

# Package ‘CMHSU’

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**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](https://doi.org/10.1111/add.15580)>, Lavergne MR, et al. (2022) <[doi:10.1186/s12913-022-07759-z](https://doi.org/10.1186/s12913-022-07759-z)>, Casillas, S M, et al. (2022) <[doi:10.1016/j.abrep.2022.100464](https://doi.org/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

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MHSU_status_basic	<i>Concurrent Mental Health and Substance Use status detection in North American Healthcare Administrative Databases</i>
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## 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)
```

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MHSU_status_broad	<i>Concurrent Mental Health and Substance Use status detection in North American Healthcare Administrative Databases with flexible window</i>
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### 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:  $k = \text{date\_range} - t\_MHSU + 1$ . 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),])
```

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MH\_status

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


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**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)
```

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 SampleRWD

*Sample RWD Data*


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**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

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 SU\_status

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


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**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)
```



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