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) | | J12  J15  J16  J18  J69  J851 | Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included |  |
| 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 | Included  Included  Included | Included  Excluded  Included |  |
| Asthma [**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9-11**](#_ENREF_9)  Wheezing | Asthma  Status asthmaticus  Wheezing | | J45  J46  R062 | Included  Included  Included | Included  Included  Included |  |
| 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) | | J00  J01  J02  J03  J04  J050  J06 | Included  Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included  Included |  |
| 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 and  periapical 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  K26  K27  K28 | Excluded  Excluded  Excluded  Excluded | Included  Included  Included  Included |  |
| 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 | | A00  A01  A02  A03  A04  A05  A06  A07  A08  A09  R11  K529 | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included |  |
| 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 | | D50  D51  D52  D53 | Included  Included  Included  Included | Included  Included  Included  Included |  |
| 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) | | E40  E41  E42  E43  E44  E45  E46  E50  E51  E52  E53  E54  E55  E56  E58  E59  E60  E61  E63  E64  M833 | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Excluded | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included |  |
| **Cardiovascular diseases** | |  |  |  |  |  |
| Acute rheumatic fever[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | | Rheumatic fever without mention of heart  involvement  Rheumatic chorea | I00  I02 | Included  Included | Included  Included |  |
| Chronic rheumatic heart diseases[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | | Rheumatic mitral valve diseases  Rheumatic aortic valve diseases  Rheumatic tricuspid valve diseases  Multiple valve diseases  Other rheumatic heart diseases | I05  I06  I07  I08  I09 | Included  Included  Included  Included  Included | Included  Included  Included  Included  Included |  |
| **Otitis media** | |  |  |  |  |  |
| Otitis media[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) | | Nonsuppurative otitis media  Suppurative and unspecified otitis media[**10**](#_ENREF_10)  Otitis media in diseases classified elsewhere | H65  H66  H67 | Included  Included  Included | Included  Included  Included |  |
| **Dermatological conditions** | | |  |  |  |  |
| Skin infections [**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | | Staphylococcal scalded skin syndrome  Impetigo  Cutaneous abscess, furuncle and carbuncle  Cellulitis  Acute lymphadenitis  Pilonidal cyst  Other local infections of skin and subcutaneous  tissue  Hordeolum and other deep inflammation of eyelid  Blepharitis  Abscess, furuncle and carbuncle of nose  Pyogenic granuloma | L00  L01  L02  L03  L04  L05  L08  H000  H010  J340  L980 | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included |  |
| Dermatitis and eczema[**7**](#_ENREF_7)**,** [**9**](#_ENREF_9) | | Atopic dermatitis  Seborrhoeic dermatitis  Diaper (napkin) dermatitis  Allergic contact dermatitis  Irritant contact dermatitis  Unspecified contact dermatitis  Exfoliative dermatitis  Dermatitis due to substances taken internally  Lichen simplex chronicus and prurigo  Pruritus  Other dermatitis | L20  L21  L22  L23  L24  L25  L26  L27  L28  L29  L30 | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included | Included  Included  Excluded  Included  Included  Included  Included  Included  Included  Included  Included |  |
| **Diabetes complications** | |  |  |  |  |  |
| Diabetes complications [**7**](#_ENREF_7)**,** [**10**](#_ENREF_10) | | Type 1 diabetes mellitus  Type 2 diabetes mellitus  Other specified diabetes mellitus  Unspecified diabetes mellitus  Hypoglycaemia, unspecified | E10  E11  E13  E14  E162 | Included  Included  Included  Included  Included | Included  Included  Included  Included  Included |  |
| **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 acute  or chronic[**10**](#_ENREF_10)  Pyonephrosis[**10**](#_ENREF_10)  Acute cystitis  Cystitis, unspecified[**10**](#_ENREF_10)  Urinary tract infection, site not specified | N10  N12  N136  N300  N309  N390 | Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included | >= 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 syphilis  Early syphilis  Late syphilis  Other and unspecified syphilis  Gonococcal infection  Chlamydial lymphogranuloma (venereum)  Other sexually transmitted chlamydial diseases  Chancroid  Granuloma inguinale  Trichomoniasis  Anogenital herpesviral (herpes simplex) infection  Other predominantly sexually transmitted diseases, NEC  Unspecified sexually transmitted disease  Reiter’s disease  Nonspecific urethritis | A50  A51  A52  A53  A54  A55  A56  A57  A58  A59  A60  A63  A64  M023  N341 | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included  Included |  |
