Package 'ICD10gm'

<div align="center">January 20, 2025</div>

Title Metadata Processing for the German Modification of the ICD-10
Coding System

Version 1.2.5

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Description

Provides convenient access to the German modification of the International Classification of Di-
agnoses, 10th revision (ICD-10-GM). It provides functionality to aid in the identification, specifi-
cation and historisation of ICD-10 codes. Its intended use is the analysis of routinely col-
lected data in the context of epidemiology, medical research and health services research. The un-
derlying metadata are released by the German Institute for Medical Documentation and Informa-
tion <https://www.dimdi.de>, and are redistributed in accordance with their license.

Depends R (>= 3.1.2)

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URL https://edonnachie.github.io/ICD10gm/,
https://doi.org/10.5281/zenodo.2542833

BugReports https://github.com/edonnachie/ICD10gm/issues/

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Author Ewan Donnachie [aut, cre] (<https://orcid.org/0000-0002-0668-0049>)

Maintainer Ewan Donnachie <ewan@donnachie.net>

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charlson_rcs	*Charlson Comorbidities (Royal College of Surgeons)*

Description

Specification of the Charlson comorbidity index in the version of the Royal College of Surgeons (2010).

Usage

```
charlson_rcs
```

Format

An object of class spec_tbl_df (inherits from tbl_df, tbl, data.frame) with 124 rows and 2 columns.

Details

The specification can be expanded using the icd_expand function to return all corresponding ICD-10-GM codes.

This table was created on the basis of the publication referenced below. It is provided as is with no guarantee of accuracy. Furthermore, the applicability of the codes in the context of the German ICD-10-GM is unclear.

Condition Disease entity

ICD_SPEC Secification of the corresponding ICD-10 codes, suitable for input to icd_expand

Source

[doi:10.1002/bjs.6930](doi:10.1002/bjs.6930)

See Also

Other Charlson: charlson_sundararajan

---

charlson_sundararajan   *Charlson Comorbidities (Sundararajan)*

Description

Specification of the Charlson comorbidity index in the version of Sunhararahan et al. (2004).

Usage

charlson_sundararajan

Format

An object of class spec_tbl_df (inherits from tbl_df, tbl, data.frame) with 17 rows and 3 columns.

Details

The specification can be expanded using the icd_expand function to return all corresponding ICD-10-GM codes.

This table was created on the basis of the publication referenced below. It is provided as is with no guarantee of accuracy. Furthermore, the applicability of the codes in the context of the German ICD-10-GM is unclear.

Condition Disease entity

Weight Controbition of the disease entity towords the combined comorbidity index

ICD_10_AM Secification of the corresponding ICD-10 codes, suitable for input to icd_expand

Source

doi:10.1016/j.jclinepi.2004.03.012

See Also

Other Charlson: charlson_rcs

---

get_icd_history   *Get ICD history metadata*

Description

A utility function to query the icd_meta_transition table.

Usage

```
get_icd_history(years = NULL, icd3 = NULL)
```

Arguments

years	Year or years to get (numeric or character vector)
icd3	(optional) ICD codes to select (regular expression, matched exactly using grep)

Details

Returns a data frame with ICD transition history, consisting of year, ICD code and label. Optional arguments allow selection of entries by year or ICD code. This is beneficial because the entire history is relatively large and rarely required in full.

Value

data.frame, see icd_hist

Examples

```
get_icd_history(years = 2009:2010, icd3 = "K52")
```

---

get_icd_labels   *Get or query ICD-10 labels*

Description

A utility function to get or query icd_meta_codes, returning a limited selection of ICD-10 codes and labels.

Usage

```
get_icd_labels(year = NULL, icd3 = NULL, search = NULL, ...)
```

Arguments

year	Year or years to get (numeric or character vector)
icd3	A character vector of three-digit ICD-10 codes to select
search	(optional) A string to search for in the label column using fuzzy matching (agrep)
...	(optional) Further arguments passed to agrep when searching with icd_label

Details

If an ICD code is provided as argument `icd3`, all corresponding codes and subcodes are returned. If a search term is provided, all codes are returned whose label matches the string approximately.

