



Safety Platform for Emergency vACcines

## D2.3.1 Tier 1 AESI: ICD-9/10-CM and MedDRA Codes

Work Package: WP2 Standards and tools

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## DOCUMENT INFORMATION

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Description of the deliverable (3-5 lines)	This deliverable describes the rationale and methodology for providing relevant ICD-9/10-CM and MedDRA codes for tier 1 adverse events of special importance (AESI) determined to be of relevance to CEPI vaccine development.
Key words	AEFI, AESI, Brighton case definitions, anaphylaxis, thrombocytopenia, generalized convulsion, aseptic meningitis, encephalitis, myelitis, acute disseminated encephalomyelitis, Guillain Barré syndrome, Miller Fisher syndrome, peripheral facial nerve palsy/Bell's palsy

## DOCUMENT HISTORY

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## 1. Background

### Adverse events of special importance (AESI)

An adverse event of special interest (serious or non-serious) is one of scientific and medical concern specific to the sponsor's product or program, for which ongoing monitoring and rapid communication by the investigator to the sponsor could be appropriate. Such an event might require further investigation in order to characterize and understand it. Depending on the nature of the event, rapid communication by the trial sponsor to other parties (e.g., regulators) might also be warranted [1].

Defining potential AESI has been a key part of SPEAC's work to facilitate and harmonize standard approaches to vaccine safety data collection, presentation and analysis across CEPI vaccine development programs. The list of potential AESI was established based on landscape analyses and AESI lists created for vaccine candidates that target. The list of deliverables is shown below. With the exception of the COVID 19 landscape analysis which is posted at the Brighton Collaboration website, the others are not publicly available but are posted in the CEPI developer's toolbox.

- Lassa Fever and MERS (WP2 D2.2)
- Nipah virus (WP2 D2.3 Nipah landscape analysis)
- Rift Valley Fever (WP2 D2.3 Rift valley fever landscape analysis)
- Chikungunya (WP2 D2.3 CHIK landscape analysis)
- COVID-19 (WP2 D2.3 V2.0 COVID 19 landscape analysis)

SPEAC has recommended that the CEPI vaccine developers adopt the listed AESI and that the developers be prepared to take a uniform approach to the identification, assessment, investigation, analysis and reporting of any AESI should it occur during a clinical trial.

To assist in that approach SPEAC is undertaking several activities, each with specific outputs, including:

1. Creation and maintenance of a toolbox that provides available definitions and guidance documents.
2. Creation of new case definitions for AESI that have not yet been published through the Brighton Collaboration process [2].
3. Creation of tools to facilitate data collection, investigation and determination of level of diagnostic certainty as outlined in the case definition.
4. Provide ICD9-CM/10-CM and MedDRA coding terms applicable to each AESI for coding or identification of AESI in different type of studies.
5. Provide an overview on the causes, risk factors and background rates (incidence rates independent in absence of vaccination) for each AESI.

This deliverable focuses on number 4 above: **ICD9-CM/10-CM and MedDRA codes Background to MedDRA**

MedDRA stands for

Med = Medical

D = Dictionary for

R = Regulatory

A = Activities

[MedDRA](#) is a clinically validated international proprietary medical terminology used by regulatory authorities and the regulated biopharmaceutical industry.

In continuously maintaining MedDRA, the International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use (ICH) endeavors to facilitate the exchange of clinical information through a single standardized international medical terminology which can be used for regulatory communication and evaluation of data pertaining to medicinal products for human use [3]. As a result, MedDRA is designed for use in the registration, documentation and safety monitoring of medicinal products through all phases of the development life cycle.

MedDRA comprises: Medical conditions, indication, investigations (tests, results), medical and surgical procedures, medical, social, family history, medication errors, product quality issues, device-related issues, product use issues, pharmacogenetic terms, toxicologic issues, and standardized queries.

The MedDRA dictionary is organized with a five-level hierarchy. The highest or broadest level is System Organ Class (SOC), further divided into High-Level Group Terms (HLGT), High-Level Terms (HLT), Preferred Terms (PT) and finally into the most granular Lowest Level Terms (LLT). In addition, the MedDRA dictionary includes [Standardised MedDRA Queries \(SMQs\)](#). SMQs are groupings of terms that relate to a defined medical condition or area of interest. SMQs are developed to facilitate retrieval of MedDRA-coded data as a first step in investigating drug safety issues in pharmacovigilance and clinical development. Individual cases are usually coded for data entry at the most specific (LLT) level, and outputs of counts or cases are usually provided at the PT level. The higher levels (HLT, HLGT and SOC) as well as SMQs are used for searching and for organizing and subtotaling of output.

