2017 Clinic Dataset Analysis

Assisted reproduction clinics data from the CDC

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Foreword

This work is inspired in an exercise from the course 'Software para el análisis de datos' in UOC's degree 'Bioinformática y Bioestadística'.

I am using this to learn the use of the language R, and the tools RStudio, Git and GitHub. This is not a professional level study of assisted reproduction data from clinics in the USA. If you want to have access to such studies, or even the raw data, you can get them from CDC's webpage ART's Success Rate Data.

Statement

MARKDOWN will be used for this paper, generating a Pdf report with Knitr in RStudio.

The file with the R code have to be delivered as well.

From a dataset, a statistical study must be carried out using R. The points below can be used as an outline:

1. Look for a dataset related with Biostatistics or Bioinformatics.

Must be public data. Explain source of data and include pertinent references. Justify why that specific dataset has been chosen.

2. Display the data.

Using R, display and explain the type of file that has been imported, which variables are included (type, classification,. . .) and anything else that seems relevant.
Include snapshots and R commands used for import and display of the data.

3. Probe questions.

Make a minimum of six questions that probe the kind of information contained in the dataset.

4. Descriptive analysis of the data.

The paper must include a parametric summary of the data and several graphic representations of said data.

5. Probability and simulation.

A minimum of three questions answering probability questions and a question corresponding a short simulation model.

6. Regression analysis.

A brief regression analysis from the variables in the dataset answering some question of interest.

7. Final assessment.

Final assessment from source data and papaer: Do we have conclussions? Would be necessary a more advanced analysis? Would be necessary more data for obtaining another kind of information?

1. Dataset

I wanted to do something with data from human assisted reproduction techniques. Those are difficult to find as public datasets, I suppose that it is due to privacy issues.

Finally, I found public datasets published by the Centers for Disease Control and Prevention (CDC) with several kinds of data from assisted reproduction clinics in the United States:
https://www.cdc.gov/art/artdata/index.html

Other datasets from previous years can be downloaded/looked up as well:
https://www.cdc.gov/art/reports/archive.html

Datasets downloading

```
# The code option eval = FALSE prevents this chunk to run. In this way, data WON'T
# be downloaded each time the .Rmd file is knitted to produce a report.
# For allowing this chunk to run, change eval to TRUE.

source_url <- "https://www.cdc.gov/art/artdata/docs/excel/FINAL-2017-Clinic-Table-Dataset.xlsx"

download.file(source_url, destfile = "../datos/FINAL-2017-Clinic-Table-Dataset.xlsx", method = "curl")
```

This is the dataset I am using for this practise study, but we could want to download datasets from previous years to do longitudinal studies:

```
# The code option eval = FALSE prevents this chunk to run. In this way, data WON'T
# be downloaded each time the .Rmd file is knitted to produce a report.
# For allowing this chunk to run, change eval to TRUE.

years <- c(1995:2015)

url_start1 <- "https://www.cdc.gov/art/excelfiles/clinic_tables_data_"
url_start2 <- "https://www.cdc.gov/art/excelfiles/"
url_start3 <- "https://www.cdc.gov/art/artdata/docs/excel/FINAL-"

file_start1 <- "clinic_tables_data_"
file_start2 <- ""
file_start3 <- "FINAL-"

url_end1 <- ".xls"
url_end2 <- "-clinic-tables-dataset.xls"
url_end3 <- "-clinic-table-dataset.xls"

# This code is rough on the edges, it doesn't take into account when a file
# fails to download.

for (year in years){
  if (year <= 2012){
    url <- paste0(url_start1, year, url_end1)
    destfile <- paste0(file_start1, year, url_end1)
  }
  else if (year == 2013){
    url <- paste0(url_start2, year, url_end2)
    destfile <- paste0(file_start2, year, url_end2)
  }
```

```
    else if (year == 2014){
    url <- "https://www.cdc.gov/art/artdata/docs/excel/2014-Clinic-Tables-Data-Dictionary.xls"
    destfile <- "2014-Clinic-Tables-Data-Dictionary.xls"
  }
  else {
    url <- paste0(url_start3, year, url_end3)
    destfile <- paste0(file_start3, year, url_end3)
  }

  #cat(url, "\n", destfile, "\n\n") # Cheks that the names of url and files are rightly constructed.
  download.file(url, destfile, method = "curl")
}
```

2. Display data

The downloaded file *FINAL-2017-Clinic-Table-Dataset.xlsx* includes data from assisted reproduction treatments from 448 US clinics, collected during 2017. It is an Excel workbook containing four sheets:

National Summary Data. Aggregated data from all the clinics included in the report.
National Table Dictionary. Dictionary-table with the explanation for each variable in the previous table.
Clinic Table Data Records. Tabla with data broke down by clinic.
Clinic Table Dictionary. Dictionary-table explaining each variable from Clinic Table.