Returns a data frame with ICD metadata, consisting of year, ICD code and label. Optional arguments allow selection of entries by year, code or label. This is beneficial because the entire history is relatively large and rarely required in full.

Value

data.frame(year, icd3, icd_code, icd_normcode, icd_sub, label), see icd_labels

Examples

```
get_icd_labels(year = 2019, icd3 = "I25")
get_icd_labels(year = 2019, search = "Asthma")
```

---

icd_browse	*Lookup a 3-digit ICD-10-GM code in the official BfArM browser*

Description

Given a 3-digit ICD-10-GM code, this function will generate the URL of the corresponding page of the BfArM ICD-10-GM browser, and use `browseURL()` to open it.

Usage

```
icd_browse(icd3, year = NULL, open_browser = TRUE)
```

Arguments

icd3	3-digit ICD-10-GM code (e.g. "A01")
year	ICD-10-GM version (default: most recent available version). Only works for year >= 2009.
open_browser	Whether to open the ICD-10-GM documentation in the default browser (Default: TRUE, as this is the primary intention of the function)

Details

This currently provides the correct URL for ICD-10-GM versions from 2009. Given that BfArM are still using the old dimdi.de domain for this purpose, it is possible that the URL schema will change in the near future.

This is a convenience function intended for interactive use.

Value

Called for side-effect, but returns the URL invisibly icd_search() to search for a string in the ICD-10-GM labels icd_lookup() to lookup an ICD-10-GM code in the console

Examples

```
icd_browse("R50", open_browser = FALSE)
```

---

icd_expand   *Expand list of ICD codes to include all possible subcodes*

Description

The function icd_expand takes a data.frame containing ICD codes and optional metadata as input. It returns a data.frame containing all ICD codes at or below the specified level of the hierarchy (e.g. the specification "E11" is expanded to include all three, four and five-digit codes beginning with E11).

Usage

```
icd_expand(
  icd_in,
  year,
  col_icd = "ICD",
  col_meta = NULL,
  type = "strict",
  ignore_icd_errors = FALSE
)
```

Arguments

icd_in	Data frame defining ICD codes of interest
year	ICD 10 version
col_icd	Column of icd_in containing ICD codes (Default: ICD)
col_meta	(Optional) Columns containing meta information to retain (e.g. Grouper, age or other criteria for later use). If left NULL, only col_icd is retained.

type
: A character string determining how strictly matching should be performed, passed to icd_parse. This must be one of "strict" (str contains a ICD code with no extraneous characters), bounded (str contains an ICD code with a word boundary on both sides) or weak (ICD codes are extracted even if they are contained within a word, e.g. "E10Diabetes" would return "E10"). Default: strict.

ignore_icd_errors

    logical. Whether to ignore incorrectly specified input (potentially leading to incomplete output) or stop if any ICD specification does not correspond to a valid ICD code. Default: FALSE, stop on error.

Value

data.frame with columns YEAR, ICD_CODE, ICD_COMPRESSED, ICD_LABEL and, if specified, columns specified by col_meta

See Also

[icd_history()](#) to historize the output

Examples

```
# Incomplete or non-terminal codes expand to the right.
# This is useful to specified code blocks in a compact manner
icd_meta <- data.frame(ICD = "R1")
icd_expand(icd_meta, year = 2019)

# Optional metadata columns can be carried
# through with the specification
icd_meta <- data.frame(ICD = "M54", icd_label = "Back pain")
icd_expand(icd_meta, year = 2019, col_meta = "icd_label")
```

---

icd_history   *Historize a list of ICD codes to cover the specified years*

Description

The function icd_history takes the result of icd_expand, specified for a particular year, and returns a data.frame containing all corresponding codes for the specified years (from 2003). To do this, it applies the ICD-10-GM transition tables to map codes between successive ICD-10-GM versions. Only automatic transitions are followed.