## Background to ICD-9/10-CM

The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) is based on the World Health Organization (WHO)'s Ninth Revision, International Classification of Diseases (ICD-9). ICD-9-CM can be used to code and classify morbidity data. ICD-10 was adopted by the WHO in 1990, with modifications made by Australia in 1998, and Canada in 2001. The ICD-10 is copyrighted by the WHO, which owns and publishes the classification [4]

ICD-9-CM has an alphabetic or numeric first digit; the remaining digits are numeric. Minimum of three digits, maximum of five digits; decimal after 1st three digits: X X X . X X

Category (Digits 1–3) Etiology (4–5)

ICD-10-CM starts with alphabetic (uses all letters except “U”); 2nd character always numeric; 3rd–7th characters can be alphabetic or numeric; decimal is always after 1st three digits: X X X . X X X X

Category (1–3) Etiology (4–6) Extension (7)

## 2. Objectives of this deliverable

To provide a list of potential ICD 9-CM &10-CM and MedDRA codes to retrieve or code the following AESI:

- Anaphylaxis,
- Thrombocytopenia,
- Generalized convulsion,
- Aseptic meningitis,
- Encephalitis, myelitis, acute disseminated encephalomyelitis (ADEM),
- Guillain Barré Syndrome and Miller Fisher Syndrome,
- Peripheral facial nerve palsy.

## 3. Methods

An initial set of codes were retrieved through the Codemapper tool that was developed in the IMI-ADVANCE project (see below a summary). Subsequently they were reviewed and classified into narrow or broad codes by the authors.

### Codemapper

CodeMapper [5] builds upon information from the Metathesaurus of the Unified Medical Language System (UMLS). The Metathesaurus is a compendium of many medical vocabularies, which have been integrated by assigning equivalent codes and terms from different source vocabularies to the same concepts. Each concept in the UMLS is identified by a CUI. A CUI is a Concept Unique Identifier for a Metathesaurus concept to which strings with the same meaning are linked. The Metathesaurus contains more than one million concepts connected to codes from 201 vocabularies. Each concept is assigned to one or more of 127 semantic types, which define broad conceptual categories like Disease or syndrome, Finding, or Substance [6]. Codemapper was built on the version 2016AA of the UMLS. The automatic concept identification of CodeMapper is based on lexical information from the Metathesaurus. The lexical information of a concept consists of terms that can be used in free text to refer to that concept. We compiled a dictionary for the concepts in the semantic groups Anatomy, Chemicals & Drugs, Disorders, Genes & Molecular Sequences, Living Beings, Phenomena, Physiology, and Procedures of non-suppressible, English terms from the following vocabularies: MeSH, MedDRA SNOMED-CT, ICD-9 CM, ICD-10 CM, ICPC-2, and Read-CTv3 [7, 8, 9]. A text-indexing engine Peregrine uses this dictionary to identify medical concepts in the case definition.[10]

CodeMapper provides two operations to improve the sensitivity of the mapping by expanding a concept to more general or more specific concepts, based on the hierarchical relationships in the Metathesaurus. Hierarchical relationships connect concepts that are more general or more specific in meaning. To expand a concept in CodeMapper, all concepts that have a more general or more specific relationship with it are identified and displayed in the application for selection by the user. Hierarchical relationships in the Metathesaurus are inherited

from the source vocabularies (called parent and child) or defined in the Metathesaurus (called broader and narrower). Both types of hierarchical relationships are taken into account for concept expansion. The CodeMapper application is implemented as a web application from the vac4eu website. CodeMapper has three screens. On the first screen, the user enters a clinical case definition (e.g. Brighton Collaboration definition) of an event as free text. Medical concepts are automatically identified in the text and highlighted inline. The second screen displays the mapping as a table with one row for each medical concept, and one column for each targeted vocabulary. Each cell contains the names of the codes that are used to represent the medical concept of the row in the targeted vocabulary of the column. The codes are displayed when the names are hovered over with the mouse. Several user operations are available for revising the mapping. The user can remove concepts from the mapping, search and add concepts, or retrieve more general and more specific concepts. The retrieved concepts are shown in a list and can be selected by the user for inclusion in the mapping. The user can also add or remove vocabularies that should be targeted by the mapping. After every operation, the codes are automatically updated and displayed in the table.

