European > Asian/Indian children and those in average-to-more deprived (NZDep decile 4–10) areas.

In Canterbury and the West Coast during 2000–2010, hospital admissions for URTI in children declined, while in South Canterbury admissions increased. In contrast, rates in Nelson Marlborough, Otago and Southland fluctuated from year to year. In Canterbury admissions were higher for Pacific > European > Asian/Indian children, although differences for Māori children were more variable. In the other South Island DHBs, no consistent differences were seen between Māori and European children. Admissions in all DHBs were highest during the cooler months.

Tonsillectomy

In New Zealand during 2006–2010, chronic tonsillitis was the most frequent primary diagnosis in children admitted to hospital for tonsillectomy +/- adenoidectomy, accounting for 60.1% of all admissions in this category. Hypertrophy of the tonsils/adenoids was the second leading diagnosis, followed by sleep apnoea. When broken down by age, admissions increased during the pre-school years, to reach their highest point at four years of age in European and Asian/Indian children, at five years of age in Māori children, and at six years of age in Pacific children. Admissions were *significantly* higher for European > Māori > Asian/Indian and Pacific children, and *significantly* lower for those living in the least deprived (NZDep decile 1) areas.

In Nelson Marlborough and South Canterbury, arranged/waiting list admissions for tonsillectomy +/- adenoidectomy in children fluctuated during the early-mid 2000s, but increased rapidly after 2006–07. In Canterbury admissions declined during the early-2000s, reached their lowest point in 2002–03 and then gradually increased again, while in the West Coast rates exhibited an overall downward trend. In Otago, admissions increased rapidly during the mid-late 2000s, while in Southland, admissions decreased during the early 2000s, but increased again after 2004–05. In Canterbury admissions were generally higher for European and Māori children than for Pacific and Asian/Indian children, while in Nelson Marlborough, South Canterbury, Otago and Southland, rates were generally higher for European than for Māori children. In the West Coast however, ethnic differences were less consistent.



Local Policy Documents and Evidence-Based Reviews Relevant to Upper Respiratory Infections and Tonsillectomy

In New Zealand there are no policy documents which focus solely on the prevention of upper respiratory tract infections. A range of documents however consider approaches to respiratory/infectious diseases more generally, and these are reviewed in other sections of this report:

1. **Generic Approaches to Infectious and Respiratory Disease:** Table 46 on Page 166
2. **The Prevention of Second Hand Cigarette Smoke Exposure:** Table 47 on Page 168
3. **Interventions Aimed at Housing and Household Crowding:** Table 48 on Page 170
4. **Interventions to Improve Breastfeeding Rates:** Table 27 on Page 107
5. **Guidelines for the Management of Sore Throats:** Table 91 on Page 299

A number of international evidence-based reviews however consider the most appropriate management of upper respiratory tract infections, and these are considered in **Table 58**, along with those reviews which consider the indications for tonsillectomy in children.

Table 58. Local Policy Documents and Evidence-Based Reviews Relevant to the Prevention and Management of Upper Respiratory Tract Infections and Tonsillectomy

Government Policy Documents
<p>Mesdsafe. 2010 June 8. Sale restrictions on some cough and cold medicines for children under 12. http://www.medsafe.govt.nz/hot/media/2010/CoughandColdJune2011.asp accessed 25/8/11.</p> <p>This media release announces that cough and cold medications for children can only be sold in pharmacies except for those containing ingredients such as lemon, honey and other natural products which can be sold in supermarkets for use in children over six years of age. Products containing dextromethorphan, phenylephrine and ipecacuanha can only be sold by pharmacies for use in children less than 12 years of age. Supermarkets can sell these products provided they are labelled as being for use only in adults and children over 12 years of age. These restrictions follow concern about the safety and efficacy of cough and cold medicines in children. Details about these medicine can be found in the minutes of the Medicines Classification Committee's 13 April 2010 meeting at: http://www.medsafe.govt.nz/profs/class/mccMin13April2010.htm</p>
International Guidelines on the Management of Upper Respiratory Infections and Cough
<p>National Guideline Clearinghouse (NGC). 1999 Oct 6 (revised 2011 Mar). Guideline synthesis: Diagnosis and management of pharyngitis. http://www.guideline.gov</p> <p>This web page provides a comparison of three published guidelines:</p> <ol style="list-style-type: none"> 1). Institute for Clinical Systems Improvement (ICSI). Respiratory Illness in Children and Adults, Diagnosis and Treatment of (Guideline) Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2008 http://www.icsi.org/respiratory_illness_in_children_and_adults_guideline_/respiratory_illness_in_children_and_adults_guideline_13116.html 2). Scottish Intercollegiate Guidelines Network (SIGN). Management of sore throat and indications for tonsillectomy. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2010 3). University of Michigan Health System (UMHS). Pharyngitis. Ann Arbor (MI): University of Michigan Health System; 2006 <p>Areas of agreement and disagreement are outlined, along with the methodologies and grading schemes used for the evidence. Tables provide direct comparisons of the recommendations in all three guidelines.</p>
<p>National Institute for Health and Clinical Excellence. 2008. Prescribing of Antibiotics for Self-limiting Respiratory Tract Infections in Adults and Children in Primary Care. London: National Institute for Health and Clinical Excellence. http://www.nice.org.uk/nicemedia/live/12015/41323/41323.pdf</p> <p>Acute respiratory infections are common and usually self-limiting. Overuse of antibiotics in primary care increases rates of antibiotic resistance which could become a major public health problem. This guideline is intended to provide evidence-based best practice advice on the care of adults and children over three months of age for whom immediate prescribing of antibiotics is not warranted. The guidelines state that a no antibiotic or delayed antibiotic prescribing strategy is appropriate for patients with the following conditions: acute otitis media, acute sore throat/acute pharyngitis/acute tonsillitis, common cold, acute rhinosinusitis, acute cough/acute bronchitis but that an immediate antibiotic prescribing strategy can be considered for bilateral acute otitis media in children younger than two years, acute otitis media in children with otorrhoea and acute sore throat/acute pharyngitis/acute tonsillitis when three or more Centor criteria are present. The guidelines also cover advice to patients and identifying patients at risk of developing complications who require immediate antibiotics and/or further investigations.</p>

