Dec 20, 2023

Protocol for Medication Possession Ratio (MPR) Calculation

DOI
dx.doi.org/10.17504/protocols.io.j8nlkoy2wv5r/v1

Pryscila Rodrigues Moreira[1], Leonardo Teodoro de Farias[1], Dra. Ana Carolina Figueiredo Modesto[1]

[1]Programa de Pós-Graduação em Atenção e Avaliação em Saúde/Faculdade de Farmácia. Universidade Federal de Goiás (UFG), Goiânia, GO, Brasil.

Pryscila Rodrigues Moreira

DOI: https://dx.doi.org/10.17504/protocols.io.j8nlkoy2wv5r/v1

Protocol Citation: Pryscila Rodrigues Moreira, Leonardo Teodoro de Farias, Dra. Ana Carolina Figueiredo Modesto 2023. Protocol for Medication Possession Ratio (MPR) Calculation. **protocols.io**
https://dx.doi.org/10.17504/protocols.io.j8nlkoy2wv5r/v1

Manuscript citation:
MOREIRA; FARIAS; MODESTO, 2023.

Protocol status: Working
We use this protocol and it's working

Created: December 19, 2023

Last Modified: December 20, 2023

Protocol Integer ID: 92501

Keywords: Patient Compliance, Chronic Disease, Leukemia Myeloid Chronic-Phase, calculation the medication possession ratio, protocol for medication possession ratio, medication possession ratio, spreadsheet with tyrosine kinase inhibitor dispensation data, mpr calculation, flexibility for mpr calculation, tyrosine kinase inhibitor dispensation data, estimate of patient adherence, mpr, actual possession of medication, such as chronic myeloid leukemia, patient adherence, specialized packages in the healthcare domain, chronic myeloid leukemia, medication, proper management of chronic disease, calculation, spreadsheet, chronic disease, software, healthcare domain

Abstract

The Medication Possession Ratio (MPR) provides an estimate of patient adherence based on the actual possession of medications. It is a metric that offers crucial information to assist in the development of strategies for the proper management of chronic diseases, such as Chronic Myeloid Leukemia (CML). RStudio is a free, open-source software maintained by an active community of developers, ensuring frequent updates and specialized packages in the healthcare domain. This software can be easily integrated into the practices of healthcare professionals for MPR calculations, optimizing their activities and allowing more time for direct patient care. In this context, a protocol was developed using the R programming language for MPR calculation, utilizing a spreadsheet with Tyrosine Kinase Inhibitor dispensation data. This script provides flexibility for MPR calculations to be applied to any chronic disease.

Troubleshooting

Before start

The RStudio program must be installed on the computer. If it is not installed, the link below provides the tutorial for download.

https://posit.co/download/rstudio-desktop/

Installing the packages

1 In the specific context of this script, the section "Installing the packages" is dedicated to installing additional packages that are necessary to execute the subsequent analyses. Each line install.packages("package_name") installs a specific package. Press Ctrl + Enter to run the code. The
code is as follows:

Command

new command name

```
install.packages("tidyverse")
install.packages("openxlsx")
install.packages("psych")
install.packages("gtsummary")
install.packages("flextable")
install.packages("magrittr")
```

Loading the packages

2 Every time you open the software, you should load the following packages:

Command

new command name

```
library(tidyverse)   # Loads the Tidyverse, a collection of packages
for data manipulation and visualization, including popular packages
like dplyr and ggplot2.
library(openxlsx)    # Loads the openxlsx library, which is used for
spreadsheet manipulation and working with Excel files.
library(psych)       # Loads the psych library, providing functions
for statistical analysis and psychometrics.
library(gtsummary)   # Loads the gtsummary library, used for creating
summary tables in a concise and elegant manner.
library(flextable)   # Loads the flextable library, providing a
flexible approach to creating tables with various formatting options.
library(magrittr)    # Loads the magrittr library, facilitating data
manipulation using the pipe operator %>%. The pipe operator is used
to chain operations together in a readable and efficient way.
```

Setting the working directory to a specific path

3 Setting the working directory is important because it determines the default location for reading and writing files.

1- In RStudio, go to the "Session" menu.

2- Select "Set Working Directory" and choose "Choose Directory..."