The third screen shows a list of all operations that have been made, for later traceability of the mapping process. When the user saves the mapping, he has to provide a summary of the modifications, which is incorporated into the mapping history. After saving, the mapping and history list are available to other users of the application. Comments can be attached to concepts to capture the discussion about the mapping. Concepts can be categorized by tags. Finally, the user can download the mapping as a spreadsheet file, for example to incorporate the codes into extraction queries. The spreadsheet file comprises the original free-text case definition, the concepts of the mapping, the codes for the targeted vocabulary, and the full history of the mapping process.

Codemapping was conducted by MS. The output of the Codemapper concepts was reviewed by a medical expert (BL) familiar with the Brighton case definitions for all Tier 1 AESI. The concepts were divided into several categories as follows:

- Narrow: those that were clearly related to the AESI in the context of a vaccine-product related reaction
- Expanded: terms that were less specific (e.g. hypersensitivity in the context of anaphylaxis) and could be useful for a broader, more sensitive search.
- Relevant for background rate determination, including coincidental events. (e.g. food related anaphylaxis).

## 4. Results

### 4.1. Anaphylaxis

Anaphylaxis is a complicated condition for coding. The concepts were categorized in a narrow concept set, a set around allergic reactions which might be included to search cases of anaphylaxis and a set of concepts of anaphylaxis with specific other causes (food or insects) that may be added to the codes in table 1 for background rate estimations. ICD-9-CM, 10 and MedDRA Codes for the concepts can be found in appendix 1.



**TABLE 1. NARROW SET OF CONCEPTS FOR ANAPHYLAXIS**

CUI	Name
C0002792	Anaphylaxis
C0161840	Anaphylactic transfusion reaction
C3263932	Anaphylactic reaction due to adverse effect of correct drug or medicament properly administered
C3263869	Anaphylaxis due to serum
C2349793	Anaphylactic reaction due to serum
C3161457	Anaphylactoid reaction due to serum
C0161840	Anaphylactic transfusion reaction
C3263868	Allergic shock due to serum
C0274304	Anaphylactic shock, due to adverse effect of correct medicinal substance properly administered
C2886703	Anaphylactic shock, unspecified, sequela

**TABLE 2. SET OF CONCEPTS FOR CONDITIONS THAT SHOW ALLERGIC REACTIONS.**

CUI	Name
C0002994	Angioedema
C0149526	Allergic urticaria
C0020517	Hypersensitivity
C1527304	Allergic Reaction
C2886707	Other and unspecified allergy

**TABLE 3. SET OF BROADER CONCEPTS THAT MAY BE USED FOR BACKGROUND RATES OF ANAPHYLAXIS**

CUI	Name
C0685898	Food anaphylaxis

## 4.2 Thrombocytopenia

**TABLE 4. CONCEPTS RELATED TO THROMBOCYTOPENIA**

Number	Name
C004003	Thrombocytopenia
C0154301	Acquired thrombocytopenia
C0392386	Decreased platelet count
C0398650	Immune thrombocytopenic purpura
C0857305	Thrombocytopenic purpura
C0701157	Primary thrombocytopenia
C0477317	Other primary thrombocytopenia
C0272278	Congenital thrombocytopenia
C0270236	Neonatal thrombocytopenia due to idiopathic maternal thrombocytopenia
C0270237	Neonatal thrombocytopenia due to isoimmunization
C0158991	Transient neonatal thrombocytopenia

There are no broader concepts for thrombocytopenia

### 4.3 Generalized convulsions

For generalized convulsions narrow and broad concepts were identified. Codes for these concepts are provided in appendix 3.

**TABLE 5. NARROW (SPECIFIC) CONCEPTS TO IDENTIFY GENERALIZED CONVULSIONS**

CUI	Name
C0234533	Generalized seizures
C0036572	Seizures
C0856799	Classic fit
C0234975	Convulsions aggravated
C0751494	Convulsive seizures
C0495698	Convulsions, not elsewhere classified
C0751056	Non-epileptic convulsion
C0490011	Other convulsions
C0270846	Epileptic drop attack
C0014544	Epilepsy
C0494475	Tonic-clonic seizures
C0234535	Seizures, Clonic
C0270844	Seizures, Tonic
C3263970	Epileptic seizures related to external causes Epileptic seizures related to external causes, NOS
C0009952	Febrile convulsions
C0149886	Seizure, Febrile, Simple
C0751057	Seizure, Febrile, Complex
C0311335	Grand Mal Status Epilepticus
C0270823	Petit mal status
C0863106	Afebrile seizure
C0159020	Convulsions in the newborn

Beyond the specific terms we also identified broader terms, reflective of epilepsy (repeated seizure episodes). Codes for these concepts are provided in appendix 3.