| **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) | J09  J10  J11  J13  J14  G000 | Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included | \*No H5N1 case in NZ, most are H1N1 |
| Tetanus [**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | | Tetanus neonatorum  Obstetrical tetanus  Other tetanus | A33  A34  A35 | Included  Included  Included | Excluded  Included  Included |  |
| 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 pertussis  Whooping cough due to Bordetella parapertussis  Whooping cough due to other Bordetella species  Whooping cough, unspecified | A370  A371  A378  A379 | Included  Included  Included  Included | Included  Included  Included  Included |  |
| Poliomyelitis[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | | Acute poliomyelitis | A80 | Included | Included |  |
| Varicella[**10**](#_ENREF_10) | | Varicella meningitis  Varicella encephalitis  Varicella pneumonia  Varicella with other complications  Varicella without complication | B010  B011  B012  B018  B019 | Included  Included  Included  Included  Included | Included  Included  Included  Included  Included |  |
| Measles[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | | Measles complicated by encephalitis  Measles complicated by meningitis  Measles complicated by pneumonia  Measles complicated by otitis media  Measles with intestinal complications  Measles with other complications  Measles without complication | B050  B051  B052  B053  B054  B058  B059 | Included  Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included  Included |  |
| Rubella[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9**](#_ENREF_9)**,** [**10**](#_ENREF_10) | | Rubella (German measles)  Congenital rubella syndrome  Rubella arthritis | B06  P350  M014 | Included  Included  Included | Included  Included\*  Included | \*Lifetime impacts of the condition |
| Hepatitis A[**11**](#_ENREF_11) | | Hepatitis A with hepatic coma  Hepatitis A without hepatic coma | B150  B159 | Included  Included | Included  Included |  |
| 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 coma  Acute hepatitis B with delta-agent (coinfection) without  hepatic coma  Acute hepatitis B without delta-agent with hepatic  coma  Acute hepatitis B without delta-agent and without  hepatic coma  Acute hepatitis C | B160  B161  B162  B169  B171 | Included  Included  Included  Included  Included | Included  Included  Included  Included  Included |  |
| 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-agent  Chronic viral hepatitis C | B180  B181  B182 | Included  Included  Included | Included  Included  Included |  |
| Mumps[**3**](#_ENREF_3)**,** [**7**](#_ENREF_7)**,** [**9-11**](#_ENREF_9) | | Mumps orchitis  Mumps meningitis  Mumps encephalitis  Mumps pancreatitis  Mumps with other complications  Mumps without complication | B260  B261  B262  B263  B268  B269 | Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included |  |
| Tuberculosis[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) | | Respiratory tuberculosis, bacteriologically and  histologically confirmed  Respiratory tuberculosis, not confirmed  bacteriologically or histologically  Tuberculosis of nervous system  Tuberculosis of other organs  Miliary tuberculosis | A15  A16  A17  A18  A19 | Included  Included  Included  Included  Included | Included  Included  Included  Included  Included |  |
| **Meningococcal infection** | | |  |  |  |  |
| Meningococcal infection[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9) | | Meningococal meningitis  Waterhouse-Friderichsen syndrome  Acute meningococcaemia  Chronic meningococcaemia  Meningococcaemia, unspecified  Meningococcal heart disease  Other meningococcal infections  Meningococcal infection, unspecified | A390  A391  A392  A393  A394  A395  A398  A399 | Included  Included  Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included  Included  Included |  |
| **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) | G40  G41  O15  R560  R568 | Included  Included  Included  Excluded  Included | Included  Included  Included  Excluded  Included |  |
| **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 classified  elsewhere[**3**](#_ENREF_3)**,** [**9**](#_ENREF_9)  Meningitis in other infectious and parasitic  diseases 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) | A403  M86  A87  G01  G02  G03  B34 | Included  Included  Included  Included  Included  Included  Included | Included  Included  Included  Included  Included  Included  Included |  |
| **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).