I am interested in the data broke down by clinic. Therefore, I will import the data from sheets **Clinic Table Dictionary** and **Clinic Table Data Records**.

```
require("xlsx")
clinic_dictionary <- read.xlsx("../datos/FINAL-2017-Clinic-Table-Dataset.xlsx", 4,
                               endRow = 165, encoding = "UTF-8")
# Everything is NA after row 166; row 166 is a comment.

View(clinic_dictionary)

# In Viewer, in the column Age the symbols '>=' are displayed as '=',
# but if we print the column to screen the correct symbols are displayed.

clinic_data <- read.xlsx("../datos/FINAL-2017-Clinic-Table-Dataset.xlsx", 3
                         , encoding = "UTF-8", stringsAsFactors=FALSE)
View(clinic_data)
```

Let's see how each variable has been codified:

```
str(clinic_data, list.len = length(clinic_data))
```

```
## 'data.frame':    448 obs. of  164 variables:
##  $ OrderID                 : num  1 2 3 4 5 6 7 8 9 10 ...
##  $ CurrentClinicName1      : chr  "ALABAMA FERTILITY SPECIALISTS" "ART FERTILITY PROGRAM OF ALABAMA"
##  $ CurrentClinicName2      : chr  "" "" "REPRODUCTIVE ENDOCRINOLOGY AND INFERTILITY" "" ...
##  $ CurrentClinicCity       : chr  "BIRMINGHAM" "BIRMINGHAM" "BIRMINGHAM" "MOBILE" ...
##  $ CurrentClinicState      : chr  "ALABAMA" "ALABAMA" "ALABAMA" "ALABAMA" ...
##  $ MedicalDirector         : chr  "Janet M. Bouknight, MD" "Virginia L. Houserman, MD" "Deidre D. Gur
##  $ ND_NumIntentRet1        : chr  "30" "110" "76" "82" ...
##  $ ND_NumIntentRet2        : chr  "11" "49" "29" "34" ...
##  $ ND_NumIntentRet3        : chr  "12" "31" "23" "26" ...
##  $ ND_NumIntentRet4        : chr  "1" "6" "5" "16" ...
##  $ ND_NumIntentRet5        : chr  "0" "4" "2" "5" ...
##  $ ND_IntentRetLB1         : chr  "33.3%" "39.1%" "56.6%" "59.8%" ...
##  $ ND_IntentRetLB2         : chr  "2 / 11" "32.7%" "34.5%" "35.3%" ...
##  $ ND_IntentRetLB3         : chr  "4 / 12" "19.4%" "26.1%" "38.5%" ...
##  $ ND_IntentRetLB4         : chr  "0 / 1" "0 / 6" "0 / 5" "0 / 16" ...
##  $ ND_IntentRetLB5         : chr  "" "0 / 4" "0 / 2" "1 / 5" ...
##  $ ND_IntentRetSingleLB1   : chr  "20.0%" "24.5%" "51.3%" "43.9%" ...
##  $ ND_IntentRetSingleLB2   : chr  "2 / 11" "16.3%" "34.5%" "23.5%" ...
##  $ ND_IntentRetSingleLB3   : chr  "3 / 12" "19.4%" "21.7%" "23.1%" ...
##  $ ND_IntentRetSingleLB4   : chr  "0 / 1" "0 / 6" "0 / 5" "0 / 16" ...
##  $ ND_IntentRetSingleLB5   : chr  "" "0 / 4" "0 / 2" "1 / 5" ...
##  $ ND_NumRetrieve1         : chr  "24" "105" "70" "78" ...
##  $ ND_NumRetrieve2         : chr  "5" "42" "29" "26" ...
##  $ ND_NumRetrieve3         : chr  "9" "22" "21" "25" ...
##  $ ND_NumRetrieve4         : chr  "1" "6" "3" "11" ...
##  $ ND_NumRetrieve5         : chr  "0" "1" "1" "5" ...
##  $ ND_RetrieveLB1          : chr  "41.7%" "41.0%" "61.4%" "62.8%" ...
##  $ ND_RetrieveLB2          : chr  "2 / 5" "38.1%" "34.5%" "46.2%" ...
##  $ ND_RetrieveLB3          : chr  "4 / 9" "27.3%" "28.6%" "40.0%" ...
##  $ ND_RetrieveLB4          : chr  "0 / 1" "0 / 6" "0 / 3" "0 / 11" ...
##  $ ND_RetrieveLB5          : chr  "" "0 / 1" "0 / 1" "1 / 5" ...
##  $ ND_RetrieveSingleLB1    : chr  "25.0%" "25.7%" "55.7%" "46.2%" ...
##  $ ND_RetrieveSingleLB2    : chr  "2 / 5" "19.0%" "34.5%" "30.8%" ...
##  $ ND_RetrieveSingleLB3    : chr  "3 / 9" "27.3%" "23.8%" "24.0%" ...
##  $ ND_RetrieveSingleLB4    : chr  "0 / 1" "0 / 6" "0 / 3" "0 / 11" ...
##  $ ND_RetrieveSingleLB5    : chr  "" "0 / 1" "0 / 1" "1 / 5" ...
##  $ ND_NumTrans1            : chr  "30" "105" "72" "105" ...
##  $ ND_NumTrans2            : chr  "8" "34" "24" "29" ...
##  $ ND_NumTrans3            : chr  "13" "16" "14" "24" ...
##  $ ND_NumTrans4            : chr  "1" "6" "2" "3" ...
##  $ ND_NumTrans5            : chr  "0" "1" "0" "2" ...
##  $ ND_TransLB1             : chr  "33.3%" "41.0%" "59.7%" "46.7%" ...
##  $ ND_TransLB2             : chr  "2 / 8" "47.1%" "41.7%" "41.4%" ...
##  $ ND_TransLB3             : chr  "4 / 13" "6 / 16" "6 / 14" "41.7%" ...
##  $ ND_TransLB4             : chr  "0 / 1" "0 / 6" "0 / 2" "0 / 3" ...
##  $ ND_TransLB5             : chr  "" "0 / 1" "" "1 / 2" ...
