

SwedPop Documentation

Principles of Coding
Historic Causes of Death using
the ICD10h code system

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Historical causes of death

A cause of death can be defined as the chain of events leading to death. Causes of death can therefore be diseases, accidents and other external causes of death, e.g. injuries, poisoning, suicide and homicide. In the historical sources, the causes of death were recorded in the death and burial books and in parallel, in death certificates. For more information on reporting causes of death in Sweden see Rogers (1999)¹, and the National Board of Health and Welfare (2010)².

From the 19th century onwards, there has been a major change in both medical terminology and diagnostics. This means that the cause of death information gradually changes over time. Examples include the existence of different names for the same disease as well as the use of archaic disease names that are no longer used in modern medical terminology. Who reported the death and, in particular, access to a physician, also creates differences in the historical cause of death material.

With the aim of structuring and making the information easily accessible for research, Swedpop has applied an international code system for historical causes of death, ICD10h, developed within the research network SHiP+ (Studying the history of Health in (Port) cities)³.

The structure of the ICD10h system

As a basic structure for ICD10h, the modern international classification system, ICD-10 (version 2016)⁴ has been used and adapted to work with the medical terms and designations used in the 19th and 20th centuries. For more information on the construction of the system, see Janssens (2021)⁵. The chapters and categories of the ICD-10 classification system can be seen in Table 1. For an introduction to the ICD-10 classification system, please consult the ICD-10 Instruction manual⁶.

The ICD10h code system has a structure that follows the ICD-10 system's four-digit alphanumeric code extended by two decimal places. The purpose of this extension is to provide scope for assigning special codes to historical designations that are synonyms for the same disease, see the example of Typhoid fever in Table 2.

¹ Rogers, J., (1999). Reporting causes of death in Sweden, 1750–1950. *Journal of the history of medicine and allied sciences*, 54(2): 190–209, <https://doi.org/10.1093/jhmas/54.2.190>.

² Befolkningsstatistik, Historik, produktionsmetoder och tillförlitlighet (2010)

<https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/statistik/2010-4-33.pdf>

³ Forskarnätverket SHiP websida <https://www.ru.nl/rich/our-research/research-groups/radboud-group-historical-demography-family-history/networks/ship/>

⁴ <https://icd.who.int/browse10/2016/en>

⁵ Janssens, A. (2021). Constructing SHiP and an International Historical Coding System for Causes of Death. *Historical Life Course Studies*, 10, 64-70. <https://doi.org/10.51964/hlcs9569>

⁶ The WHO ICD-10 Instruction manual (2016) https://icd.who.int/browse10/Content/statichtml/ICD10Volume2_en_2016.pdf

Table 1. The Chapters and categories of the ICD-10 system

Chapter	ICD-10 Categories	Description
I	A00-B99	Certain infectious and parasitic diseases
II	C00-D48	Neoplasms
III	D50-D89	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
IV	E00-E90	Endocrine, nutritional and metabolic diseases
V	F00-F99	Mental and behavioural disorders
VI	G00-G99	Diseases of the nervous system
VII	H00-H59	Diseases of the eye and adnexa
VIII	H60-H95	Diseases of the ear and mastoid process
IX	I00-I99	Diseases of the circulatory system
X	J00-J99	Diseases of the respiratory system
XI	K00-K93	Diseases of the digestive system
XII	L00-L99	Diseases of the skin and subcutaneous tissue
XIII	M00-M99	Diseases of the musculoskeletal system and connective tissue
XIV	N00-N99	Diseases of the genitourinary system
XV	O00-O99	Pregnancy, childbirth and the puerperium
XVI	P00-P96	Certain conditions originating in the perinatal period
XVII	Q00-Q99	Congenital malformations, deformations and chromosomal abnormalities
XVIII	R00-R99	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified
XIX	S00-T98	Injury, poisoning and certain other consequences of external causes
XX	V01-Y98	External causes of morbidity and mortality
XXI	Z00-Z99	Factors influencing health status and contact with health services
XXII	U00-U85	Codes for special purposes