Shields MD, Bush A, Everard ML, et al. 2008. **BTS guidelines: Recommendations for the assessment and management of cough in children.** Thorax, 63 Suppl 3, iii1-iii15.

These British Guidelines cover the management, in both primary and secondary care, of acute, chronic and recurrent coughing in children up to 12 years of age without known lung disease. They state that "There is currently a lack of evidence on which to make evidence-based statements for the diagnosis, investigation and treatments included in this guideline" however the recommendations in the guidelines are accompanied by references to the available literature.

Chang AB, Landau LI, Van Asperen P, et al. 2006. **Cough in children: definitions and clinical evaluation. Position statement of the Thoracic Society of Australia and New Zealand.** Medical Journal of Australia, 184(8), 394-403.

This position statement provides a concise guide to the management of cough in children in the Australasian context and is aimed at physicians who treat children. The management statements are accompanied by a grade indicating the quality of the published evidence on which they are based.

Chang AB, WB G. 2006. **Guidelines for evaluating chronic cough in pediatrics: ACCP evidence-based clinical practice guidelines.** Chest, 129(1), 260S-83S.

Paediatric chronic cough is defined as a daily cough lasting for four or more weeks. These guidelines mostly deal with non-specific cough i.e. dry cough in the absence of known respiratory disease and they state there have been few RCTs in this area. Table 2 summarises studies describing the yield of specific investigations for cough in children. The recommendations are accompanied by grades indicating the level of evidence and the degree of benefit.

International Guidelines on the Indications for Tonsillectomy

Baugh R, Archer S, Mitchell R, et al. 2011. **Clinical Practice Guideline: Tonsillectomy in Children.** American Academy of Otolaryngology–Head and Neck Surgery. <http://www.entnet.org/HealthInformation/upload/CPG-TonsillectomyInChildren.pdf>

This guideline provides evidence-based guidance for identifying the children (1–18 years) who are the best candidates for tonsillectomy, optimising perioperative management, and improving communication with parents about management options. Each evidence-based statement is followed by an indication of the strength of the recommendation based on the quality of the evidence. It recommends watchful waiting for recurrent throat infections if there have been <7 episodes in the past year, <5 episodes in the past 2 years, or <3 episodes in the past 3 years. These criteria form part of the "Paradise Criteria", which are used in what the guidelines call *the most frequently cited and meticulous* RCTs investigating the efficacy of tonsillectomy. Table 9 compares three major guidelines: those of the U.S., Scotland and Italy. The Scottish and US guidelines recommend the Paradise criteria for assessing the need for tonsillectomy. The Italian guidelines state that tonsillectomy is indicated in patients with at least one year of recurrent tonsillitis (5+ episodes per year) that is disabling and interferes with normal activities, but only after an additional six months of watchful waiting during which a diary documenting clinical symptoms is kept. The guidelines also cover indications for tonsillectomy in children with sleep disordered breathing (the common indication for tonsillectomy other than recurrent sore throat).

