Package 'CMHSU'

July 21, 2025

Type Package

Title Mental Health Status, Substance Use Status and their Concurrent Status in North American Healthcare Administrative Databases

Version 0.0.6.9

Description

Patients' Mental Health (MH) status, Substance Use (SU) status, and concurrent MH/SU status in the American/Canadian Healthcare Administrative Databases can be identified. The detection is based on given parameters of interest by clinicians including the list of plausible ICD MH/SU codes (3/4/5 characters), the required number of visits of hospital for MH/SU , the required number of visits of service physicians for MH/SU, and the maximum time span within MH visits, within SU visits, and, between MH and SU visits. Methods are described in: Khan S <https://pubmed.ncbi.nlm.nih.gov/29044442/>, Keen C, et al. (2021) <doi:10.1111/add.15580>, Lavergne MR, et al. (2022) <doi:10.1186/s12913-022-07759-z>, Casillas, S M, et al. (2022) <doi:10.1016/j.abrep.2022.100464>, CIHI (2022) <https://www.cihi.ca/en>, CDC (2024) <https://www.cdc.gov>, WHO (2019) <https://icd.who.int/en>.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.3.2

Depends R (>= 2.10)

Suggests knitr, rmarkdown

VignetteBuilder knitr

Imports dplyr, magrittr, purrr, tidyr, utils

NeedsCompilation no

Author Mohsen Soltanifar [aut] (ORCID: <https://orcid.org/0000-0002-5989-0082>), Chel Hee Lee [cre, aut] (ORCID: <https://orcid.org/0000-0001-8209-8176>)

Maintainer Chel Hee Lee <chelhee.lee@ucalgary.ca>

Repository CRAN

Date/Publication 2025-01-10 21:20:05 UTC

Contents

`MHSU_status_basic` *Concurrent Mental Health and Substance Use status detection in North American Healthcare Administrative Databases*

Description

Concurrent Mental Health and Substance Use status is detected in North American Healthcare Administrative Databases using clinician's parameters of interest such as minimum number of hospital visits, minimum number of physician services, time lag between them and plausible ICD diagnostics. It is assumed that all input data dates fall into the maximum time span between mental health status and substance use status.

Usage

```
MHSU_status_basic(
  inputdata,
  n_MHH,
  n_MHP,
  n_SUH,
  n_SUP,
  t_MH,
  t_SU,
  t_MHSU,
  ICD_MH,
  ICD_SU
)
```

Arguments

`inputdata`	a dataframe including columns: 'ClientID', 'VisitDate', 'Diagnostic_H', and 'Diagnostic_P'
`n_MHH`	minimum number of potential mental health related hospital visits
`n_MHP`	minimum number of potential mental health related medical service physician visits
`n_SUH`	minimum number of potential substance use related hospital visits
`n_SUP`	minimum number of potential substance use related medical service physician visits

t_MH	maximum time lag (in days) between all hospital visits and all medical service physician visits
t_SU	maximum time lag (in days) between all hospital visits and all medical service physician visits
t_MHSU	the maximum time span (in days) between mental health status and substance use status
ICD_MH	plausible list of Mental Health status diagnostic codes
ICD_SU	plausible list of Substance Use status diagnostic codes

Value

a dataframe matrix with Clients' ID, earliest dates of Substance Use/Mental Health, latest dates of Substance Use/Mental Health, Mental Health status, Substance Use status, and, Concurrent Mental Health and Substance Use status

