Indicator of potentially avoidable hospitalisations for the Child and Youth Wellbeing Strategy

A brief report on methodology

Citation: Ministry of Health. 2020. *Indicator of potentially avoidable hospitalisations for the Child and Youth Wellbeing Strategy: A brief report on methodology.* Wellington: Ministry of Health.

Published in April 2020 by the Ministry of Health
PO Box 5013, Wellington 6140, New Zealand

ISBN 978-1-98-859775-1 (online)
HP 7350



This document is available at health.govt.nz

|  |  |
| --- | --- |
| **CCBY** | This work is licensed under the Creative Commons Attribution 4.0 International licence. In essence, you are free to: share ie, copy and redistribute the material in any medium or format; adapt ie, remix, transform and build upon the material. You must give appropriate credit, provide a link to the licence and indicate if changes were made. |

# Acknowledgements

The development of the indicator of potentially avoidable hospitalisations was led by the Health and Disability Intelligence (HDI) and managed by a working group which comprised:

* Zhi-ling (Jim) Zhang, Senior Advisor, HDI, Health System Improvement and Innovation, Ministry of Health
* Dr Peter Watson, Acting Chief Advisor, Child and Youth, Ministry of Health
* Dr Peter Jones, Clinical Chief Advisor, Ministry of Health.

A draft of the condition list of potentially avoidable hospitalisations was reviewed by internal and external experts, including:

* Prof Ian Town, Chief Science Advisor, Ministry of Health
* Prof Shanthi Ameratunga, University of Auckland
* Dr Philippa Anderson, Counties Manukau District Health Board
* Dr Riana Clarke, National Clinical Director, Oral Health, Ministry of Health
* Laurence Holding, Manager of Communicable Disease, Ministry of Health
* Tracy Thompson, Senior Analyst, Classification and Terminology, Ministry of Health
* Moses Alatini, Injury Prevention Analyst, Safekids New Zealand.

This work is supported by the Child Wellbeing Unit and Child Poverty Unit at the Department of the Prime Minister and Cabinet (DPMC). It is also supported by many colleagues in the Ministry of Health, particularly Grant Pittams, Dean Rutherford and Denise Hutana in HDI, Ministry of Health.

We are grateful for their comments, the provision of information and other contributions. The final decisions relating to the methodology incorporated in this report are the views expressed by the authors.

This brief report was written by Zhi-ling (Jim) Zhang.

Contents

[Acknowledgements iii](#_Toc34127179)

[Introduction 1](#_Toc34127180)

[Methods of development 2](#_Toc34127181)

[Processes 2](#_Toc34127182)

[Literature searching and preliminary data analysis 2](#_Toc34127183)

[Structure of PAH conditions 3](#_Toc34127184)

[Methodological considerations on non-injury conditions 4](#_Toc34127185)

[Methodological considerations on injury conditions 5](#_Toc34127186)

[General rules and flags 7](#_Toc34127187)

[Discussion 8](#_Toc34127188)

[Appendix 1: Condition list of PAH in children and youth 9](#_Toc34127189)

[References 21](#_Toc34127190)

# Introduction

Potentially avoidable hospitalisations (PAH) is an indicator of health-related outcomes under the Child and Youth Wellbeing Strategy[**1**](#_ENREF_1) and a Child Poverty Related Indicator (CPRI) required by the Child Poverty Reduction Act 2018.[**14**](#_ENREF_1) Data on PAH is not routinely collected by the health system. This report briefly describes the development of the indicator using the routinely collected National Minimum Dataset for hospital inpatient events (NMDS).

The PAH indicator is required to help the government:

* better understand the social determinants of child health
* monitor the collective efforts of health and other sectors on improving the health status of this population subgroup.

To meet the purpose of the indicator and to be in line with the vision and guiding principles of the Child and Youth Wellbeing Strategy,[**2**](#_ENREF_2) the definition of PAH is broad. It includes hospitalisations that can potentially be avoided by:

* the provision of appropriate healthcare interventions and early disease management, usually delivered in primary care and community-based care settings (ambulatory sensitive hospitalisations (ASH)){Billings, 1993 #95}
* public health interventions, such as injury prevention, health promotion and immunisation
* social policy interventions (such as income support and housing policy).