**TABLE 6. BROADER CONCEPTS THAT MAY BE INCLUDED TO IDENTIFY GENERALIZED CONVULSIONS IN BACKGROUND RATES**

Number	Name
C0014544	Epilepsy
C1719410	Epilepsy and recurrent seizures
C0154709	Generalized convulsive epilepsy, without mention of intractable epilepsy
C0017332	Generalized nonconvulsive seizure disorder
C0270850	Idiopathic generalized epilepsy
C3263996	Juvenile myoclonic epilepsy (impulsive petit mal)
C0477370	Other generalised epilepsy and epileptic syndromes (NOS)
C3263972	Other epilepsy and recurrent seizures

Number	Name
C1718409	Other forms of epilepsy and recurrent seizures
C0220669	Familial benign neonatal epilepsy

## 4.4 Aseptic meningitis

For aseptic meningitis we identified specific concepts as no broader concepts were found to be eligible. Codes for these concepts are provided in appendix 4.

**TABLE 7. SPECIFIC CODES TO IDENTIFY ASEPTIC MENINGITIS**

Number	Name
C0025290	Aseptic meningitis
C0154651	Non-pyogenic meningitis
C0025297	Viral meningitis
C0153092	Mumps meningitis
C0276430	Enterovirus meningitis
C0276431	Coxsackie meningitis
C0338388	Echovirus meningitis
C0029843	Other specified viral meningitis
C0025297	Viral meningitis
C0868783	Meningitis due to viruses not elsewhere classified
C2887055	Aseptic leptospiral meningitis

## 4.5 Guillain-Barré syndrome and Miller Fisher syndrome

Only two concept sets were identified for Guillain-Barré syndrome and Miller Fisher, the ICD-9/10 and MedDRA codes related to them are listed in appendix 5

**TABLE 8. SPECIFIC CODES TO IDENTIFY GUILLAIN-BARRE SYNDROME AND MILLER FISHER SYNDROME**

C0018378	Guillain-Barre Syndrome
C0393799	Miller Fisher Syndrome

## 4.6 Myelitis, encephalitis and ADEM

For these conditions table 9 provides the concepts, no broader concepts were considered eligible. Codes are provided in appendix 6

**TABLE 9. SPECIFIC CONCEPT SETS TO IDENTIFY MYELITIS, ENCEPHALITIS AND ADEM**

C0014038	Encephalitis
C0751101	Post-vaccinal encephalitis
C0729577	Post-immunization encephalitis
C1719353	Encephalitis and encephalomyelitis following immunization procedures
C1719358	Encephalitis, myelitis, and encephalomyelitis following immunization procedures
C1719361	Postinfectious encephalitis, myelitis and encephalomyelitis
C1719360	Other postinfectious encephalitis and encephalomyelitis

C0014038	Encephalitis
C1719365	Other causes of encephalitis and encephalomyelitis
C1719368	Other causes of encephalitis, myelitis and encephalomyelitis
C1719369	Unspecified cause of encephalitis, myelitis and encephalomyelitis
C0026975	Myelitis
C1719356	Myelitis following immunization procedures
C0751343	Myelitis, Postinfectious
C1719367	Other causes of myelitis
C0026976	Myelitis, Transverse
C0270627	Myelitis, Acute Transverse
C0014059	Encephalomyelitis, Acute Disseminated
C1719722	Infectious acute disseminated encephalomyelitis (ADEM)
C2875015	Acute disseminated encephalitis and encephalomyelitis, unspecified
C3263956	Postinfectious acute disseminated encephalitis and encephalomyelitis (postinfectious ADEM)
C3263957	Postimmunization acute disseminated encephalitis, myelitis and encephalomyelitis

## 4.7 Peripheral facial nerve palsy

Only two concept sets were identified for idiopathic facial nerve palsy also known as Bell's Palsy. The ICD-9/10 and MedDRA codes related to them are listed in appendix 7.

**TABLE 10. CONCEPT SETS TO IDENTIFY FACIAL NERVE PALSY.**

CUI	Name
C0376175	Bell Palsy
C0015469	Facial paralysis

## 5. Conclusions and recommendations

This document was created to provide investigators with concepts and ICD-9/10 CM and MedDRA codes for the identification of cases from diagnosis codes in electronic health care datasources and pharmacovigilance datasets. Based on the purpose of the study, identification may be more specific or more sensitive. In signal detection one may wish to be more sensitive, as well as in estimation of background rates, whereas in signal evaluation studies we aim for specificity to reduce misclassification of cases. Concept identifiers can also be used to map to other terminologies (e.g. ICPC, READ or Mesh)