Scottish Intercollegiate Guidelines Network. 2010. **Management of sore throat and indications for tonsillectomy: A national clinical guideline.** Edinburgh: Scottish Intercollegiate Guidelines Network. <http://www.sign.ac.uk/pdf/sign117.pdf>

This Scottish Guidelines covers diagnosis, pain management, antibiotic use, indications tonsillectomy and postoperative care for acute and recurrent sore throat in children and adults. Recommendations are accompanied by a grade indication of the strength of the evidence on which they are based. Key recommendations include: Using the Centor clinical prediction score to help decide whether to prescribe an antibiotic (grade C), watchful waiting is more appropriate than tonsillectomy for children with mild sore throats (Grade A) and that the indications for considering tonsillectomy are 7+ well-documented, adequately treated disabling sore throats due to tonsillitis in the preceding year or, 5+ such episodes in each of the previous two years or, 3+ such episodes in the previous three years. (Grade D)

Bellussi L, Busoni Paolo, Camaioni A, et al. 2008. **SNLG15 Appropriateness and Safety of Tonsillectomy and/or Adenoidectomy.** Rome: Sistema Nazionale Linee Guida (SNLG). http://www.snlg-iss.it/cms/files/LG_en_tonsillectomy_2008.pdf

These Italian evidence-based guidelines cover indications for tonsillectomy and/or adenoidectomy, surgical techniques, perioperative management and clinical and organisational aspects of adenotonsillectomy. They state that the main indications for tonsillectomy and/or adenoidectomy are obstructive sleep apnoea syndrome in children with adenotonsillar hypertrophy and severe recurrent tonsillitis. They state that tonsillectomy for severe recurrent sore throat is only indicated if there have been at least five incapacitating episodes during at least one year. Recommendations in the guidelines are accompanied by a grade indicating the strength of the evidence on which they are based.

Indications for Tonsillectomy and Adenotonsillectomy in Children A joint Position paper of the Paediatrics & Child Health Division of The Royal Australasian College of Physicians and The Australian Society of Otolaryngology Head and Neck Surgery. 2008 Sydney. <http://www.racp.edu.au/index.cfm?objectid=B5637C7B-E823-E407-E65AB8D6F27A07BD>

These guidelines support the use of the Paradise criteria for tonsillectomy for frequent recurrent acute tonsillitis. The following conditions are also listed as indications for tonsillectomy: upper airway obstruction in children with obstructive sleep apnoea, peritonsillar abscess and suspected neoplasm.

Systematic and Other Reviews from the International Literature

Burton MJ, Glasziou PP. 2009. **Tonsillectomy or adeno-tonsillectomy versus non-surgical treatment for chronic/recurrent acute tonsillitis**. Cochrane Database of Systematic Reviews, 2009(1), Art. No.: CD001802. DOI: 10.1002/14651858.CD001802.pub2.

This review included five RCTs, four of which involved children (719 in total) and one of which involved adults (70 in total, followed for 90 days after surgery). The reviewers considered two groups of children: those "severely affected" who met the "Paradise criteria" (see below for the original paper) and those less severely affected. The reviewers concluded that for severely affected children having adenotonsillectomy would result in avoiding, on average, three unpredictable episodes of any type of sore throat over the next year at a cost of one predictable episode of significant pain, lasting on average five to seven days, in the immediate post-operative period. Less severely affected children would have only one less sore throat of any type in the next year (on average two rather than three).

Bailey EJ, Morris PS, Kruske SG, et al. 2008. **Clinical pathways for chronic cough in children**. Cochrane Database of Systematic Reviews, 2008(2), Art. No.: CD006595. DOI: 10.1002/14651858.CD006595.pub2.

Chronic cough (cough lasting 4+ weeks) is common in children. There are clinical guidelines (pathways) for this condition however there have been no RCTs comparing outcomes between children treated according to a clinical pathway and those who were not. In the absence of such trials the authors recommend that decisions on further investigations and treatment in a child with chronic cough be made on an individual basis according to the clinical symptoms and signs.

Spurling GKP, Del Mar CB, Dooley L, et al. 2007. **Delayed antibiotics for respiratory infections**. Cochrane Database of Systematic Reviews, 2007(3), Art. No.: CD004417. DOI: 10.1002/14651858.CD004417.pub3.