##  $ ND_TransSingleLB1       : chr  "20.0%" "25.7%" "54.2%" "34.3%" ...
##  $ ND_TransSingleLB2       : chr  "2 / 8" "23.5%" "41.7%" "27.6%" ...
##  $ ND_TransSingleLB3       : chr  "3 / 13" "6 / 16" "5 / 14" "25.0%" ...
##  $ ND_TransSingleLB4       : chr  "0 / 1" "0 / 6" "0 / 2" "0 / 3" ...
##  $ ND_TransSingleLB5       : chr  "" "0 / 1" "" "1 / 2" ...
##  $ ND_IntentRetPerLB1      : chr  "3.0" "2.6" "1.8" "1.7" ...
##  $ ND_IntentRetPerLB2      : chr  "5.5" "3.1" "2.9" "2.8" ...
##  $ ND_IntentRetPerLB3      : chr  "3.0" "5.2" "3.8" "2.6" ...
##  $ ND_IntentRetPerLB4      : chr  "" "" "" "" ...
##  $ ND_IntentRetPerLB5      : chr  "" "" "" "5.0" ...
##  $ NewND_1IntentRetLB1     : chr  "40.9%" "34.7%" "61.8%" "58.3%" ...
##  $ NewND_1IntentRetLB2     : chr  "1 / 4" "27.3%" "4 / 15" "31.8%" ...
##  $ NewND_1IntentRetLB3     : chr  "3 / 7" "5 / 18" "3 / 10" "5 / 14" ...
##  $ NewND_1IntentRetLB4     : chr  "0 / 1" "0 / 3" "0 / 3" "0 / 3" ...
##  $ NewND_1IntentRetLB5     : chr  "" "0 / 2" "0 / 2" "0 / 1" ...
##  $ NewND_2IntentRetLB1     : chr  "40.9%" "44.0%" "63.6%" "68.3%" ...
##  $ NewND_2IntentRetLB2     : chr  "1 / 4" "36.4%" "6 / 15" "36.4%" ...
##  $ NewND_2IntentRetLB3     : chr  "3 / 7" "5 / 18" "4 / 10" "5 / 14" ...
##  $ NewND_2IntentRetLB4     : chr  "0 / 1" "0 / 3" "0 / 3" "0 / 3" ...
##  $ NewND_2IntentRetLB5     : chr  "" "0 / 2" "0 / 2" "0 / 1" ...
##  $ NewND_AllIntentRetLB1   : chr  "40.9%" "44.0%" "63.6%" "70.0%" ...
##  $ NewND_AllIntentRetLB2   : chr  "1 / 4" "36.4%" "6 / 15" "36.4%" ...
##  $ NewND_AllIntentRetLB3   : chr  "3 / 7" "5 / 18" "5 / 10" "5 / 14" ...
##  $ NewND_AllIntentRetLB4   : chr  "0 / 1" "0 / 3" "0 / 3" "0 / 3" ...
##  $ NewND_AllIntentRetLB5   : chr  "" "0 / 2" "0 / 2" "0 / 1" ...
##  $ NewND_IntentRetPerNew1  : chr  "1.2" "1.2" "1.1" "1.2" ...
##  $ NewND_IntentRetPerNew2  : chr  "1.0" "1.2" "1.3" "1.2" ...
##  $ NewND_IntentRetPerNew3  : chr  "1.1" "1.1" "1.5" "1.1" ...
##  $ NewND_IntentRetPerNew4  : chr  "1.0" "1.0" "1.0" "3.0" ...
##  $ NewND_IntentRetPerNew5  : chr  "" "1.0" "1.0" "2.0" ...
##  $ NewND_TransPerIntentRet1: chr  "1.0" "1.0" "1.0" "1.2" ...
##  $ NewND_TransPerIntentRet2: chr  "1.3" "0.7" "0.8" "0.8" ...
##  $ NewND_TransPerIntentRet3: chr  "1.0" "0.6" "0.6" "0.9" ...
##  $ NewND_TransPerIntentRet4: chr  "1.0" "1.0" "0.3" "0.2" ...
##  $ NewND_TransPerIntentRet5: chr  "" "0.5" "0.0" "0.0" ...
##  $ Donor_NumTrans1         : chr  "4" "2" "3" "1" ...
##  $ Donor_NumTrans2         : chr  "4" "3" "2" "11" ...
##  $ Donor_NumTrans3         : chr  "1" "7" "12" "4" ...
##  $ Donor_NumTrans4         : chr  "0" "9" "1" "2" ...
##  $ Donor_TransLB1          : chr  "3 / 4" "1 / 2" "2 / 3" "1 / 1" ...
##  $ Donor_TransLB2          : chr  "2 / 4" "2 / 3" "1 / 2" "5 / 11" ...
##  $ Donor_TransLB3          : chr  "0 / 1" "4 / 7" "8 / 12" "1 / 4" ...
##  $ Donor_TransLB4          : chr  "" "3 / 9" "0 / 1" "1 / 2" ...
##  $ Donor_TranSingleLB1     : chr  "2 / 4" "0 / 2" "2 / 3" "1 / 1" ...
##  $ Donor_TranSingleLB2     : chr  "1 / 4" "1 / 3" "1 / 2" "2 / 11" ...
##  $ Donor_TranSingleLB3     : chr  "0 / 1" "4 / 7" "7 / 12" "0 / 4" ...
##  $ Donor_TranSingleLB4     : chr  "" "1 / 9" "0 / 1" "0 / 2" ...
##  $ TotNumCycles1           : chr  "58" "208" "121" "186" ...
##  $ TotNumCycles2           : chr  "19" "104" "52" "58" ...
##  $ TotNumCycles3           : chr  "13" "55" "42" "55" ...
##  $ TotNumCycles4           : chr  "7" "22" "13" "21" ...
##  $ TotNumCycles5           : chr  "5" "16" "16" "24" ...
##  $ TotNumCyclesAll         : chr  "102" "405" "244" "344" ...
##  $ CycleCancel1            : chr  "8.6%" "14.4%" "4.1%" "10.2%" ...
##  $ CycleCancel2            : chr  "2 / 19" "15.4%" "5.8%" "6.9%" ...
##  $ CycleCancel3            : chr  "2 / 13" "21.8%" "14.3%" "12.7%" ...
##  $ CycleCancel4            : chr  "1 / 7" "31.8%" "2 / 13" "28.6%" ...
##  $ CycleCancel5            : chr  "2 / 5" "6 / 16" "6 / 16" "29.2%" ...
##  $ CycleCancelAll          : chr  "11.8%" "17.5%" "9.0%" "12.5%" ...
##  $ CycleStop1              : chr  "3.4%" "13.0%" "4.1%" "17.7%" ...