Hence, the concept of PAH used in this work takes a broader approach than ASH, considering many socioeconomic factors, including income and housing.

# Methods of development

## Processes

The following chart shows the main processes used in this work.



These processes were designed to involve key stakeholders with relevant expertise in the exercise within a tight timeline and to consider the needs of further development and quality assurance of the work (setting up an advisory group).

## Literature searching and preliminary data analysis

We searched Medline in Ovid datasets for relevant publications, especially for New Zealand studies. Internet search was also conducted to find technical reports on PAH. A New Zealand study[**3**](#_ENREF_3) was used as a base for this work.

We also considered other sources of information, including current methodology of ASH, and the condition list for the Better Public Services (BPS 3).

Total hospitalisations in the population under 25 years old were also analysed during the project scoping. Hospitalisation rates (per 1,000 population) are significantly higher among those aged 0–14 years when compared with those aged 15–24. The patterns for the causes of hospitalisations are also considerably different, especially in the rates of respiratory diseases and injuries. The age group differences were considered in determining PAH conditions. For example, a medical condition can be determined as potentially avoidable in children, but not in youth if the mechanism of preventing hospitalisation cannot be applied to youth.

## Structure of PAH conditions

Based on the literature review, preliminary data analysis, and the internal and external consultation, 16 main categories are included in PAH. Table 1 lists the main categories and the potential mechanisms to avoid hospitalisation for each category.

Table 1: Main categories and potential mechanisms to avoid hospitalisation

|  |  |  |  |
| --- | --- | --- | --- |
| **Main category** | **Primary care****intervention**  | **Public health intervention** | **Social policy intervention** |
| Respiratory conditions | ✓ |  | ✓ |
| Dental conditions | ✓ | ✓ | ✓ |
| Gastrointestinal diseases | ✓ | ✓ | ✓ |
| Nutrition deficiency and anaemia | ✓ | ✓ | ✓ |
| Cardiovascular diseases | ✓ | ✓ | ✓ |
| Otitis media | ✓ |  | ✓ |
| Dermatological conditions | ✓ | ✓ | ✓ |
| Diabetes complications | ✓ | ✓ | ✓ |
| Kidney, urinary tract infection | ✓ |  |  |
| Sexually transmitted infections | ✓ | ✓ |  |
| Vaccine-preventable diseases | ✓ | ✓ | ✓ |
| Meningococcal infection | ✓ | ✓ | ✓ |
| Epilepsy | ✓ |  |  |
| Other non-injury conditions | ✓ |  |  |
| **Injury and poisoning** |  |  |  |
| Unintentional injuries |  | ✓ | ✓ |
| Intentional injuries |  | ✓ | ✓ |

In general, each main category contains some subcategories. For example, **respiratory conditions** contains five subcategories:

* pneumonia
* bronchitis/bronchiolitis/bronchiectasis
* asthma
* upper respiratory and ears, nose and throat (ENT) infections
* lower respiratory tract infection (LRTI).

For non-injury conditions, subcategories are based on the principal diagnosis of the hospitalisation. However, subcategories of injury conditions are based on the external cause of the injury that are critical factors for injury prevention. The classification of the external cause of injury is modified from the method used in the second National Study of the Burden of Diseases and Injuries,[**4**](#_ENREF_4) and is generally in agreement with a classification system used by the Centres for Disease Control and Prevention (CDC).[**5**](#_ENREF_5)

Each subcategory contains individual diagnoses. For example, the subcategory of **Asthma** under **respiratory conditions** contains three principal diagnoses:

* asthma (ICD-10-AM code J45)
* status asthmaticus (ICD-10-AM code J46)
* wheezing (ICD-10-AM code R062).

PAH was determined at this level of individual diagnosis to be potentially avoidable in the age groups 0–14 years and/or 15–24 years.

The main categories, subcategories and diagnoses of PAH are listed in Appendix 1, with detailed ICD-10-AM (8th Edition) codes.