The SPEAC team recommends that developers (CEPI or otherwise funded) or investigators use the proposed codes, to harmonize background rate generation and preferably generate rates by concept as well as report on the distribution of concepts and codes

## 6. References

- [1] The Development Safety Update Report (DSUR): Harmonizing the Format and Content for Periodic Safety Reporting During Clinical Trials: Report of CIOMS Working Group VII, Geneva 2007. <https://cioms.ch/shop/product/development-safety-update-report-dsur-harmonizing-format-content-periodic-safety-report-clinical-trials-report-cioms-working-group-vii/> (accessed January 14, 2020)
- [2] Bonhoeffer J, Kohl K, Chen R et al. The Brighton Collaboration – enhancing vaccine safety. *Vaccine* 2004; 22: 2046
- [3]. MedDRA. <https://www.ich.org/page/meddra> accessed Sept 30 2020
- [4] Donna J. Cartwright. ICD-9-CM to ICD-10-CM Codes: What? Why? How? *Advances in Wound Care*, 2013 (2) 10: 588-592. Doi: 10.1089/wound.2013.0478
- [5] Becker BFH, Avillach P, Romio S, van Mulligen EM, Weibel D, Sturkenboom MCJM, Kors J. CodeMapper: Semi-automatic coding of case definitions. A contribution from the ADVANCE project. *Pharmacoepidemiology and Drug Safety*, 2017 (8) 26: 998-1005. Doi:10.1002/pds.4245
- [6] McCray AT, Burgun A, Bodenreider O. Aggregating UMLS semantic types for reducing conceptual complexity. *Studies Health Technology Information*, 2001 84(Pt 1): 216-20. PMID: 11604736; PMCID: PMC4300099.
- [7] Rogers F. Medical subject headings. *Bull Med Libr Assoc*, 1963. 51(1): 114-6. PMID: 13982385; PMCID: PMC197951.
- [8] Brown EG, Wood L, Wood S. The medical dictionary for regulatory activities (MedDRA). *Drug Safety*, 1999. 0(2):109-17. Doi: 10.2165/00002018-199920020-00002.
- [9] Donnelly K. SNOMED-CT: The advanced terminology and coding system for eHealth. *Stud Health Technol Inform*, 2006 121:279-90. PMID: 17095826
- [10] Schuemie MJ, Jelier R, Kors JA. Peregrine: Lightweight gene name normalization by dictionary lookup. In: *Proc of the Second BioCreative Challenge Evaluation Workshop.*, 2007. 131–133.

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# ANNEXES

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## ANNEX 1.

### Anaphylaxis Codes

**TABLE 1. NARROW TERMS FOR ANAPHYLAXIS**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0002792	anaphylaxis	Anaphylactic reaction (ICD9CM other anaphylactic reaction; ICD10CM anaphylactic shock, unspecified, initial encounter)	10002198	995.0	T78.2XXA
		Anaphylactic shock	10002199		
		Anaphylaxis	10002218		
		Systemic anaphylactic reaction	10042930		
		Systemic anaphylaxis	10042931		
		Allergic shock	10069526		T78.2
C0161840	Anaphylactic transfusion reaction	Anaphylactic transfusion reaction	10067113		
C3263932	Anaphylactic reaction due to adverse effect of correct drug or medicament properly administered	Anaphylactic reaction due to adverse effect of correct drug or medicament properly administered			T88.6
C3263869	Anaphylaxis due to serum	Anaphylaxis due to serum			T80.5
C2349793	Anaphylactic reaction due to serum	Anaphylactic reaction due to serum			T80.5
C3161457	Anaphylactoid reaction due to serum	Anaphylactoid reaction due to serum			T80.5
C0161840	Anaphylactic transfusion reaction	Anaphylactic shock due to serum			T80.5
C3263868	Allergic shock due to serum	Allergic shock due to serum			T80.5
C0274304	Anaphylactic shock, due to adverse effect of correct medicinal substance properly administered	Anaphylactic shock due to adverse effect of correct drug or medicament properly administered			T88.6
C2886703	Anaphylactic shock, unspecified, sequela	Anaphylactic shock, unspecified, sequela			T78.2XXS