References

Khan S. (2017). Concurrent mental and substance use disorders in Canada. Health reports, 28(8), 3–8, Ottawa, ON, Canada, PMID: 29044442. https://pubmed.ncbi.nlm.nih.gov/29044442/ Canadian Institute for Health Information. (2022). Canadian coding standards for version 2022 ICD-10-CA and CCI. Canadian Institute for Health Information. Ottawa, Ontario, Canada. https://www.cihi.ca/en/version-2022-icd-10-cacci-classifications-canadian-coding-standards-and-related-products Centers for Disease Control and Prevention. (2024). International classification of diseases, tenth revision, clinical modification (ICD-10-CM) 2024. National Center for Health Statistics. Atlanta, GA, United States. https://www.cdc.gov/nchs/icd/icd-10-cm/index.html World Health Organization. (2019). International classification of diseases for mortality and morbidity statistics (11th Revision). Geneva, Switzerland: World Health Organization. https://icd.who.int. Casillas, S. M., Scholl, L., Mustaquim, D., & Vivolo-Kantor, A. (2022). Analysis of trends and usage of ICD-10-CM discharge diagnosis codes for poisonings by fentanyl, tramadol, and other synthetic narcotics in emergency department data. Addictive Behaviors Reports, 16, 100464. Atlanta, GA, USA. https://doi.org/10.1016/j.abrep.2022.100464 Keen, C., Kinner, S. A., Young, J. T., Jang, K., Gan, W., Samji, H., Zhao, B., Krausz, M., & Slaunwhite, A. (2021). Prevalence of co-occurring mental illness and substance use disorder and association with overdose: a linked data cohort study among residents of British Columbia, Canada. Addiction, 117(1), 129–140. https://doi.org/10.1111/add.15580 Lavergne, M. R., Loyal, J. P., Shirmaleki, M., Kaoser, R., Nicholls, T., Schütz, C. G., Vaughan, A., Samji, H., Puyat, J. H., Kaulius, M., Jones, W., & Small, W. (2022). The relationship between outpatient service use and emergency department visits among people treated for mental and substance use disorders: Analysis of population-based administrative data in British Columbia, Canada. BMC Health Services Research, 22(1), 477. https://doi.org/10.1186/s12913-022-07759-z

Examples

```
data(SampleRWD)
myexample <- SampleRWD[, c(1:4)]
SampleMHSU_1 <- MHSU_status_basic(myexample,
n_MHH=1, n_MHP=1, n_SUH=1, n_SUP=1, t_MH=60, t_SU=60, t_MHSU=365,
ICD_MH=c("F060","F063","F064", "F067"),
ICD_SU=c("F100","T4041","F120","F140"))
head(SampleMHSU_1)
```

MHSU_status_broad *Concurrent Mental Health and Substance Use status detection in North American Healthcare Administrative Databases with flexible window*

Description

Concurrent Mental Health and Substance Use status is detected in North American Healthcare Administrative Databases using clinician's parameters of interest such as minimum number of hospital visits, minimum number of physician services, time lag between them and plausible ICD diagnostics. No assumption taken is on the input data dates span.

Usage

```
MHSU_status_broad(
  inputdata,
  n_MHH,
  n_MHP,
  n_SUH,
  n_SUP,
  t_MH,
  t_SU,
  t_MHSU,
  ICD_MH,
  ICD_SU
)
```

Arguments

inputdata	a dataframe including columns: 'ClientID', 'VisitDate', 'Diagnostic_H', and 'Diagnostic_P'
n_MHH	minimum number of potential mental health related hospital visits
n_MHP	minimum number of potential mental health related medical service physician visits
n_SUH	minimum number of potential substance use related hospital visits
n_SUP	minimum number of potential substance use related medical service physician visits
t_MH	maximum time lag (in days) between all hospital visits and all medical service physician visits
t_SU	maximum time lag (in days) between all hospital visits and all medical service physician visits
t_MHSU	the maximum time span (in days) between mental health status and substance use status
ICD_MH	plausible list of Mental Health status diagnostic codes
ICD_SU	plausible list of Substance Use status diagnostic codes

Value

a dataframe matrix with Clients' ID, earliest dates of Substance Use/Mental Health, latest dates of Substance Use/Mental Health, Mental Health status, Substance Use status, and, Concurrent Mental Health and Substance Use status. Here, there are k dataset outputs where for the input data dates span of date_range: k=date_range - t_MHSU + 1. Each output is related of detection for moving one day ahead from previous input data with assigned fixed parameter of 't_MHSU'.