## Methodological considerations on non-injury conditions

### Neonatal hospitalisation events

Neonatal (infants under 28 days) non-injury conditions are excluded from the ASH and BPS3 methodology,[**6**](#_ENREF_6)**,** [**7**](#_ENREF_7) due to the clinical complexity and different hospital admission criteria.

Neonatal hospitalisations include conditions caused by low birth weight and preterm birth. These two conditions are also associated with many medical conditions in children and youth. However, the target population (pregnant women) to prevent low birth weight and preterm birth can be quite different from the target population (children and youth, aged 0–24 years) of other PAH conditions. In addition, another indicator of prenatal care has been designed under the Child and Youth Wellbeing Strategy.[**2**](#_ENREF_2) Considering all these factors, this work follows established protocol[**6**](#_ENREF_6)**,** [**7**](#_ENREF_7) to exclude non-injury neonatal hospitalisations from PAH.

### Type 1 diabetes, epilepsy and febrile convulsions

A review of literature shows there are different conclusions on whether type 1 diabetes, epilepsy and febrile convulsions are PAH.

During the consultation, it was advised that type 1 diabetes and epilepsy can be effectively managed in a primary care setting, and therefore hospital admission is potentially avoidable.

In contrast, febrile convulsions are unlikely to be potentially avoidable admissions, due to individual differences in responding to fever. Febrile convulsions are therefore excluded from the PAH list.

### Influenza due to certain identified influenza virus (ICD-10-AM code J09)

This group of conditions is not included in PAH in the literature reviewed. This is likely because H5N1 influenza (bird flu) is in this group (according to ICD-10-AM classification). H5N1 influenza cannot be separated from other conditions in the group. H5N1 influenza is currently not a vaccine-preventable disease.

However, no H5N1 influenza has been identified in New Zealand since 2003. Therefore, cases coded under J09 can be considered as non-H5N1 influenza. Furthermore, clinical notes available in the data warehouse for hospitalisations coded as J09 show that most of the cases are H1N1 influenza, which is a vaccine-preventable disease.

Influenza due to certain identified viruses is therefore included in PAH under vaccine-preventable diseases.

## Methodological considerations on injury conditions

Physical injuries are generally considered as preventable; however, very few studies included injuries in the scope of PAH. There is a lack of well-established or accepted methodology to cover injuries under PAH. Injuries are included in this work, with some exceptions.

### Adverse effects, not elsewhere classified (ICD-10-AM codes T780–T789)

These primary codes are used ‘to identify the effects, not elsewhere classifiable, unknown, undetermined or ill-defined causes’.[**8**](#_ENREF_8) This includes anaphylactic shock due to adverse food reaction, anaphylactic shock (unspecified), other adverse food reactions (not elsewhere classified), angioneurotic oedema, allergy (unspecified), other adverse effects (not elsewhere classified) and adverse effect unspecified. This group is excluded from the PAH definition mainly because of the nature of the conditions and the unclear causes of the conditions.

### Complications of surgical and medical care (ICD-10-AM codes T80–T88, T983)

This category includes complications following infusion, transfusion and therapeutic injection, procedures, prosthetic devices, implants and grafts, and failure and rejection of transplanted organs and tissues. Other unspecified, and sequelae of complications of surgical and medical care (T88, T983) are also included in this group.

Some conditions in this group could be prevented by improved patient safety and quality of care. However, more detailed literature searching, evidence assessment and consultation are needed to determine the inclusion or exclusion for individual conditions. The tight timeline means we are unable to carry out this analysis at this stage. This group is therefore excluded from the PAH definition.

### External causes of the complications of surgical and medical care (ICD-10-AM codes Y40–Y59, Y60–Y69, Y70–Y82, Y83–Y84, Y88, Y95)

Hospitalisations with these external causes of complications of surgical and medical care are also excluded from the PAH definition for the same reasons as described in the previous section.

### Unspecified external causes (ICD-10-AM codes X58, X59, Y86, Y899)

These external causes do not contain meaningful information on the injury mechanism. Hospitalisations with these codes are therefore excluded.

### Injury intention undetermined (ICD-10-AM codes Y10–Y34, Y872)

About 1% of hospitalisations due to injury in patients aged under 25 years were coded as injury intention undetermined. Most of them were diagnosed as poisoning. With an injury intention undetermined, it is difficult to analyse how the injury could be prevented. These events are therefore excluded from the PAH definition.