**TABLE 2. BROAD SEARCH TERMS FOR ALLERGIC REACTIONS**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0002994	Angioedema	Angio-edema	10002394		
		Angio-oedema	10002395		
		Angioedema	10002424		
		Angioedemas	10002425		
		Angioedema and urticaria	10002426		
		Giant hives	10018257		
		Giant urticaria	10018259		
		Hives giant	10020198		
		Urticaria giant	10046744		
C0149526	Allergic urticaria	Allergic urticaria	10001734	708.0	L50.0
C0020517	Hypersensitivity	Allergic reaction	10001718		
		Allergic reaction NOS	10001719		
		Allergy	10001738		
		Allergy NOS	10001741		
		Hypersensitivity	10020751		
		Hypersensitivity NOS	10020755		
		Hypersensitivity reaction	10020756		
		Hypersensitivity reaction (NOS)	10020757		
		Hypersensitivity symptom	10020759		
		HYSN	10021150		
		Reaction allergic (NOS)	10037932		
		Reaction hypersensitivity (NOS)	10037948		
		Allergic reaction (NOS)	10048495		
		Allergy, unspecified			T78.40
C1527304	Allergic Reaction	Allergic reaction NOS			T78.40
C2886707	Other and unspecified allergy	Other and unspecified allergy			T78.40



**TABLE 3. CONCEPTS THAT COULD BE CONFUSED WITH VACCINE-ASSOCIATED ANAPHYLAXIS (MAY BE INCLUDED FOR BACKGROUND INCIDENCE RATE PURPOSES)**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0685898	Food anaphylaxis	Anaphylactic shock due to adverse food reaction	10002200		
		Anaphylactic reaction to food	10054843		
		Anaphylactic reaction due to food		995.6	
		Anaphylactic reaction due to adverse food reaction			T78.0

## ANNEX 2.

### Thrombocytopenia Codes

**TABLE 1. CONCEPTS FOR THROMBOCYTOPENIA AND THROMBOCYTOPENIC PURPURA**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0040034	Thrombocytopenia	Thrombocytopaenia	10043551		
		Thrombocytopenia	10043554		
		Thrombocytopenias	10043555		
		Thrombocytopenia, unspecified	10043560	287.5	D69.6
		Thrombopenia	10043569		
C0154301	Acquired thrombocytopenia	Secondary thrombocytopenia	10039884	287.4	D69.5
C0392386	Decreased platelet count	Low platelets	10024922		
		Platelet count decreased	10035528		
		Platelet count low	10035529		
		Platelets decreased	10035545		
		Reduced platelet count	10038213		
		Thrombocyte count decreased	10043546		
C0398650	Immune thrombocytopenic purpura	Immune thrombocytopenic purpura	10074667	287.31	D69.3
		Idiopathic purpura	10021243		
		Idiopathic thrombocytopenic purpura	10021245		
		ITP	10023095		
		Werlhof's syndrome	10051064		
C0857305	Thrombocytopenic purpura	Thrombocytopaenic purpura	10043552		
		Thrombocytopenia purpura	10043558		
		Thrombocytopenic purpura	10043561		
		Purpura thrombocytopenic	10037561		
C0701157	Primary thrombocytopenia	Primary thrombocytopenia	10036735	287.3	
		Primary thrombocytopenia NOS			D69.49
C0477317	Other primary thrombocytopenia	Other primary thrombocytopenia		287.39	D69.49
C0272278	Congenital thrombocytopenia	Congenital thrombocytopenia			D69.42
C0270236	Neonatal thrombocytopenia due to idiopathic maternal thrombocytopenia				P61.0
C0270237	Neonatal thrombocytopenia due to isoimmunization				P61.0
C0158991	Transient neonatal thrombocytopenia	Transient neonatal thrombocytopenia	10044394	776.1	P61.0

## ANNEX 3.

### Generalized convulsion Codes

**TABLE 1. NARROW SEARCH TERMS FOR GENERALIZED CONVULSION**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0234533	Generalized seizures	Convulsions generalised	10010916 10010917		
		Generalized convulsion	10018079		
		Seizures	10010914	780.3	
C0036572	Seizures	Unspecified convulsions			R56.9
		Convulsion	10010904		
		Convulsion (NOS)	10010906		
		Convulsions (NOS)	10010922		
		Seizure	10039906	780.39	
		Seizures	10039910	780.39	
		Fit	10016731		
		Fits NOS	10016735		
		Fitting	10039910		
C0856799	Classic fit	Classic fit	10009234		
C0234975	Convulsions aggravated	Convulsions aggravated	10010915		
		Convulsions NOS aggravated	10010923		
C0751494	Convulsive seizures	Convulsive seizure	10010926		
		Seizure(s) (convulsive) NOS			R56.9
C0495698	Convulsions, not elsewhere classified				R56.9
C0751056	Non-epileptic convulsion	Fit (non-epileptic)	10016733		
C0490011	Other convulsions	Other convulsions		780.39	
C0270846	Epileptic drop attack	Atonic seizures	10003628		
		Drop seizures	10071377		
C0014544	Epilepsy	Epileptic fit	10015051		
		Epileptic seizure	10015052		
C0494475	Tonic-clonic seizures	Grand mal seizure	1008663		
		Grand mal seizure NOS			G40.4
		Grand mal fit	10018662		
		Grand mal epileptic fit	10018661		
		Seizure grand mal	10039909		
		Generalised tonic-clonic seizure	10018100		
		Generalised tonic-clonic seizures	10018101		
C0234535	Seizures, Clonic	Clonic seizures	10009340		
		Clonic convulsion	10053398		
C0270844	Seizures, Tonic	Tonic convulsion	10043994		
		Tonic seizure	10043996		
		Tonic seizures	10043997		