References

Khan S. (2017). Concurrent mental and substance use disorders in Canada. Health reports, 28(8), 3–8, Ottawa, ON, Canada, PMID: 29044442. https://pubmed.ncbi.nlm.nih.gov/29044442/ Canadian Institute for Health Information. (2022). Canadian coding standards for version 2022 ICD-10-CA and CCI. Canadian Institute for Health Information. Ottawa, Ontario, Canada. https://www.cihi.ca/en/version-2022-icd-10-cacci-classifications-canadian-coding-standards-and-related-products Centers for Disease Control and Prevention. (2024). International classification of diseases, tenth revision, clinical modification (ICD-10-CM) 2024. National Center for Health Statistics. Atlanta, GA, United States. https://www.cdc.gov/nchs/icd/icd-10-cm/index.html World Health Organization. (2019). International classification of diseases for mortality and morbidity statistics (11th Revision). Geneva, Switzerland: World Health Organization. https://icd.who.int. Casillas, S. M., Scholl, L., Mustaquim, D., & Vivolo-Kantor, A. (2022). Analysis of trends and usage of ICD-10-CM discharge diagnosis codes for poisonings by fentanyl, tramadol, and other synthetic narcotics in emergency department data. Addictive Behaviors Reports, 16, 100464. Atlanta, GA, USA. https://doi.org/10.1016/j.abrep.2022.100464 Keen, C., Kinner, S. A., Young, J. T., Jang, K., Gan, W., Samji, H., Zhao, B., Krausz, M., & Slaunwhite, A. (2021). Prevalence of co-occurring mental illness and substance use disorder and association with overdose: a linked data cohort study among residents of British Columbia, Canada. Addiction, 117(1), 129–140. https://doi.org/10.1111/add.15580 Lavergne, M. R., Loyal, J. P., Shirmaleki, M., Kaoser, R., Nicholls, T., Schütz, C. G., Vaughan, A., Samji, H., Puyat, J. H., Kaulius, M., Jones, W., & Small, W. (2022). The relationship between outpatient service use and emergency department visits among people treated for mental and substance use disorders: Analysis of population-based administrative data in British Columbia, Canada. BMC Health Services Research, 22(1), 477. https://doi.org/10.1186/s12913-022-07759-z

Examples

```
data(SampleRWD)
myexample <- SampleRWD[,c(1:4)]
# No. windows k=date_range - t_MHSU + 1 = 363-360+1 = 4
SampleMHSU_2 <- MHSU_status_broad(myexample,
n_MHH=1, n_MHP=1, n_SUH=1, n_SUP=1, t_MH=60, t_SU=60, t_MHSU=360,
ICD_MH=c("F060","F063","F064", "F067"),
ICD_SU=c("F100","T4041","F120","F140"))
head(SampleMHSU_2[c(1,201,401,601),])
```

`MH_status` *Mental Health status detection in North American Healthcare Administrative Databases*

Description

Mental Health status is detected in North American Healthcare Administrative Databases using clinician's parameters of interest such as minimum number of hospital visits, minimum number of physician services, time lag between them and plausible ICD diagnostics.

Usage

```
MH_status(inputdata, n_MHH, n_MHP, t_MH, ICD_MH)
```

Arguments

inputdata	a dataframe including columns: ClientID, VisitDate, Diagnostic_H, and Diagnostic_P
n_MHH	minimum number of potential mental health related hospital visits
n_MHP	minimum number of potential mental health related medical service physician visits
t_MH	maximum time lag (in days) between all hospital visits and all medical service physician visits
ICD_MH	plausible list of Mental Health status diagnostic codes

Value

a dataframe matrix with Clients' ID, earliest date of Mental Health, latest date of Mental Health, and Mental Health status