## General rules and flags

As well as the exclusions discussed in the previous sections, there are general rules applied on the PAH definition.

### Overseas patients

These hospitalisation events are identified by domicile codes. They are excluded since they are generally not targeted for the interventions to prevent hospitalisations in New Zealand. Furthermore, the associated population cannot be quantified.

### Non-public hospital events

These events were identified by facility code and accounted for about 13% of all hospitalisation events every year. Clinical coding on these events is usually completed one or two years after discharge. These hospitalisation events are excluded from the PAH definition due to this delay.

### Hospital transfers

Hospital transfer events including within and between hospitals, are identified from NMDS by event timestamps and event end type. Only the first event is counted.

### Emergency department short stay flag

Emergency department (ED) short stay is when a patient is treated in the emergency department for more than three hours. According to the NMDS reporting requirements, these need to be reported as a hospitalisation. ED short stays are identified by the event timestamps and health specialty. Some hospitals have different rules in reporting ED short stays.

ED short stays are flagged in the dataset since these events are relevant in further analysis of regional variations and hospital resources (such as bed days) used.

### Same-day event flag

For the same reasons as ED short stays, same-day events are also flagged in the dataset. A same-day event is when an inpatient is admitted and discharged on the same day. A same-day event is identified by the timestamps of the event.

# Discussion

The process of developing the PAH indicator involved key stakeholders providing specialist knowledge and expertise to determine the conditions that can potentially be avoided from hospitalisation. However, stakeholder engagement with people who would implement changes or take actions (such as social policy makers) may be needed in the future.

Even though we used a broad concept to define PAH, there are still some areas that we were unable to cover due to the time constraints and a lack of information from available data or literature. For instance, occupational diseases are also preventable by occupational health interventions. These diseases can occur among those aged 15–24 years. However, we are unable to identify occupational diseases directly from our routinely collected datasets.

PAH is an outcome measure and cannot always quickly reflect the improvement associated with interventions, due to the time lag between interventions and outcome changes. To monitor the progress in this area, some related process measures may need to be considered (for example, using process measure on housing condition improvement in addition to the measure on respiratory diseases).

In addition to these issues, new research, changes in medical practice and care models, development of treatment and other interventions (such as new vaccines) will also require changes to the PAH condition list as new evidence becomes available. To deal with these issues, an advisory group has been planned to:

* review the results of the indicator and to agree on interpretation and implications of the results
* function as a platform to connect the indicator with internal and external stakeholders, and to drive improvement
* advise on technical issues such as new evidence in relation to PAH, and on responses to relevant queries (from media, for example) on the work.

