

Getting the Most out of Pragmatic Trials -- Beyond Intention-to-Treat

Installing R for the practical example

1 Introduction

The practical example will include code written in R, SAS, and Stata. If you do not have any of these three software languages already install, then R is the recommended language since it is available for free online. The following instructions describe how to install R (this includes the base packages) and RStudio, the graphical user interface we will be using. The whole process should take no more than 15 minutes.

Before you begin, please make sure you have administrator privileges on your laptop to make the installation process run as smoothly as possible.

2 Installing R

R is open-source software, and can be downloaded for free from the Comprehensive R Archive Network (CRAN) at <http://cran.r-project.org>. Click the appropriate link for your operating system and follow the installation instructions (download the .exe or .pkg file, then double click when finished downloading to run the installer). Agree to all of the default settings. Running the most recent version of R is recommended.

R is a language and environment for statistical computing and graphics. It provides a wide variety of statistical techniques (e.g. linear and nonlinear modeling, statistical tests, plotting, classification, clustering). Basic R can be supplemented with user-written packages, which cover a wide variety of statistics. There are several packages included with the base R installation, and many more are freely available online.

You can find R packages to install from:

- CRAN
- Bioconductor
- Github

We will provide code for you to install any extra **R** packages as necessary throughout the workshop.

Although you can run code directly in **R**, we recommend installing and running **RStudio** to facilitate an easier-to-use workflow.

3 Installing RStudio

RStudio is an integrated development environment (IDE) for **R**. It includes a console, syntax-highlighting editor that supports direct code execution, as well as tools for plotting, history, debugging and workspace management. **RStudio Desktop** can be downloaded for free from:

<https://www.rstudio.com/products/rstudio/download>

Please select the file that corresponds to your operating system.

3.1 If you are using a Mac OSX

Some **R** packages require compilation. That requires utilities not installed on OS X by default. You can wait to do the following until it's needed, but since you're already installing things...

- Get **Xcode** from <https://itunes.apple.com/us/app/xcode/id497799835?mt=12> and install it like any “normal” Mac application.
- When the installation is done, open **Xcode** then close it just to verify it installed correctly
- Find and open the **Terminal** program in the Utilities folder under the Applications folder (or by typing apple key + space bar and typing “Terminal” into the search bar that appears)
- Paste the following into the Terminal window and hit enter/return (accept any dialog/prompt):

```
xcode-select --install
```
- Close the Terminal application

You may also want to have downloaded and installed **XQuartz**, which can be found at

<https://www.xquartz.org/releases/XQuartz-2.7.11.html>

4 Optional: R Package Installation

This workshop relies on the following R packages:

- here
- rms
- survival
- sandwich
- lmtest
- ggplot2
- survminer
- reshape2
- tidyverse

The workshop code cannot be run without installing these packages and installing them requires an internet connection, so installing the packages before the workshop is a good idea. If you would like to install these packages on your laptop before the work-shop, please copy and paste the following code into the **Console** window in RStudio and hit “enter”.

```
# To set working directory
if(!require(here)) { install.packages("here"); require(here)}
# To use restricted cubic splines
if(!require(rms)) { install.packages("rms"); require(rms)}
# To run Cox PH models
if(!require(survival)) { install.packages("survival"); require(survival)}
# To calculate robust estimates of standard errors
if(!require(sandwich)) { install.packages("sandwich"); require(sandwich)}
if(!require(lmtest)) { install.packages("lmtest"); require(lmtest)}
# To plot results
if(!require(ggplot2)) { install.packages("ggplot2"); require(ggplot2)}
# To plot survival curves
if(!require(survminer)) { install.packages("survminer"); require(survminer)}
# To easily change data from long to wide
if(!require(reshape2)) { install.packages("reshape2"); require(reshape2)}
# For tidy code
if(!require(tidyverse)) { install.packages("tidyverse"); require(tidyverse)}
```