##  $ CycleStop2              : chr  "0 / 19" "12.5%" "5.8%" "12.1%" ...
##  $ CycleStop3              : chr  "1 / 13" "16.4%" "4.8%" "9.1%" ...
##  $ CycleStop4              : chr  "1 / 7" "22.7%" "2 / 13" "14.3%" ...
##  $ CycleStop5              : chr  "0 / 5" "2 / 16" "2 / 16" "8.3%" ...
##  $ CycleStopAll            : chr  "3.9%" "13.8%" "5.7%" "14.5%" ...
##  $ CycleFertPres1          : chr  "0.0%" "2.4%" "5.0%" "3.8%" ...
##  $ CycleFertPres2          : chr  "1 / 19" "6.7%" "1.9%" "1.7%" ...
##  $ CycleFertPres3          : chr  "0 / 13" "9.1%" "0.0%" "0.0%" ...
##  $ CycleFertPres4          : chr  "0 / 7" "0.0%" "0 / 13" "9.5%" ...
##  $ CycleFertPres5          : chr  "0 / 5" "0 / 16" "0 / 16" "0.0%" ...
##  $ CycleFertPresAll        : chr  "1.0%" "4.2%" "2.9%" "2.9%" ...
##  $ TransCarrier1           : chr  "0.0%" "1.6%" "0.0%" "2.5%" ...
##  $ TransCarrier2           : chr  "0 / 16" "0.0%" "0.0%" "2.3%" ...
##  $ TransCarrier3           : chr  "0 / 10" "0.0%" "0.0%" "0.0%" ...
##  $ TransCarrier4           : chr  "0 / 5" "0 / 10" "0 / 8" "0 / 8" ...
##  $ TransCarrier5           : chr  "0 / 3" "0 / 8" "0 / 7" "3 / 14" ...
##  $ TransCarrierAll         : chr  "0.0%" "0.9%" "0.0%" "3.1%" ...
##  $ TransFrozEmb1           : chr  "25.5%" "54.1%" "78.7%" "58.0%" ...
##  $ TransFrozEmb2           : chr  "7 / 16" "58.8%" "87.1%" "50.0%" ...
##  $ TransFrozEmb3           : chr  "3 / 10" "51.9%" "95.0%" "55.3%" ...
##  $ TransFrozEmb4           : chr  "1 / 5" "8 / 10" "5 / 8" "3 / 8" ...
##  $ TransFrozEmb5           : chr  "2 / 3" "6 / 8" "5 / 7" "6 / 14" ...
##  $ TransFrozEmbAll         : chr  "30.9%" "56.9%" "81.6%" "54.3%" ...
##  $ TransICSI1              : chr  "46.8%" "88.5%" "80.0%" "96.6%" ...
##  $ TransICSI2              : chr  "6 / 16" "68.6%" "71.0%" "95.5%" ...
##  $ TransICSI3              : chr  "7 / 10" "70.4%" "60.0%" "89.5%" ...
##  $ TransICSI4              : chr  "2 / 5" "6 / 10" "4 / 8" "7 / 8" ...
##  $ TransICSI5              : chr  "1 / 3" "5 / 8" "2 / 7" "8 / 14" ...
##  $ TransICSIAll            : chr  "46.9%" "79.4%" "70.9%" "92.4%" ...
##  $ TransPGT1               : chr  "2.1%" "8.2%" "45.3%" "5.9%" ...
##  $ TransPGT2               : chr  "0 / 16" "15.7%" "48.4%" "0.0%" ...
##  $ TransPGT3               : chr  "0 / 10" "11.1%" "65.0%" "15.8%" ...
##  $ TransPGT4               : chr  "0 / 5" "1 / 10" "4 / 8" "3 / 8" ...
##  $ TransPGT5               : chr  "1 / 3" "0 / 8" "3 / 7" "1 / 14" ...
##  $ TransPGTAll             : chr  "2.5%" "10.1%" "48.9%" "7.6%" ...
##  $ ReasonMale              : chr  "30%" "60%" "37%" "43%" ...
##  $ ReasonEndo              : chr  "25%" "27%" "24%" "16%" ...
##  $ ReasonTubal             : chr  "12%" "21%" "17%" "18%" ...
##  $ ReasonOvul              : chr  "37%" "15%" "8%" "22%" ...
##  $ ReasonUterine           : chr  "10%" "3%" "8%" "3%" ...
##  $ ReasonPGT               : chr  "0%" "6%" "4%" "5%" ...
##  $ ReasonCarrier           : chr  "0%" "<1%" "0%" "<1%" ...
##  $ ReasonDOR               : chr  "18%" "10%" "26%" "12%" ...
##  $ ReasonBank              : chr  "5%" "17%" "28%" "10%" ...
##  $ ReasonPregLoss          : chr  "4%" "6%" "1%" "2%" ...
##  $ ReasonOtherInfert       : chr  "11%" "53%" "11%" "15%" ...
##  $ ReasonNonInfert         : chr  "0%" "12%" "3%" "2%" ...
##  $ ReasonUnexplained       : chr  "4%" "1%" "12%" "8%" ...
##  $ DonorEggService         : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ DonatedEmbryoService    : chr  "No" "Yes" "Yes" "Yes" ...
##  $ EmbryoCryoService       : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ EggCryoService          : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ SingleWomenService      : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ GestCarrierService      : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ SARTmember              : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ LabAccred               : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ NumResearch             : chr  "0" "0" "0" "0" ...
##  $ CurrentStateAbbrev      : chr  "AL" "AL" "AL" "AL" ...
```