Usage

```
icd_history(icd_expand, years, custom_transitions = NULL)
```

Arguments

icd_expand   A data.frame (e.g. as generated by the function icd_expand)

years   Years to historize (e.g. 2005:2014)

custom_transitions

                  (Optional) A data.frame containing custom transitions to complement the offi-
                  cial transitions provided by `icd_meta_transition`.

Value

data.frame with columns YEAR, ICD_CODE, ICD_COMPRESSED, ICD_LABEL and, if speci-
fied, DIAG_GROUP #' @seealso icd_expand() to generate the necessary input

Examples

```
# Between 2018 and 2019, causalgia (G56.4) was reclassified
# under G90 as a complex regional pain syndrome
icd_meta <- data.frame(ICD = "G56.4", ICD_LABEL = "Causalgia")
icd_meta_expanded <- icd_expand(icd_meta, year = 2018, col_meta = "ICD_LABEL")
icd_history(icd_meta_expanded, years = 2018:2019)
```

---

icd_lookup   *Lookup an ICD-10 code in R*

Description

This is a convenience function to quickly look up the label associated with one or more ICD-10
codes. By default, it performs the lookup using the most recent version of the ICD-10-GM available.

Usage

```
icd_lookup(icd, year = NULL, expand = TRUE)
```

Arguments

icd   ICD code to look up (any format that can be recognised by `icd_parse`)

year   ICD-10-GM version to use (Default: most recent year available)

expand   Should all subcodes of the given code be returned? (Default: TRUE)

Details

This is a convenience function intended for interactive use. The browser will only be opened if R is
being used interactively. The function always returns invisibly the URL of the page to be opened.

Value

A tibble with three columns: (year, icd_sub, label) and one row for each result

See Also

icd_search() to search for a string in the ICD-10-GM labels icd_browse() to lookup an ICD-10-GM code in the official BfArM documentation, opening the page in a browser

Examples

```
icd_lookup("E10.9")
```

---

icd_meta_blocks   *data.frame containing metadata for the ICD-10-GM code blocks*

Description

The ICD blocks (German: "Gruppen") constitute a level in the hierarchy between the chapters and the three-digit codes. The three-digit code are grouped in sequence to form 240 groups that represent similar aetiological diagnoses. Unlike some other grouper systems, the ICD blocks do not consider similar diagnoses from different chapters of the ICD classification, for example chronic pain coded as a unspecific symptom (R52.1) and as a somatoform disorder (F45.4).

Usage

```
icd_meta_blocks
```

Format

An object of class data.frame with 4813 rows and 6 columns.

Details

year Year of validity (from 2004)

icd_block_first First three-digit ICD code in the block

icd_block_last Last three-digit ICD code in the block

chapter ICD-10 chapter to which the block belongs

block_label Label for the block

block_id Short label for the block in format "A00-A09"

Source

The source data was downloaded from the official download centre of the German Institute for Medical Documentation and Information (DIMDI). See also https://www.dimdi.de/dynamic/en/classifications/icd/icd-10-gm/tabular-list/structure/

See Also

Other ICD-10-GM metadata: icd_meta_chapters, icd_meta_codes, icd_meta_transition

---

icd_meta_chapters   *data.frame containing metadata for the ICD-10-GM chapters*

Description

The ICD chapters group codes according to their aetiology.

Usage

```
icd_meta_chapters
```

Format

An object of class data.frame with 440 rows and 4 columns.

Details

year Year of validity (from 2004)

chapter Chapter number (arabic numerals)

chapter_roman Chapter number (Roman numerals)

chapter_label Label for the chapter

Source

The source data was downloaded from the official download centre of the German Institute for Medical Documentation and Information (DIMDI). See also https://www.dimdi.de/dynamic/en/classifications/icd/icd-10-gm/tabular-list/structure/

See Also

Other ICD-10-GM metadata: `icd_meta_blocks`, `icd_meta_codes`, `icd_meta_transition`

---

icd_meta_codes   *data.frame containing metadata for all ICD-10-GM codes*

Description

DIMDI provide a CSV file with metadata on all valid codes. This table is read in with only minor modifications to facilitate changes between versions.