Antibiotics provide only modest benefits in acute otitis media, pharyngitis and acute bronchitis and have no effect on the common cold. There is interest in limiting unnecessary antibiotic prescribing, with a possible strategy being to provide a prescription but advise waiting 48 hours to see if the symptoms resolve untreated. This review considered ten RCTs which compared delayed antibiotics with either immediate antibiotics (9 trials) or no antibiotics (3 trials) for patients with acute upper respiratory tract infections. There was no difference in clinical outcomes between immediate, delayed and no antibiotics for cough and the common cold. Some studies reported that immediate antibiotics were more effective than delayed antibiotics for fever, pain and malaise in acute otitis media and in sore throat. There were no significant differences in complication rates and only slight differences in adverse effects. Patients were more satisfied with immediate rather than delayed antibiotics (92% vs.87%) and more satisfied with delayed than no antibiotics (87% vs. 83%). Re-consultation rates were the same in both the immediate and delayed antibiotic groups. The authors concluded that although delayed antibiotics reduced antibiotic use compared to immediate antibiotics, it has not been shown that delayed antibiotics are different from no antibiotics in terms of symptom control and complication rates. They suggest that where a clinician considers immediate antibiotics are not indicated, offering no antibiotics with advice to return if symptoms do not resolve is likely to result in the least antibiotic use and provide similar patient satisfaction and clinical outcomes to delayed antibiotics.

In addition to the reviews above, the **Cochrane Collection**: <http://www.thecochranelibrary.com/view/0/index.html> contains a large number of other reviews relevant to upper respiratory conditions. These include:

- *Croup*: Glucocorticoids, Heliox and Nebulised Epinephrine
- *Common Cold*: Acetylcysteine and carbocysteine, antibiotics, antihistamines, Chinese herbs, echinacea, garlic, heated humidified air, intranasal ipratropium bromide, nasal decongestants, non-steroidal anti-inflammatory drugs, vitamin C and zinc.
- *Cough*: Honey, over-the-counter medications.
- *Non-specific cough* (non-productive cough in the absence of identifiable respiratory disease or known aetiology): anticholinergics, antihistamines, gastro-oesophageal reflux treatment, honey and lozenges, indoor air modification, inhaled beta-2 agonists, inhaled corticosteroids, inhaled cromones, Leukotriene receptor antagonist, methylxanthines, treatment of obstructive sleep apnoea.
- *Tonsillectomy*: Antibiotics, coblation vs. other techniques, dissection vs. diathermy, oral rinses, mouthwashes and sprays post tonsillectomy, perioperative local anaesthesia, steroids, Periodic fever, aphthous stomatitis, pharyngitis, & cervical adenitis syndrome (PFAPA).
- *Sinusitis*: decongestants, antihistamines and nasal irrigation, functional endoscopic balloon dilation of sinus ostia, functional endoscopic surgery, nasal saline irrigation, systemic antibiotics, topical and systemic antifungal therapy, topical steroid, antibiotics for acute maxillary sinusitis, intranasal steroids for acute sinusitis.
- *Upper respiratory conditions in general*: pelargonium sidoides extract, saline nasal irrigation.

Other Relevant Publications

Paradise JL, Bluestone CD, Bachman RZ, et al. 1984. **Efficacy of tonsillectomy for recurrent throat infection in severely affected children. Results of parallel randomized and nonrandomized clinical trials.** *New England Journal of Medicine* 310(11) 674-83.

This paper reports on two studies comparing the efficacy of tonsillectomy with non-surgical treatment in children meeting strict criteria for recurrent tonsillitis in the following categories: frequency of episodes of throat infection (7+ episodes in the preceding year, or 5+ in each of the preceding 2 years, or 3+ in each of the preceding 3 years), clinical features, treatment and documentation. There was a non-randomised study of 96 children whose parents did not consent to being part of the randomised study and a RCT involving 91 children. In both studies the incidence of throat infections was significantly lower in the surgical group ($p \leq 0.05$) in the first two years of follow up but not in the third year, however many in the non-surgical group had only 1-2 if any episodes of infection and most episodes were mild. The authors say their results support choosing tonsillectomy for children meeting stringent eligibility criteria but they also support choosing non-surgical management.

Schaefer MK, Shehab N, Cohen AL, et al. 2008. **Adverse Events From Cough and Cold Medications in Children.** *Pediatrics* 121(4) 783-87.

This paper reports on the use of public health surveillance data to describe emergency department visits for adverse drug events due to cough and cold medications ingested by children in the U.S. The investigation was undertaken in response reports of unintentional overdoses and links between these medications and infant deaths which had led to calls for the U.S. Food and Drug Administration to advise that these medications not be used in children under 6 years of age. The results of the study indicated that an estimated 7091 patients under 12 years of age were treated in emergency departments for adverse drug events due to cough and cold medications and that this number equates to 5.7% of all ED visits for all medications in this age group. Unsupervised ingestion accounted for 66% of all estimated ED visits and most of these ingestions (77%) in children involved children aged between 2 and 5. Most children (93%) did not require admission or extended observation. It is suggested that engineering innovations such as incorporating adaptors onto bottles of liquid medication such that medication can only be accessed via a needle-less syringe, would prevent unsupervised preschool-aged children from drinking directly from the bottle and the wider use of child-resistant packaging could help reduce the problem of unsupervised ingestions.