3- Navigate to the directory

Alternatively, you can use the command below:

Command

new command name

```
Setwd ( "C:/Path/To/Your/Directory") #put the path of your directory
inside the parenthesis
```

Reading CSV file

4 # Here we read the data file called "file.mpr." and store it in a variable called MPR.
The read.csv2 function is used to read data from a CSV file where the column separator is a semicolon (;).
The argument "file.mpr" represents the name of the file to be read. You should download the spreadsheet with the medication dispensation data from your institution's dispensation system. In
this example, the obtained spreadsheet contains: Medication name, number of dispensed units, and patient medical record number. We chose to use the medical record number to avoid homonyms.

Command

new command name

```
MPR <- read.csv2("file.mpr.csv") #Add .csv after the file name
```

Now, the variable MPR contains the data from the CSV file, and you can manipulate or perform additional analyses as needed.

Selecting the columns of interest

5 Now, we select the columns that are relevant to our analysis and store them in a new variable called MPR1.

Command

new command name

```
MPR1 <- MPR %>%
  select(Drug, Dispensed, Medical.record)
```

Inspecting the Database

6 We use the "glimpse" command to visualize the structure of our MPR1 dataset.

Command

new command name

```
glimpse(MPR1)
```

Transforming the medical.record column into character

7 In this step, we convert the by "Medical.record" column into characters to ensure it is handled correctly.

Command

new command name

```
MPR1$Medical.record <- as.character(MPR1$Medical.record)
```

Calculating the percentage

8 We perform calculations in the "Dispensed" column based on the conditions specified for each
"drug".
We also group the data by "Medical.record "and "drug" and calculate the percentagem.

Command

new command name

```
MPR1 <- MPR1 %>%
  mutate(
    Dispensed = Dispensed / 365,  #calculation for a period of 1 year)
    Dispensed = case_when(
      Drug == "Imatinibe 100mg" ~ Dispensed / 2,#referring to two
tablets per day. In the case of 3 tablets, divide by 3, and so on.
      Drug == "Dasatinibe 20mg" ~ Dispensed / 2,
      Drug == "Nilotinibe 200mg" ~ Dispensed / 4,
      Drug == "Imatinibe 400mg" ~ Dispensed,
      Drug == "Dasatinibe 100mg" ~ Dispensed
    )
  ) %>%
  group_by(Medical.record, Drug) %>%
  summarise(
    Porcentagem = ifelse(sum(Dispensed) > 100, 100,
round(sum(Dispensed), 2) * 100),
    .groups = "drop"
  ) %>%
  mutate(Porcentagem = ifelse(Porcentagem > 100, 100, Porcentagem),
         Porcentagem = format(Porcentagem, digits = 2, nsmall = 2,
scientific = FALSE) %>%
           paste0("%"))
```

Sorting the table alphabetically by Drug

9 Now we sort the data alphabetically based on the "Drug" column.

Command

new command name

```
MPR1 <- MPR1 %>%
   arrange(Drug)
```

Saving the result to a .docx file

10 Here we create a flexible table (ft) and adjust its properties such as width and alignment.

Command

new command name

```
ft <- flextable(MPR1)
set_table_properties(ft,
                     width = 0.99,
                     align = "center")  #Aligns the table contents to
the center.
```

Saving the .docx document

11 Finally, we save the document with the name "MPR_Percentagem.docx" in the specified location.

Command

new command name

```
save_as_docx(ft, path =
"C:/Path/To/Your/Directory/MPR_Percentagem.docx") #put the path of
your directory inside the parenthesis
```

Protocol references

Andrade, K.H. Kahler, F. Frech, and K. A. Chan, “Methods for evaluation of medication adherence and persistence using automated databases,” Pharmacoepidemiology andDrug Safety, vol. 15, no. 8, pp. 565–574, 2006.

R CORE TEAM. R: A language and environment for statistical computing. R Foundation for Statistical Computing. 2022 Vienna, Austria

TAN, B.K. et al. Monitoring and Improving Adherence to Tyrosine Kinase Inhibitors in Patients with Chronic Myeloid Leukemia: A Systematic Review. Patient Prefer Adherence, v. 18, n. 15, p. 2563 -2575, 2021.