References

Khan S. (2017). Concurrent mental and substance use disorders in Canada. Health reports, 28(8), 3–8, Ottawa, ON, Canada, PMID: 29044442. https://pubmed.ncbi.nlm.nih.gov/29044442/ Canadian Institute for Health Information. (2022). Canadian coding standards for version 2022 ICD-10-CA and CCI. Canadian Institute for Health Information. Ottawa, Ontario, Canada. https://www.cihi.ca/en/version-2022-icd-10-cacci-classifications-canadian-coding-standards-and-related-products Centers for Disease Control and Prevention. (2024). International classification of diseases, tenth revision, clinical modification (ICD-10-CM) 2024. National Center for Health Statistics. Atlanta, GA, United States. https://www.cdc.gov/nchs/icd/icd-10-cm/index.html Casillas, S. M., Scholl, L., Mustaquim, D., & Vivolo-Kantor, A. (2022). Analysis of trends and usage of ICD-10-CM discharge diagnosis codes for poisonings by fentanyl, tramadol, and other synthetic narcotics in emergency department data. Addictive Behaviors Reports, 16, 100464. Atlanta, GA, USA. https://doi.org/10.1016/j.abrep.2022.100464

Examples

```
data(SampleRWD)
myexample <- SampleRWD[,c(1:4)]
SampleMH_1 <- MH_status(myexample,
n_MHH=1, n_MHP=1, t_MH=60,
ICD_MH=c("F060","F063","F064", "F067"))
head(SampleMH_1)
```

SampleRWD *Sample RWD Data*

Description

Simulated Data for illustration

Usage

```
data(SampleRWD)
```

Format

A data frame with 1665 rows and 8 variables

Details

ClientID a character indicating Client identity

VisitDate a date of the form 'yyyy-mm-dd'

Diagnostic_H a recorded (3/4/5 characters) ICD diagnostic list at the time of visiting/discharging from hospital

Diagnostic_P a recorded (3/4/5 characters) ICD diagnostic list at the time of visiting/leaving medical service physician

MHSU_H

Meaning_H description of MHSU_H

MHSU_P

Meaning_P description of MHSU_P

SU_status *Substance Use status detection in North American Healthcare Administrative Databases*

Description

Substance Use status is detected in North American Healthcare Administrative Databases using clinician's parameters of interest such as minimum number of hospital visits, minimum number of physician services, time lag between them and plausible ICD diagnostics.

Usage

```
SU_status(inputdata, n_SUH, n_SUP, t_SU, ICD_SU)
```

Arguments

inputdata	a dataframe including columns: ClientID, VisitDate, Diagnostic_H, and Diagnostic_P
n_SUH	minimum number of potential substance use related hospital visits
n_SUP	minimum number of potential substance use related medical service physician visits
t_SU	maximum time lag (in days) between all hospital visits and all medical service physician visits
ICD_SU	plausible list of Substance Use status diagnostic codes

Value

a dataframe matrix with Clients' ID, earliest date of Substance Use, latest date of Substance Use, and Substance Use status

References

Khan S. (2017). Concurrent mental and substance use disorders in Canada. Health reports, 28(8), 3–8, Ottawa, ON, Canada, PMID: 29044442. https://pubmed.ncbi.nlm.nih.gov/29044442/ Canadian Institute for Health Information. (2022). Canadian coding standards for version 2022 ICD-10-CA and CCI. Canadian Institute for Health Information. Ottawa, Ontario, Canada. https://www.cihi.ca/en/version-2022-icd-10-cacci-classifications-canadian-coding-standards-and-related-products Centers for Disease Control and Prevention. (2024). International classification of diseases, tenth revision, clinical modification (ICD-10-CM) 2024. National Center for Health Statistics. Atlanta, GA, United States. https://www.cdc.gov/nchs/icd/icd-10-cm/index.html Casillas, S. M., Scholl, L., Mustaquim, D., & Vivolo-Kantor, A. (2022). Analysis of trends and usage of ICD-10-CM discharge diagnosis codes for poisonings by fentanyl, tramadol, and other synthetic narcotics in emergency department data. Addictive Behaviors Reports, 16, 100464. Atlanta, GA, USA. https://doi.org/10.1016/j.abrep.2022.100464

Examples

```
data(SampleRWD)
myexample <- SampleRWD[,c(1:4)]
SampleSU_1 <- SU_status(myexample,
n_SUH=1, n_SUP=1,  t_SU=60,
ICD_SU=c("F100","T4041","F120","F140"))
head(SampleSU_1)
```

Index