C3263970	Epileptic seizures related to external causes				G40.5	
	Epileptic seizures related to external causes, NOS				G40.509	
C0009952	Febrile convulsions	Febrile convulsions	10016284		R56.0	
		Febrile convulsions(simple) unspecified		780.31		
		Febrile convulsion NOS				R56.00
		Convulsion febrile	10010908			
		Febrile convulsion seizure	10016285			
		Febrile seizure	10016290			
		Febrile fits	10016287			
		Fever convulsions	10016560			
		Pyrexial fit	10037670			
C0149886	Seizure, Febrile, Simple			780.31	R56.00	
C0751057	Seizure, Febrile, Complex			780.32	R56.01	
C0311335	Grand Mal Status Epilepticus	Grand mal status (epileptic)	10018664	345.3		
		Status epilepticus grand mal	10041963			
		Convulsive status epilepticus	10057955			
C0270823	Petit mal status	Petit mal status (epileptic)	10034760	345.2		
		Status epilepticus petit mal	10041964			
C0863106	Afebrile seizure	Afebrile seizure	1001436			
		Afebrile convulsion	1001435			
C0159020	Convulsions in the newborn	Convulsions in newborn	10010919	779.0	P90	
		Convulsion neonatal	10010911			
		Convulsions in newborn	10010921			
		Neonatal convulsion	10028932			
		Neonatal seizures	10061197			
		Neonatal fit	10028939			

**TABLE 2. ADDITIONAL TERMS FOR BACKGROUND RATE DETERMINATION FOR GENERALIZED CONVULSION**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0014544	Epilepsy	Epilepsy, unspecified	10015046	345.9	G40.9
		Epilepsy NOS	10015042		G40.909
		Epilepsy	10015037		
		Epileptic fit	10015051		
		Epileptic seizure	10015052		
C0311334	Generalized convulsive epilepsy		10018109 10073920	345.1	
C0154709	Generalized convulsive epilepsy, without mention of intractable epilepsy		10018111	345.10	
C0017332	Generalized nonconvulsive seizure disorder	Generalized non-convulsive epilepsy	10018090 10018119 10057704	345.0	
C0270850	Idiopathic generalized epilepsy		10071081 10071096		G40.3
C3263996	Juvenile myoclonic epilepsy (impulsive petit mal)				G40.B
C0477370	Other generalised epilepsy and epileptic syndromes (NOS)				G40.4 G40.40
C3263972	Other epilepsy and recurrent seizures				G40.8
C1718409	Other forms of epilepsy and recurrent seizures			345.8	
C0220669	Familial benign neonatal epilepsy	Benign familial neonatal convulsions	10067866		

## ANNEX 4.

### Aseptic meningitis Codes

**TABLE 1. CONCEPTS AND CODES FOR ASEPTIC MENINGITIS**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0025290	Aseptic meningitis	Aseptic meningitis	10003458		G03.0
		Meningitis aseptic	10027201		
C0154651	Non-pyogenic meningitis	Non-pyogenic meningitis	10029669	322.0	
		Non-pyogenic meningitis	10057724		G03.0
C0025297	Viral meningitis	Viral meningitis	10047469		A87
		Viral meningitis, unspecified	10046236		A87.9
		Meningitis viral	10027260		
		Meningitis viral NOS	10027262		
C0153092	Mumps meningitis	Mumps meningitis	10028263	072.1	B26.1
		Mumps virus meningitis	10028273		
		Meningitis mumps	10027250		
		Meningitis due to mumps virus	10027220		
C0276430	Enterovirus meningitis	Enteroviral meningitis			A87.0
		Meningitis due to enterovirus	10027213	047	
		Meningitis due to enterovirus, other	10027214		
		Meningitis due to other enterovirus	10027222		
		Meningitis due to enterovirus, unspecified	10027215		
		Meningitis due to unspecified enterovirus	10027229		
C0276431	Coxsackie meningitis	Meningitis due to coxsackie virus	10027211	047.0	
		Coxsackie aseptic meningitis	10011253		
		Meningitis coxsackie viral	10027208		
C0338388	Echovirus meningitis	Echovirus meningitis			A87.0
		Meningitis due to echo virus	10027212	047.1	
		Meningitis echo viral	10027231		
C0029843	Other specified viral meningitis		10032945	047.8	
C0025297	Viral meningitis	Unspecified viral meningitis		047.9	
C0868783	Meningitis due to viruses not elsewhere classified			321.2	
C2887055	Aseptic leptospiral meningitis	Aseptic meningitis in leptospirosis			A27.81