In the structure can be seen a problem from this data source. Percentages and ratios are coded as text, not as numbers. It will be necessary pre-process the data from the table before we can work with them.

Why numeric variables are detected as characters. Ratios contain non-numeric symbols ("%", "/", "<"). What's the problem with the rest?

We will order alphabetically each column, see what happens.

First of all, to avoid problems down the line, we will change null values in the table for `NA`:

```
clinic_data[clinic_data==""] <- NA

View(clinic_data)
```

Should we order the values in the columns, we see that there are columns with integers in which the thousands are marked with a comma (,).

```
ordenadas <- sapply(clinic_data, function(x) sort(x, na.last = TRUE))

View(ordenadas)
```

Next, we will correct those variables that should be `integer` o `numeric`.

Code adapted from a question in Stack Overflow: How to read data when some numbers contain commas as thousand separator?

```
# Vectors that refer the columns that should be integers
# and the columns that should be ratios.

integers <- c(7:11, 22:26, 37:41, 82:85, 94:99, 163)
ratios <- c(12:21, 27:36, 42:81, 86:93, 100:154)

# Pre-processing columns with integers deleting "," symbol.
clinic_data[, integers] <- lapply(clinic_data[, integers],
                                  function(x){
                                    as.integer(gsub(",", "", x))
                                  })

str(clinic_data[, integers])
```

```
## 'data.frame':    448 obs. of  26 variables:
##  $ ND_NumIntentRet1: int  30 110 76 82 15 224 42 56 3 28 ...
##  $ ND_NumIntentRet2: int  11 49 29 34 6 106 33 38 0 12 ...
##  $ ND_NumIntentRet3: int  12 31 23 26 4 53 16 32 0 15 ...
##  $ ND_NumIntentRet4: int  1 6 5 16 3 36 2 8 1 4 ...
##  $ ND_NumIntentRet5: int  0 4 2 5 2 40 7 8 0 8 ...
##  $ ND_NumRetrieve1 : int  24 105 70 78 12 223 42 54 3 27 ...
##  $ ND_NumRetrieve2 : int  5 42 29 26 4 105 31 30 0 12 ...
##  $ ND_NumRetrieve3 : int  9 22 21 25 3 53 16 23 0 12 ...
##  $ ND_NumRetrieve4 : int  1 6 3 11 3 36 2 7 1 4 ...
##  $ ND_NumRetrieve5 : int  0 1 1 5 2 40 6 5 0 8 ...
##  $ ND_NumTrans1    : int  30 105 72 105 12 233 54 70 3 28 ...
##  $ ND_NumTrans2    : int  8 34 24 29 4 82 37 36 0 15 ...
##  $ ND_NumTrans3    : int  13 16 14 24 3 36 17 16 0 8 ...
##  $ ND_NumTrans4    : int  1 6 2 3 3 10 2 2 1 4 ...
##  $ ND_NumTrans5    : int  0 1 0 2 2 5 6 3 0 6 ...
##  $ Donor_NumTrans1 : int  4 2 3 1 0 1 9 1 1 2 ...
##  $ Donor_NumTrans2 : int  4 3 2 11 0 0 1 4 1 2 ...
##  $ Donor_NumTrans3 : int  1 7 12 4 0 9 20 34 2 3 ...
##  $ Donor_NumTrans4 : int  0 9 1 2 0 0 5 0 1 2 ...
##  $ TotNumCycles1   : int  58 208 121 186 21 458 95 180 19 72 ...
##  $ TotNumCycles2   : int  19 104 52 58 11 195 72 83 12 40 ...
##  $ TotNumCycles3   : int  13 55 42 55 9 181 42 54 15 29 ...
##  $ TotNumCycles4   : int  7 22 13 21 3 59 10 21 3 11 ...
##  $ TotNumCycles5   : int  5 16 16 24 5 62 17 31 1 1 ...
##  $ TotNumCyclesAll : int  102 405 244 344 49 955 236 369 50 153 ...
##  $ NumResearch     : int  0 0 0 0 0 0 0 0 0 0 ...
```

Pre-processing the columns with rations is a bit more complex. It is necessary to deal with three different cases:

1) Data as <1%. Since we don't have the real value, what I will do is arbitrarily chose the value 0.5%, expressed as 0.005 ratio.

2) Data including "%" symbol. Same strategy that we followed with integers; I will remove the symbol with `gsub`. Besides, I will divide the result by 100, making all numbers a ratio (parts per unit).