# Appendix 1:Condition list of PAH in children and youth

January 2020

| **Main category & subcategory** | **Principal diagnosis/external cause of injury** | **ICD-10-AM** **8th Edition** | **Age 0-14** | **Age 15-24** | **Note** |
| --- | --- | --- | --- | --- | --- |
| **Respiratory conditions** |  |  |  |  |  |
| Pneumonia |  Viral pneumonia, not elsewhere classified (NEC)[**6**](#_ENREF_6) Bacterial pneumonia, NEC[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) Pneumonia due to other infectious organisms, NEC[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) Pneumonia, organism unspecified[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) Pneumonitis due to solids and liquids [**6**](#_ENREF_6) Abscess of lung with pneumonia[**6**](#_ENREF_6) | J12J15 J16 J18 J69 J851 | IncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncluded |  |
| Bronchitis,Bronchiolitis and Bronchiectasis |  Acute bronchitis[**10**](#_ENREF_10) Acute bronchiolitis[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)  Bronchiectasis[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) | J20 J21 J47 | IncludedIncludedIncluded | IncludedExcludedIncluded |  |
| Asthma [**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9-11**](#_ENREF_9)Wheezing |  Asthma Status asthmaticus Wheezing | J45 J46 R062 | IncludedIncludedIncluded | IncludedIncludedIncluded |  |
| Upper respiratory and ENT infections[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7) |  Acute nasopharyngitis (common cold) Acute sinusitis Acute pharyngitis [**10**](#_ENREF_10) Acute tonsillitis [**10**](#_ENREF_10) Acute laryngitis and tracheitis[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)  Acute obstructive laryngitis (croup)[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) Acute upper respiratory infections of multiple and  unspecified sites [**10**](#_ENREF_10) | J00J01J02J03J04J050J06 | IncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| Lower respiratory tract infection (LRTI)[**7**](#_ENREF_7) |  Unspecified acute lower respiratory infection | J22 | Included | Included |  |
| **Dental conditions** |  |  |  |  |  |
| Dental caries |  Dental caries[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | K02 | Included | Included |  |
| Diseases of pulp andperiapical tissues |  Diseases of pulp and periapical tissues[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | K04 | Included | Included |  |
| Gingivitis and periodontal diseases |  Gingivitis and periodontal diseases[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | K05 | Excluded | Excluded |  |
| **Gastrointestinal diseases** |  |  |  |  |
| Peptic ulcer[**7**](#_ENREF_7)**,** [**10**](#_ENREF_10) |  Gastric ulcer Duodenal ulcer Peptic ulcer, site unspecified Gastrojejunal ulcer | K25 K26K27K28 | ExcludedExcludedExcludedExcluded | IncludedIncludedIncludedIncluded |  |
| Constipation |  Constipation[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) | K590 | Included | Included |  |
| Gastroenteritis/dehydration [**3**](#_ENREF_3) **,**[**7**](#_ENREF_7) **,**[**9**](#_ENREF_9) |  Cholera Typhoid and paratyphoid fevers Other salmonella infections Shigellosis  Other bacterial intestinal infections Other bacterial food-borne intoxications, NEC  Amoebiasis  Other protozoal intestinal diseases Viral and other specified intestinal infections Other gastroenteritis and colitis of infectious and unspecified origin Nausea and vomiting Noninfective gastroenteritis and colitis, unspecified | A00A01A02A03A04A05A06A07A08A09R11K529 | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| Gastro-oesophageal reflux disease |  Gastro-oesophageal reflux disease[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) | K21 | Included | Included |  |
| **Nutrition deficiency and anaemia** |  |  |  |  |
| Anaemia [**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) |  Iron deficiency anaemia Vitamin B12 deficiency anaemia Folate deficiency anaemia Other nutritional anaemias | D50D51D52D53 | IncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncluded |  |
| Nutritional deficiency[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) |  Kwashiorkor  Nutritional marasmus Marasmic kwashiorkor Unspecified severe protein-energy malnutrition Protein-energy malnutrition of moderate and mild degree Retarded development following protein-energy malnutrition Unspecified protein-energy malnutrition Vitamin A deficiency Thiamine deficiency Niacin deficiency (pellagra) Deficiency of other B group vitamins Ascorbic acid deficiency Vitamin D deficiency Other vitamin deficiencies Dietary calcium deficiency Dietary selenium deficiency Dietary zinc deficiency Deficiency of other nutrient elements Other nutritional deficiencies Sequelae of malnutrition and other nutritional deficiencies[**9**](#_ENREF_9) Adult osteomalacia due to malnutrition[**7**](#_ENREF_7) | E40E41E42E43E44E45E46E50E51E52E53E54E55E56E58E59E60E61E63E64M833 | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedExcluded | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| **Cardiovascular diseases** |  |  |  |  |  |
| Acute rheumatic fever[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Rheumatic fever without mention of heartinvolvementRheumatic chorea | I00I02 | IncludedIncluded | IncludedIncluded |  |