No broad codes identified

## ANNEX 5.

### Guillain Barré Syndrome and Miller Fisher Syndrome Codes

**TABLE 1.** CONCEPTS FOR GUILLAIN BARRÉ AND MILLER FISHER SYNDROMES

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0018378	Guillain-Barre Syndrome	Guillain-Barre syndrome	10018767		G61.0
		Guillain Barre syndrome	10018766		
		Syndrome Guillain-Barre	10042812		
		Acute infective polyneuritis	10000813	357.0	
		Acute inflammatory demyelinating polyradiculoneuropathy	10067898		
		Paralysis ascending	10033803		
C0393799	Miller Fisher Syndrome	Miller Fisher Syndrome	10049567		G61.0
		Fisher's syndrome		357.0	

No broader concepts identified

## ANNEX 6.

### Encephalitis, Myelitis and Acute disseminated encephalomyelitis Codes

**TABLE 1. NARROW SEARCH TERMS FOR ENCEPHALITIS, MYELITIS AND ACUTE DISSEMINATED ENCEPHALOMYELITIS (ADEM)**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0014038	Encephalitis	Encephalitis	10014581		
		Encephalitis NOS	10014601		
C0751101	Post-vaccinal encephalitis	Encephalitis following immunization procedures	10014588 10056198		G04.02
		Encephalomyelitis, post immunization			G04.02
C0729577	Post-immunization encephalitis	Encephalitis post immunization	10014602 10054373		G04.02
C1719353	Encephalitis and encephalomyelitis following immunization procedures			323.51	G04.02
C1719358	Encephalitis, myelitis, and encephalomyelitis following immunization procedures			323.5	G04.02
C1719361	Postinfectious encephalitis, myelitis and encephalomyelitis			323.6	G04.01
C1719360	Other postinfectious encephalitis and encephalomyelitis			323.62	
C1719365	Other causes of encephalitis and encephalomyelitis			323.81	
C1719368	Other causes of encephalitis, myelitis and encephalomyelitis			323.8	
C1719369	Unspecified cause of encephalitis, myelitis and encephalomyelitis			323.9	
C0026975	Myelitis	Myelitis	10028524		
		Myelitis NOS	10028526		G04.91
C1719356	Myelitis following immunization procedures			323.52	G04.02
C0751343	Myelitis, Postinfectious	Postinfectious myelitis		323.63	
C1719367	Other causes of myelitis			323.82	G04.89
C0026976	Myelitis, Transverse	Myelitis, transverse	10028527	341.2	G37.9
C0270627	Myelitis, Acute Transverse	Myelitis, Acute Transverse		341.2 341.20	G37.3
C0014059	Encephalomyelitis, Acute Disseminated	Acute disseminated encephalomyelitis	10000709		
C1719722	Infectious acute disseminated encephalomyelitis (ADEM)			323.61	
C2875015	Acute disseminated encephalitis and encephalomyelitis, unspecified				G04.00 G04.81 G04.90
	Acute disseminated demyelination, unspecified			341.9	G36.9
C3263956	Postinfectious acute disseminated encephalitis and encephalomyelitis (postinfectious ADEM)				G04.01
C3263957	Postimmunization acute disseminated encephalitis, myelitis and encephalomyelitis				G04.02



## ANNEX 7.

### Peripheral facial nerve palsy Codes

**TABLE 1. NARROW SEARCH TERMS FOR PERIPHERAL FACIAL NERVE PALSY**

Codemapper Concept		Diagnostic Coding System Term and Codes			
Number	Name	Term	MedDRA	ICD9CM	ICD10CM
C0376175	Bell Palsy	Bell’s palsy	10004223	351.0	G51.0
		Palsy Bells	10033559		
C0015469	Facial paralysis	Facial palsy	10016060		G51.0
		Facial paralysis	10016062		
		Paralysis facial	10033808		