3) Data as fractions. Even a bit more complex. I will use regular expressions to isolate numerator and denominator, and will return the result of the division as a ratio.

```
# This function process ratios expressed as fractions.
divide <- function(x){
  numerator <- as.numeric(gsub(" .*$", "", x))
  denominator <- as.numeric(gsub("^.*/ ", "", x))
  return (numerator / denominator)
}

# This is the main functios for processing ratios from characters to numbers.
# Expect the appearance of several warnings of 'NA introduced by coercion' due to multiple # data point
numerizador <- function(dato){
    ifelse (dato == "<1%", 0.005,
            ifelse ((grepl("%", dato) == TRUE), as.numeric(gsub("%", "", dato))/100,
                    ifelse ((grepl("/", dato)==TRUE), divide(dato), as.numeric(dato))))
}
# The function 'ifelse' is needed for working with vectors of length >1.

# Pre-processing ratios:
clinic_data[, ratios] <- lapply(clinic_data[, ratios], numerizador)
```

```
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```

```r
# When using this expression, multiple warnings of 'NAs introduced by coercion' appear.
# I think it is due to "NA" being stored as character strings.
# I haven't been able to correct it yet. It is possible to avoid the raise of the warning,
# but I don't feel comfortable masking error warnings.

str(clinic_data[, ratios], list.len = length(clinic_data[, ratios]))
```

```
## 'data.frame':    448 obs. of  123 variables:
##  $ ND_IntentRetLB1         : num  0.333 0.391 0.566 0.598 0.4 ...
##  $ ND_IntentRetLB2         : num  0.182 0.327 0.345 0.353 0 ...
##  $ ND_IntentRetLB3         : num  0.333 0.194 0.261 0.385 0 ...
##  $ ND_IntentRetLB4         : num  0 0 0 0 0 0.056 0.5 0 1 0.5 ...
##  $ ND_IntentRetLB5         : num  NA 0 0 0.2 0 ...
##  $ ND_IntentRetSingleLB1   : num  0.2 0.245 0.513 0.439 0.267 ...
##  $ ND_IntentRetSingleLB2   : num  0.182 0.163 0.345 0.235 0 ...
##  $ ND_IntentRetSingleLB3   : num  0.25 0.194 0.217 0.231 0 ...
##  $ ND_IntentRetSingleLB4   : num  0 0 0 0 0 0.028 0.5 0 1 0.5 ...
##  $ ND_IntentRetSingleLB5   : num  NA 0 0 0.2 0 0.05 0 0 NA 0.125 ...
##  $ ND_RetrieveLB1          : num  0.417 0.41 0.614 0.628 0.5 ...
##  $ ND_RetrieveLB2          : num  0.4 0.381 0.345 0.462 0 ...
##  $ ND_RetrieveLB3          : num  0.444 0.273 0.286 0.4 0 ...
##  $ ND_RetrieveLB4          : num  0 0 0 0 0 0.056 0.5 0 1 0.5 ...
##  $ ND_RetrieveLB5          : num  NA 0 0 0.2 0 ...
##  $ ND_RetrieveSingleLB1    : num  0.25 0.257 0.557 0.462 0.333 ...
##  $ ND_RetrieveSingleLB2    : num  0.4 0.19 0.345 0.308 0 ...
##  $ ND_RetrieveSingleLB3    : num  0.333 0.273 0.238 0.24 0 ...
##  $ ND_RetrieveSingleLB4    : num  0 0 0 0 0 0.028 0.5 0 1 0.5 ...
##  $ ND_RetrieveSingleLB5    : num  NA 0 0 0.2 0 0.05 0 0 NA 0.125 ...
##  $ ND_TransLB1             : num  0.333 0.41 0.597 0.467 0.5 ...
##  $ ND_TransLB2             : num  0.25 0.471 0.417 0.414 0 ...
##  $ ND_TransLB3             : num  0.308 0.375 0.429 0.417 0 ...
##  $ ND_TransLB4             : num  0 0 0 0 0 0.2 0.5 0 1 0.5 ...
##  $ ND_TransLB5             : num  NA 0 NA 0.5 0 ...
##  $ ND_TransSingleLB1       : num  0.2 0.257 0.542 0.343 0.333 ...
##  $ ND_TransSingleLB2       : num  0.25 0.235 0.417 0.276 0 ...
##  $ ND_TransSingleLB3       : num  0.231 0.375 0.357 0.25 0 ...
##  $ ND_TransSingleLB4       : num  0 0 0 0 0 0.1 0.5 0 1 0.5 ...
##  $ ND_TransSingleLB5       : num  NA 0 NA 0.5 0 ...
##  $ ND_IntentRetPerLB1      : num  3 2.6 1.8 1.7 2.5 1.6 1.8 1.8 1.5 2.3 ...
##  $ ND_IntentRetPerLB2      : num  5.5 3.1 2.9 2.8 NA 2.1 1.8 2.7 NA 1.7 ...
##  $ ND_IntentRetPerLB3      : num  3 5.2 3.8 2.6 NA 2.5 8 6.4 NA 5 ...
##  $ ND_IntentRetPerLB4      : num  NA NA NA NA NA 18 2 NA 1 2 ...