| Chronic rheumatic heart diseases[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Rheumatic mitral valve diseasesRheumatic aortic valve diseasesRheumatic tricuspid valve diseasesMultiple valve diseasesOther rheumatic heart diseases | I05I06I07I08I09 | IncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncluded |  |
| **Otitis media** |  |  |  |  |  |
| Otitis media[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) | Nonsuppurative otitis mediaSuppurative and unspecified otitis media[**10**](#_ENREF_10)Otitis media in diseases classified elsewhere | H65H66H67 | IncludedIncludedIncluded | IncludedIncludedIncluded |  |
| **Dermatological conditions** |  |  |  |  |
| Skin infections [**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Staphylococcal scalded skin syndromeImpetigoCutaneous abscess, furuncle and carbuncleCellulitisAcute lymphadenitisPilonidal cystOther local infections of skin and subcutaneoustissueHordeolum and other deep inflammation of eyelidBlepharitisAbscess, furuncle and carbuncle of nosePyogenic granuloma | L00L01L02L03L04L05L08H000H010J340L980 | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| Dermatitis and eczema[**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) | Atopic dermatitisSeborrhoeic dermatitisDiaper (napkin) dermatitisAllergic contact dermatitisIrritant contact dermatitisUnspecified contact dermatitisExfoliative dermatitisDermatitis due to substances taken internallyLichen simplex chronicus and prurigoPruritusOther dermatitis | L20L21L22L23L24L25L26L27L28L29L30 | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedExcludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| **Diabetes complications** |  |  |  |  |  |
| Diabetes complications [**7**](#_ENREF_7)**,** [**10**](#_ENREF_10) | Type 1 diabetes mellitusType 2 diabetes mellitusOther specified diabetes mellitusUnspecified diabetes mellitusHypoglycaemia, unspecified | E10E11E13E14E162 | IncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncluded |  |
| **Kidney, urinary tract infection** |  |  |  |  |
| Kidney, urinary tract infection[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) | Acute tubulo-interstitial nephritis[**10**](#_ENREF_10)Tubulo-interstitial nephritis, not specified as acuteor chronic[**10**](#_ENREF_10)Pyonephrosis[**10**](#_ENREF_10)Acute cystitisCystitis, unspecified[**10**](#_ENREF_10)Urinary tract infection, site not specified | N10N12N136N300N309N390 | IncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncluded | >= 5 years old only>= 5 years old only>= 5 years old only>= 5 years old only>= 5 years old only>= 5 years old only |
| **Sexually transmitted infections (STIs)** |  |  |  |  |
| Sexually transmitted infections (STIs)[**7**](#_ENREF_7)**,** [**11**](#_ENREF_11) | Congenital syphilisEarly syphilisLate syphilisOther and unspecified syphilis Gonococcal infectionChlamydial lymphogranuloma (venereum) Other sexually transmitted chlamydial diseasesChancroid Granuloma inguinaleTrichomoniasis Anogenital herpesviral (herpes simplex) infectionOther predominantly sexually transmitted diseases, NEC Unspecified sexually transmitted diseaseReiter’s diseaseNonspecific urethritis | A50A51A52A53A54A55A56A57A58A59A60A63A64M023N341 | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| **Vaccine-preventable diseases** |  |  |  |  |
| Influenza and related pneumonia, meningitis | Influenza due to certain identified influenza virus\*Influenza due to other identified influenza virus[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10)Influenza, virus not identified[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10)Pneumonia due to streptococcus pneumoniae[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10)Pneumonia due to Haemophilus influenzae[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10)Haemophilus meningitis[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | J09J10J11J13J14G000 | IncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncluded | \*No H5N1 case in NZ, most are H1N1 |
| Tetanus [**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Tetanus neonatorumObstetrical tetanusOther tetanus | A33A34A35 | IncludedIncludedIncluded | ExcludedIncludedIncluded |  |
| Diphtheria[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Diphtheria  | A36 | Included | Included |  |
| Whooping cough[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Whooping cough due to Bordetella pertussisWhooping cough due to Bordetella parapertussisWhooping cough due to other Bordetella speciesWhooping cough, unspecified | A370A371A378A379 | IncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncluded |  |
| Poliomyelitis[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Acute poliomyelitis | A80 | Included | Included |  |
| Varicella[**10**](#_ENREF_10) | Varicella meningitisVaricella encephalitisVaricella pneumoniaVaricella with other complicationsVaricella without complication  | B010B011B012B018B019 | IncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncluded |  |