Usage

```
icd_meta_codes
```

Format

A data.frame containing the following variables:

year Year of validity (from 2004)

level Level of the hierarchy (3, 4 or 5 digits)

terminal Whether the code is a terminal code (i.e. with no further subcodes) (T: yes; N: no)

subcode_type Whether the subcode is pre- or postcombinated (X: precombinated; S: postcombinated). Precombinated codes are listed directly under the three-digit ICD code, whereas postcombinated codes are lists of possible values for the fourth and fifth digits that are not specific to the particular code (e.g. the group E10-E14 shares a common list of postcombinated fourth and fifth digits)

chapter_nr Chapter number (arabic digits 1-22)

icd_block_first First code in the respective ICD block, can be used to join with the table ICD10gm::icd_meta_blocks

icd_code Full icd code (up to 7 characters) with all symbols except the "dagger" (for aetiological codes that can be combined with an "asterisk" code to denote the manifestation)

icd_normcode The ICD "normcode", consisting of up to 6 characters and without all symbols except the period (e.g. E11.30)

icd_sub Complete ICD code without any symbols or punctuation, consisting of up to 5 characters (e.g. E1130)

label ICD label for the complete code.

label_icd3 ICD label for the three-digit ICD code.

label_icd4 ICD label for fourth digit of the ICD code.

label_icd5 ICD label for the fifth digit of the ICD code.

usage_295 Usage of the code in the ambulatory sector (Paragraph 295 SGB V) (P: primary code; O: only as a "star" code in conjunction with a "dagger" code for aetiology; Z: only an optional "!" code in conjunction with a primary code; V: not to be used for coding)

usage_301 Usage of the code in the stationary (hospital) sector (Paragraph 301 SGB V) (P: primary code; O: only as a "star" code in conjunction with a "dagger" code for aetiology; Z: only an optional "!" code in conjunction with a primary code; V: not to be used for coding)

mort_list1 Key to join with the WHO mortality list 1

mort_list2 Key to join with the WHO mortality list 2

mort_list3 Key to join with the WHO mortality list 3

mort_list4 Key to join with the WHO mortality list 4

morb_list Key to join with the WHO morbidity list

gender_specific Whether the diagnosis is gender specific (M: male; W: female; 9: Not gender specific)

gender_error_type Type of error implied by the field gender_specific (9: irrelevant; K: possible error)

age_min Minimum age for which the diagnosis is plausible (T001: from one day; Y005: from five years)

age_max Maximum age for which the diagnosis is plausible (T010: up to 10 days; Y005: up to five years)

age_error_type Type of error resulting from implausible age (9: irrelevant; M: always an error ("Muss-Fehler"); K: possible error ("Kann-Fehler"))

rare_in_central_europe Indicates whether the diagnosis is rare in Central Europe (J: yes; N: no)

code_with_content Indicates whether the code has content associated with it (J: yes; N: no, leads to an error)

notifiable Indicates whether the diagnosis is notifiable in Germany (J: yes; N: no)

notifiable_lab Indicates whether the diagnosis is notifiable for laboratories in Germany (J: yes; N: no)

Details

This metadata is not suitable for operative coding and does not include all relevant information concerning the codes. For example, the file contains neither the inclusion and exclusion notes nor the detailed definitions (where present, mainly in Chapter V). DIMDI provide additional reference material for operative coding and detailed research.

The block U00-U49 contains reserved codes that can be allocated quickly for the documentation of new diseases or epidemiological phenomena. Such usage is allowed only when mandated by DIMDI. In particular, the codes may not be utilised on the initiative of other parties, for example, for clinical trials or contractual purposes. Notable uses of the reserved codes are for the Zika and COVID-19 viruses. These are included in the DIMDI online documentation, but not in the download files. They are therefore added manually to this data set as documented in the package source.