Table 2. ICD10h codes for Typhoid fever

ICD-10	Modern description	ICD10h	historical description
A01.0	Typhoid and paratyphoid fevers <i>Febris typhoides et febris paratyphoides</i>	A01.000	typhoid fever
		A01.001	enteric fever
		A01.002	bilious fever
		A01.003	gastric fever
		A01.004	colonial fever
		A01.005	fog fever

The system also allows for geographical differences in the naming of diseases. The Swedish cause of death '*Slag*', or '*Slaganfall*', which was probably used to denote 'stroke' or 'sudden death', has been assigned its own specific ICD10h code under the stroke category I64.003, which is illustrated in Table 3.

The cause of death '*Slag*' was often used as a cause of death for adults as well as infants, and the placement under 'stroke' is thus an expanded interpretation of I64 and should of course be considered an approximate placement when used in analyses. During certain periods, there is a high incidence of death from the disease '*Slag*' among infants, which in this context perhaps could be interpreted as '*sudden death*'.

ICD10h, principles of coding

Trying to organize historical causes of death in a modern code system is no easy task. One difficulty faced is that the cause of death information provided in the historical sources was often of a symptom-describing nature rather than a clearly stated disease. Another difficulty is that the medical terminology and accuracy of the diagnoses have changed over time. Therefore, it is often a challenge to systematically interpret and translate the historical names of diseases that are registered in the sources.

This entails that an interpretation and approximation is at hand during the assignment of codes to historical causes of death. With the modern ICD-10 system as a base, the historical cause of death information has been organized into a structure adapted to work with historical naming of diseases. It is important to note that when coding historical causes of death, it has not been possible to follow all the rules and guidelines that apply to the modern ICD-10 system. In ICD10h coding, the basic coding guidelines of the ICD-10 system have been used as a starting point⁷. Instead of trying to apply these rules precisely, they have been extended to also include the sometimes vague and symptomatic causes of death used in historical contexts.

⁷ The basic coding guidelines for ICD-10, see the ICD-10 Instruction manual (2016), Section .33 https://icd.who.int/browse10/Content/statichtml/ICD10Volume2_en_2016.pdf

Table 3. Specific ICD10h code for the Swedish term 'Slag, slaganfall'

ICD-10	ICD-10 description	ICD10h	ICD10h description
I64	Stroke, not specified as haemorrhage or infarction <i>Apoplexia cerebri, haemorrhagia sive infarctu non indicato</i>	I64.000	stroke
		I64.001	apoplexy
		I64.002	strokes, multiple
		I64.003	Slag, slaganfall

Principles of classification of external causes of death

Causes of death caused by external events are often complex in their content and often described in terms of a sequence of events. The text may contain information about the circumstances of the incident, what injuries occurred, which activity was carried out, the place where it happened and, in some cases, consequential effects such as the triggering of an illness that led to death. All these parameters has to be taken into account in the ICD-10/ICD10h coding of external events.

External causes of morbidity and mortality, collected in Chapter XX in ICD-10, permits the classification of environmental events and circumstances as the cause of injury, poisoning and other adverse effects. The instructions says "Where a code from this section is applicable, it is intended that it shall be used in addition to a code from another chapter of the (ICD-10) classification indicating the nature of the condition. Most often, the condition will be classifiable to Chapter XIX, Injury, poisoning and certain other consequences of external causes (S00-T98). Causes of death should preferably be tabulated according to both Chapter XIX and Chapter XX, but if only one code is tabulated then the code from Chapter XX should be used in preference".

In the work with processing and coding external events at CEDAR, we have applied a stepwise strategy where the entire original text string is classified into a block of category and a subgroup before the detailed ICD10h code is set. This classification procedure is based on the separate publication for Classification of External Causes of Disease and Death⁸ and has been used to facilitate a consistent handling of the varying content of external events.