| Measles[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Measles complicated by encephalitisMeasles complicated by meningitisMeasles complicated by pneumoniaMeasles complicated by otitis mediaMeasles with intestinal complicationsMeasles with other complicationsMeasles without complication | B050B051B052B053B054B058B059 | IncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| Rubella[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | Rubella (German measles)Congenital rubella syndromeRubella arthritis | B06P350M014 | IncludedIncludedIncluded | IncludedIncluded\*Included | \*Lifetime impacts of the condition |
| Hepatitis A[**11**](#_ENREF_11) | Hepatitis A with hepatic comaHepatitis A without hepatic coma | B150B159 | IncludedIncluded | IncludedIncluded |  |
| Hepatitis B[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)Hepatitis C[**11**](#_ENREF_11)**,** [**12**](#_ENREF_12) | Acute hepatitis B with delta-agent (coinfection) with hepatic comaAcute hepatitis B with delta-agent (coinfection) withouthepatic comaAcute hepatitis B without delta-agent with hepaticcomaAcute hepatitis B without delta-agent and withouthepatic comaAcute hepatitis C | B160B161B162B169B171 | IncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncluded |  |
| Chronic viral hepatitis[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9-12**](#_ENREF_9) | Chronic viral hepatitis B with delta-agent Chronic viral hepatitis B without delta-agentChronic viral hepatitis C | B180B181B182 | IncludedIncludedIncluded | IncludedIncludedIncluded |  |
| Mumps[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9-11**](#_ENREF_9) | Mumps orchitisMumps meningitisMumps encephalitisMumps pancreatitisMumps with other complicationsMumps without complication | B260B261B262B263B268B269 | IncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncluded |  |
| Tuberculosis[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) | Respiratory tuberculosis, bacteriologically andhistologically confirmedRespiratory tuberculosis, not confirmedbacteriologically or histologically Tuberculosis of nervous systemTuberculosis of other organsMiliary tuberculosis | A15A16A17A18A19 | IncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncluded |  |
| **Meningococcal infection** |  |  |  |  |
| Meningococcal infection[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) | Meningococal meningitisWaterhouse-Friderichsen syndromeAcute meningococcaemiaChronic meningococcaemiaMeningococcaemia, unspecified Meningococcal heart diseaseOther meningococcal infectionsMeningococcal infection, unspecified | A390A391A392A393A394A395A398A399 | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| **Epilepsy** |  |  |  |  |  |
| Epilepsy | Epilepsy[**7**](#_ENREF_7)**,** [**10**](#_ENREF_10)Status epilepticus[**7**](#_ENREF_7)**,** [**10**](#_ENREF_10)Eclampsia[**7**](#_ENREF_7)**,** [**10**](#_ENREF_10)Febrile convulsions[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)Other and unspecified convulsions[**7**](#_ENREF_7)**,** [**10**](#_ENREF_10) | G40G41O15R560R568 | IncludedIncludedIncludedExcludedIncluded | IncludedIncludedIncludedExcludedIncluded |  |
| **Other non-injury conditions** |
| Other non-injury conditions | Sepsis due to streptococcus pneumoniae[**7**](#_ENREF_7)Osteomyelitis[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)Viral meningitis[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)Meningitis in bacterial diseases classifiedelsewhere[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)Meningitis in other infectious and parasiticdiseases classified elsewhere[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)Meningitis due to other and unspecified causes[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)Viral infection of unspecified site[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) | A403M86A87G01G02G03B34 | IncludedIncludedIncludedIncludedIncludedIncludedIncluded | IncludedIncludedIncludedIncludedIncludedIncludedIncluded |  |
| **Injury and poisoning**[**9**](#_ENREF_9)**,** [**12**](#_ENREF_12)**,** [**13**](#_ENREF_13)**\*** | All injuries, apart from injuries diagnosed as T780–T789 (adverse effects, NEC), or T80–T88, T983 (complications of treatment) or injuries due to the external causes of Y40–Y59, Y60-Y69, Y70–Y82, Y83–Y84, Y88, Y95 (adverse effects of treatment) or X58, X59, Y86, Y899 (unspecified external causes) or Y10–Y34, Y872 (intention undetermined) | S00–T98 | Included | Included | \*Modified |
| **Unintentional injuries** |  |  |  |  |  |
| Unintentional injuries[**4**](#_ENREF_4)**\*** | Transport accidents | V010–V899, V910–V919, V930–V978, V98, V99, Y850, Y859 |  |  | \*Modified |
|  | Falls | W00–W19 |  |  |  |
|  | Fires and thermal causes | X00–X19 |  |  |  |
|  | Drowning | W65–W74, V900–V909, V920–V929 |  |  |  |
|  | Poisoning (accidental) | X40–X49 |  |  |  |
|  | Mechanical force (inanimate) | W20–W49 |  |  |  |
|  | Animal-related injuries | W53–W598, W610–W619, X20–X278, X29 |  |  |  |
|  | Overexertion and strenuous | X50 |  |  |  |
|  | Other unintentional injuries | V00, W50–W52, W60, W64, W75–W79, W80–W84,W85–W99, X28, X30–X39, X51–X57 |  |  |  |
| **Intentional injuries** |  |  |  |  |  |
| Intentional injuries[**4**](#_ENREF_4) | Intentional self-harm | X60–X84, Y870 |  |  |  |
|  | Assault | X85–X99, Y0000–Y0909, Y871, Y3501–Y369, Y890, Y891 |  |  |  |