##  $ ND_IntentRetPerLB5      : num  NA NA NA 5 NA 13.3 7 NA NA 8 ...
##  $ NewND_1IntentRetLB1     : num  0.409 0.347 0.618 0.583 0.571 ...
##  $ NewND_1IntentRetLB2     : num  0.25 0.273 0.267 0.318 0 ...
##  $ NewND_1IntentRetLB3     : num  0.429 0.278 0.3 0.357 0 ...
##  $ NewND_1IntentRetLB4     : num  0 0 0 0 0 ...
##  $ NewND_1IntentRetLB5     : num  NA 0 0 0 NA ...
##  $ NewND_2IntentRetLB1     : num  0.409 0.44 0.636 0.683 0.714 ...
##  $ NewND_2IntentRetLB2     : num  0.25 0.364 0.4 0.364 0 ...
##  $ NewND_2IntentRetLB3     : num  0.429 0.278 0.4 0.357 0 ...
##  $ NewND_2IntentRetLB4     : num  0 0 0 0 0 ...
##  $ NewND_2IntentRetLB5     : num  NA 0 0 0 NA ...
##  $ NewND_AllIntentRetLB1   : num  0.409 0.44 0.636 0.7 0.714 ...
##  $ NewND_AllIntentRetLB2   : num  0.25 0.364 0.4 0.364 0 ...
##  $ NewND_AllIntentRetLB3   : num  0.429 0.278 0.5 0.357 0 ...
##  $ NewND_AllIntentRetLB4   : num  0 0 0 0 0 ...
##  $ NewND_AllIntentRetLB5   : num  NA 0 0 0 NA ...
##  $ NewND_IntentRetPerNew1  : num  1.2 1.2 1.1 1.2 1.3 1.2 1.1 1 2 1 ...
##  $ NewND_IntentRetPerNew2  : num  1 1.2 1.3 1.2 1.3 1.2 1.1 1.1 NA 1 ...
##  $ NewND_IntentRetPerNew3  : num  1.1 1.1 1.5 1.1 1.3 1.3 1.3 1.3 NA 1.2 ...
##  $ NewND_IntentRetPerNew4  : num  1 1 1 3 1 1.7 1 1.4 NA 1.3 ...
##  $ NewND_IntentRetPerNew5  : num  NA 1 1 2 NA 2.3 1 1 NA 1.8 ...
##  $ NewND_TransPerIntentRet1: num  1 1 1 1.2 0.8 1 1.3 1.3 1 1.1 ...
##  $ NewND_TransPerIntentRet2: num  1.3 0.7 0.8 0.8 0.6 0.8 1.1 1 NA 1.4 ...
##  $ NewND_TransPerIntentRet3: num  1 0.6 0.6 0.9 0.8 0.7 1 0.5 NA 0.6 ...
##  $ NewND_TransPerIntentRet4: num  1 1 0.3 0.2 1 0.2 1 0.3 NA 1 ...
##  $ NewND_TransPerIntentRet5: num  NA 0.5 0 0 NA 0.1 0.5 0.4 NA 0.7 ...
##  $ Donor_TransLB1          : num  0.75 0.5 0.667 1 NA ...
##  $ Donor_TransLB2          : num  0.5 0.667 0.5 0.455 NA ...
##  $ Donor_TransLB3          : num  0 0.571 0.667 0.25 NA ...
##  $ Donor_TransLB4          : num  NA 0.333 0 0.5 NA ...
##  $ Donor_TranSingleLB1     : num  0.5 0 0.667 1 NA ...
##  $ Donor_TranSingleLB2     : num  0.25 0.333 0.5 0.182 NA ...
##  $ Donor_TranSingleLB3     : num  0 0.571 0.583 0 NA ...
##  $ Donor_TranSingleLB4     : num  NA 0.111 0 0 NA ...
##  $ CycleCancel1            : num  0.086 0.144 0.041 0.102 0 0.011 0.032 0.017 0 0.028 ...
##  $ CycleCancel2            : num  0.1053 0.154 0.058 0.069 0.0909 ...
##  $ CycleCancel3            : num  0.154 0.218 0.143 0.127 0 ...
##  $ CycleCancel4            : num  0.143 0.318 0.154 0.286 0 ...
##  $ CycleCancel5            : num  0.4 0.375 0.375 0.292 0 ...
##  $ CycleCancelAll          : num  0.118 0.175 0.09 0.125 0.02 0.016 0.059 0.073 0.02 0.033 ...
##  $ CycleStop1              : num  0.034 0.13 0.041 0.177 0 ...
##  $ CycleStop2              : num  0 0.125 0.058 0.121 0.182 ...
##  $ CycleStop3              : num  0.0769 0.164 0.048 0.091 0 ...
##  $ CycleStop4              : num  0.143 0.227 0.154 0.143 0 ...
##  $ CycleStop5              : num  0 0.125 0.125 0.083 0.6 ...
##  $ CycleStopAll            : num  0.039 0.138 0.057 0.145 0.102 0.07 0.055 0.019 0.28 0.078 ...
##  $ CycleFertPres1          : num  0 0.024 0.05 0.038 0.143 ...
##  $ CycleFertPres2          : num  0.0526 0.067 0.019 0.017 0.0909 ...
##  $ CycleFertPres3          : num  0 0.091 0 0 0 0 0 0.037 0 0.069 ...
##  $ CycleFertPres4          : num  0 0 0 0.095 0.333 ...
##  $ CycleFertPres5          : num  0 0 0 0 0.2 0 0 0 0 0 ...
##  $ CycleFertPresAll        : num  0.01 0.042 0.029 0.029 0.122 0.014 0.008 0.027 0.02 0.033 ...
##  $ TransCarrier1           : num  0 0.016 0 0.025 0 0.004 0.013 0.011 0 0 ...
##  $ TransCarrier2           : num  0 0 0 0.023 0 0.022 0.053 0 0 0.107 ...