The blocks of categories, based on the same division as in Chapter XX of ICD-10, and its ICD10h intervals (see Table 1), are reproduced in Table 4.

⁸ The Swedish National Board of Health and Welfare has published a separate publication for Classification of External Causes of Disease and Death. The list is intended as an aid in classifying the mode of origin of injuries and poisonings. It has been found that there is a need - mainly for those working on damage prevention projects - to have a separate publication for the classification and analysis of causes of injuries etc, see the separate instruction manual (Swedish) https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/klassifikationer-och-koder/1999-4-2_199942.pdf

Table 4. Block of categories and ICD10h interval in Chapter XX, external causes of death.

Block of category	ICD-10	ICD10h interval
Accidents	V01-X59.9	V01.000-X59.900
Event of undetermined intent	X60-X84	X60.000-X84.000
Intentional self-harm	X85-Y09	X85.000-Y09.002
Assault	Y10-Y34	Y10.000-Y34.007
Legal intervention and operations of war	Y35-Y36.9	Y35.000-Y36.900
Complications of medical and surgical care	Y40-Y84.9	Y40.000-Y84.900
Sequelae of external causes of morbidity and mortality	Y85-Y89.9	Y85.000-Y89.900
Supplementary factors related to causes of morbidity and mortality classified elsewhere	Y90-Y98	Y90.000-Y98.000

However, when coding external causes of death, several principles must be considered depending on the block of categories in question, which is elaborated in Table 5.

Table 5. Principles for classification of the block of category.

Block of category	Principle
Accidents	The text contains explicit words that indicate that the event is an accident, for example 'accident', 'of danger', 'accidental incident' or the like.
Event with undetermined intent	The text lacks explicit words that state the intention of the event. For example, text strings such as 'Drowning', 'Poisoning', 'Hanging', 'Suffocated' end up under this group.
Suicide	When it appears from the text that the death is interpreted as suicide, that the injury is self-inflicted.
Assault	Words that describe an abuse such as murder, manslaughter, assault etc.
Legal intervention and operations of war	The text contains words such as war, legally executed, etc.
Supplementary factors related to causes of morbidity and mortality classified elsewhere	Contributing factors such as alcohol influence and lifestyle.

Block of category	Principle
Medical accident	Complications arising from medical and surgical care.
Sequelae of external causes of morbidity and mortality	Sequelae of external causes of morbidity and mortality. Late effects of external causes are double-coded if possible with a code from chapter 20 and supplemented with a code regarding injuries (chapter 19) and/or illnesses.

Subsequently the text string is assigned to a subgroup and the final assignment of ICD10h code is often straightforward. In Table 6 this is exemplified by different examples of drowning and submersion. Note that drowning, not otherwise specified, is interpreted as an event with undetermined intent. For the user that is interested in drowning and submersion all blocks of categories must be consulted to capture all cases of drowning and submersion, i.e. accidents, assaults, suicides and event with undetermined intent. The same applies to events involving poisoning and suffocation.

Table 6. Examples of drowning and submersion, classification and ICD10h code.

Text string	Block of category	Subgroup	ICD-10 two-level description	ICD10h
Drowning while paddling in a canoe on the Lais Rive	Accidents	Transport accident, watercraft	Accident to watercraft causing drowning and submersion Canoe or kayak	V90.500
Drowned by accident during timber floating	Accidents	Other external causes, suffocation	Accidental drowning and submersion Drowning and submersion while in natural water	W69.000
The mother drowned the child, murder	Assault	Drowning, submersion	Assault Assault by drowning and submersion	X92.000
Sucicide by drowning	Suicide	Drowning, submersion	Intentional self-harm Intentional self-harm by drowning and submersion	X71.000
Death by drowning	Event with undetermined intent	Drowning, submersion	Event of undetermined intent Drowning and submersion, undetermined intent	Y21.000