# References

1. New Zealand Government. *Child and Youth Wellbeing Strategy*. Wellington, New Zealand: The Department of the Prime Minister and Cabinet, 2019.

2. The Department of Prime Minister and Cabinet. *The Child & Youth Wellbeing Strategy Framework*. URL: www.childyouthwellbeing.govt.nz/resources/child-and-youth-wellbeing-strategy-html#child-9 2019 (accessed 21 January 2020).

3. Anderson P, Craig E, Jackson G, et al. Developing a tool to monitor potentially avoidable and ambulatory care sensitive hospitalisations in New Zealand children. *New Zealand Medical Journal* 2012;**125**(1366):25-37.

4. Ministry of Health and Accident Compensation Corporation. *Injury-related Health Loss: A report from the New Zealand Burden of Diseases, Injuries and Risk Factor Study 2006–2016*. Wellington, New Zealand: Ministry of Health, 2013.

5. Hedegaard H, Johnson R, Garnett M, et al. *The International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) External Cause-of-injury Framework for Categorizing Mechanism and Intent of Injury*. National Health Statistics Report: Centers for Disease Control and Prevention, 2019.

6. Ministry of Health. 2017. Technical document: *List of conditions and ICD codes for BPS 3*, 2017. Wellington, New Zealand: Ministry of Health.

7. Ministry of Health. *Ambulatory sensitive (avoidable) hospital admissions*. URL: www.nsfl.health.govt.nz/accountability/performance-and-monitoring/data-quarterly-reports-and-reporting/ambulatory-sensitive (accessed 8 January 2020), 2019.

8. National Casemix and Classification Centre. *The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM), Eighth Edition.* Sydney, NSW, Australia: Australian Health Services Research Institute, University of Wollongong, 2013.

9. Aung YM, Tin Tin S, Jelleyman T, et al. Dental caries and previous hospitalisations among preschool children: findings from a population-based study in New Zealand. *New Zealand Medical Journal* 2019;**132**(1493):44-53.

10. Australian Institute of Health and Welfare. *Australia's health 2018*. Australia's health series no. 16. AUS 221. Canberra, Australia: AIHW, 2018.

11. Ministry of Health. *Our Health, Our Future. The Health of New Zealand 1999*. Wellington, New Zealand, 1999.

12. Jackson G, Tobias M. Potentially avoidable hospitalisations in New Zealand, 1989–98. *Australian & New Zealand Journal of Public Health* 2001; **25**(3):212-21.

13. Chen L, Lu HM, Shih SF, et al. Poverty related risk for potentially preventable hospitalisations among children in Taiwan. *BMC Health Services Research* 2010; **10**:196

14. The Department of Prime Minister and Cabinet. *Child Poverty measures, targets and indicators*. https://dpmc.govt.nz/our-programmes/reducing-child-poverty/child-poverty-measures-targets-and-indicators (accessed 3 July 2020).