Die Schlüsselnummern U05.0-U05.9 dieser Kategorie sollen ein schnelles Reagieren auf aktuelle epidemiologische Phänomene ermöglichen. Sie dürfen nur zusätzlich benutzt werden, um einen anderenorts klassifizierten Zustand besonders zu kennzeichnen. Die Schlüsselnummern dieser Kategorie dürfen nur über das Deutsche Institut für Medizinische Dokumentation und Information (DIMDI) mit Inhalten belegt werden; eine Anwendung für andere Zwecke ist nicht erlaubt. DIMDI wird den Anwendungszeitraum solcher Schlüsselnummern bei Bedarf bekannt geben.

Source

The source data was downloaded from the official download centre of the German Institute for Medical Documentation and Information (DIMDI). See also `https://www.dimdi.de/dynamic/en/classifications/icd/icd-10-gm/tabular-list/#metadata`

See Also

Other ICD-10-GM metadata: `icd_meta_blocks`, `icd_meta_chapters`, `icd_meta_transition`

---

icd_meta_transition	*data.frame detailling the changes in ICD-10-GM codes between versions*

Description

A data.frame providing old and new ICD codes (identical if no changes) and information as to whether the transition is automatic when transitioning forwards or backwards

Usage

```
icd_meta_transition
```

Format

An object of class `data.frame` with 257310 rows and 12 columns.

Details

year_from Year of validity of the old code (from 2004)

year_to Year of validity of the new code (from 2005)

icd_from Old ICD code

icd_to New ICD code

automatic_forward Whether the transition is automatic in the forward direction (i.e. the old code can always be converted to the new code). (A: automatic, otherwise NA)

automatic_backward Whether the transition is automatic in the forward direction (i.e. the new code can always be converted to the old code) (A: automatic, otherwise NA)

change_5 Whether the change relates to the fifth digit of the ICD-10 code (TRUE/FALSE).

change_4 Whether the change relates to the fourth digit of the ICD-10 code (TRUE/FALSE).

change_3 Whether the change relates to the three-digit ICD-10 code (TRUE/FALSE).

icd3 The first three digits of `icd_from`.

icd_chapter The first character of `icd_from` (i.e. the letter denoting the chapter).

Source

The source data was downloaded from the official download centre of the German Institute for Medical Documentation and Information (DIMDI). See also https://www.dimdi.de/dynamic/en/classifications/icd/icd-10-gm/tabular-list/#crosswalks

See Also

Other ICD-10-GM metadata: `icd_meta_blocks`, `icd_meta_chapters`, `icd_meta_codes`

---

icd_parse   *Extract all ICD codes from a character vector*

Description

An ICD code consists of, at a minimum, a three digit ICD-10 code (i.e. one upper-case letter followed by two digits). This may optionally be followed by a two digit subcode, selected punctuation symbols (cross "*", dagger "U2020" or exclamation mark "!"). Both the period separating the three-digit code from the subcode, and the hyphen indicating an "incomplete" subcode, are optional. Finally, in the ambulatory system, an additional letter G, V, Z or A may be appended to signify the status ("security") of the diagnosis.

Usage

```
icd_parse(str, type = "bounded", bind_rows = TRUE)
```

Arguments

str   Character vector from which to extract all ICD codes

type   A character string determining how strictly matching should be performed. This
                must be one of "strict" (str contains a ICD code with no extraneous characters),
                bounded (str contains an ICD code with a word boundary on both sides) or
                weak (ICD codes are extracted even if they are contained within a word, e.g.
                "E10Diabetes" would return "E10"). Default: bounded.

bind_rows   logical. Whether to convert the matrix output of stirngi::stri_match_all to
                a data.frame, with additional icd_sub to uniquely represent the code and allow
                lookup of the code

Details

By default, the function returns a data.frame containing the matched codes and the standardised
three digit code (icd3), subcode (icd_subcode), normcode (icd_norm) and code without period
(icd_sub).

If bind_rows = FALSE, the list output of stringi::stri_match_all_regex is returned. This is
particularly useful to retrieve the matches from each element of the str vector separately.

Value

data.frame (if bind_rows = TRUE) or matrix

See Also

[is_icd_code()](#)

Examples

```
icd_parse("E11.7")
icd_parse("Depression: F32")
icd_parse(c(
  "Backpain (M54.9) is one of the most common diagnoses in primary care",
  "Codes for chronic pain include R52.1 and F45.4"
  ))
```

---

icd_search   *Search ICD-10-GM labels for a string*

Description

Search ICD-10-GM labels for a string

Usage

```
icd_search(pattern, level = 5, year = NULL, ignore.case = TRUE, ...)
```

Arguments

pattern	String to search for (character object of length 1)
level	Maximum level of the ICD-10 hierarchy to search. level = 3 will search ohne 3-digit codes, level = 4 all 3 and 4 digit codes, level = 5 will search through all codes.
year	Year in which to search (Default: most recent year available)
ignore.case	Should the search be case insensitive? (Default: TRUE)
...	Further parameters passed to agrep

Value

Usually called for side-effect (open browser), returns the corresponding URL invisibly.

See Also

icd_browse() to lookup an ICD-10-GM code in the official BfArM documentation, opening the page in a browser icd_lookup() to lookup an ICD-10-GM code in the console

Examples

```
icd_search("vitamin", level = 3)
icd_search("vitamin", level = 5)
```

icd_showchanges *Show historical changes to selected ICD-10-GM codes*

Description

Show all changes in ICD history relating to the 3-digit codes contained in the data.frame icd_in.
The output of icd_expand can be passed directly to this function to display relevant changes.

Usage

```
icd_showchanges(icd_in, years = NULL)
```

Arguments

icd_in	Data frame created by icd_expand(), containing codes to check
years	Years to check, corresponding to the variable year_from in icd_meta_transition

Value

data.frame, as icd_meta_transition, with labels icd_from_label and icd_to_label

See Also

icd_showchanges_icd3() to provide one or more three-digit codes as input

Examples

```
dat_icd <- icd_expand(
   data.frame(ICD_SPEC = c("K52.9")),
   col_icd = "ICD_SPEC",
   year = 2019)
icd_showchanges(dat_icd)
```

icd_showchanges_icd3 *Show historical changes to selected three-digit ICD-10-GM codes*

Description

Show all changes in ICD history relating to the 3-digit codes contained in a given vector icd

Usage

```
icd_showchanges_icd3(icd3)
```

Arguments

`icd3`	Vector of three-digit ICD codes

Value

data.frame with columns YEAR, ICD_CODE, ICD_LABEL and, if specified, DIAG_GROUP

See Also

[icd_showchanges()](#) if the input has been generated by [icd_expand()](#)

Examples

```
icd_showchanges_icd3("A09")
```

---

is_icd_code   *Test whether a string is a valid ICD code*

Description

An ICD code consists of, at a minimum, a three digit ICD-10 code (i.e. one upper-case letter followed by two digits). This may optionally be followed by a two digit subcode, selected punctuation symbols (cross "*", dagger "U2020" or exclamation mark "!"). Both the period separating the three-digit code from the subcode, and the hyphen indicating an "incomplete" subcode, are optional. Finally, in the ambulatory system, an additional letter G, V, Z or A may be appended to signify the status ("security") of the diagnosis.

Usage

```
is_icd_code(str, year = NULL, parse = TRUE)
```

Arguments

`str`	Character vector to be tested
`year`	Year for which to test whether the specification is a valid code. Default: NULL (test whether `str` matches a code from any year since 2003)
`parse`	logical. Whether to first parse the input `str` using `icd_parse` (Default: TRUE). If FALSE, assumes that `str` is already formatted as `icd_sub` (i.e. without separating period or other punctuation)

Value

Logical vector the same length as the character input

See Also

[icd_parse()](#)

Examples

```
is_icd_code("A09.9")
is_icd_code("A099")
is_icd_code("A09.9-")

is_icd_code("AA9")

# The following code is syntactically correct but
# has never been in use
is_icd_code("E15.9")
```

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