##  $ TransCarrier3           : num  0 0 0 0 0 0.015 0.057 0 0 0 ...
##  $ TransCarrier4           : num  0 0 0 0 0 0 0.125 0.125 NA 0 ...
##  $ TransCarrier5           : num  0 0 0 0.214 0 ...
##  $ TransCarrierAll         : num  0 0.009 0 0.031 0 0.012 0.037 0.016 0.034 0.028 ...
##  $ TransFrozEmb1           : num  0.255 0.541 0.787 0.58 0.385 ...
##  $ TransFrozEmb2           : num  0.438 0.588 0.871 0.5 0.167 ...
##  $ TransFrozEmb3           : num  0.3 0.519 0.95 0.553 0.667 ...
##  $ TransFrozEmb4           : num  0.2 0.8 0.625 0.375 0 ...
##  $ TransFrozEmb5           : num  0.667 0.75 0.714 0.429 0 ...
##  $ TransFrozEmbAll         : num  0.309 0.569 0.816 0.543 0.357 0.988 0.633 0.973 0.483 0.481 ...
##  $ TransICSI1              : num  0.468 0.885 0.8 0.966 1 0.746 0.893 0.931 1 0.929 ...
##  $ TransICSI2              : num  0.375 0.686 0.71 0.955 1 0.72 0.807 0.732 1 0.929 ...
##  $ TransICSI3              : num  0.7 0.704 0.6 0.895 1 ...
##  $ TransICSI4              : num  0.4 0.6 0.5 0.875 1 0.8 0.625 0.5 NA 1 ...
##  $ TransICSI5              : num  0.333 0.625 0.286 0.571 1 ...
##  $ TransICSIAll            : num  0.469 0.794 0.709 0.924 1 0.732 0.846 0.824 0.966 0.934 ...
##  $ TransPGT1               : num  0.021 0.082 0.453 0.059 0 ...
##  $ TransPGT2               : num  0 0.157 0.484 0 0 0.204 0.211 0.39 0.25 0.143 ...
##  $ TransPGT3               : num  0 0.111 0.65 0.158 0 ...
##  $ TransPGT4               : num  0 0.1 0.5 0.375 0 ...
##  $ TransPGT5               : num  0.3333 0 0.4286 0.0714 0 ...
##  $ TransPGTAll             : num  0.025 0.101 0.489 0.076 0 0.207 0.149 0.341 0.276 0.085 ...
##  $ ReasonMale              : num  0.3 0.6 0.37 0.43 0.35 0.28 0.71 0.5 0.46 0.29 ...
##  $ ReasonEndo              : num  0.25 0.27 0.24 0.16 0.31 0.07 0.1 0.08 0.02 0.12 ...
##  $ ReasonTubal             : num  0.12 0.21 0.17 0.18 0.35 0.1 0.2 0.17 0.3 0.2 ...
##  $ ReasonOvul              : num  0.37 0.15 0.08 0.22 0.39 0.17 0.15 0.16 0.12 0.12 ...
##  $ ReasonUterine           : num  0.1 0.03 0.08 0.03 0.41 0.04 0.04 0.02 0.08 0.08 ...
##  $ ReasonPGT               : num  0 0.06 0.04 0.05 0 0.72 0.01 0.09 0.08 0 ...
##  $ ReasonCarrier           : num  0 0.005 0 0.005 0 0.005 0 0.01 0.02 0.02 ...
##  $ ReasonDOR               : num  0.18 0.1 0.26 0.12 0.47 0.22 0.21 0.45 0.2 0.35 ...
##  $ ReasonBank              : num  0.05 0.17 0.28 0.1 0.35 0.99 0.09 0.46 0.12 0.2 ...
##  $ ReasonPregLoss          : num  0.04 0.06 0.01 0.02 0.04 0.07 0.04 0.01 0.12 0.03 ...
##  $ ReasonOtherInfert       : num  0.11 0.53 0.11 0.15 0.08 0.005 0.08 0.15 0.12 0.06 ...
##  $ ReasonNonInfert         : num  0 0.12 0.03 0.02 0 0.05 0.01 0.04 0.06 0.02 ...
##  $ ReasonUnexplained       : num  0.04 0.01 0.12 0.08 0 0.09 0.03 0.01 0.06 0.12 ...
```

I am not sure about why all those `NAs introduced by coercion` appear. I suspect it is because `NA` values in the table are stored as text.

Variables: type and description

I might have allowed myself to get carried along in passion choosing a file too big. The table contains 165 variables. It is not a ridiculous number, but may be not easy enough to handle for the scope of this study.

```
str(clinic_data, list.len = length(clinic_data))
```

```
## 'data.frame':    448 obs. of  164 variables:
##  $ OrderID                 : num  1 2 3 4 5 6 7 8 9 10 ...
##  $ CurrentClinicName1      : chr  "ALABAMA FERTILITY SPECIALISTS" "ART FERTILITY PROGRAM OF ALABAMA"
##  $ CurrentClinicName2      : chr  NA NA "REPRODUCTIVE ENDOCRINOLOGY AND INFERTILITY" NA ...
##  $ CurrentClinicCity       : chr  "BIRMINGHAM" "BIRMINGHAM" "BIRMINGHAM" "MOBILE" ...
##  $ CurrentClinicState      : chr  "ALABAMA" "ALABAMA" "ALABAMA" "ALABAMA" ...
##  $ MedicalDirector         : chr  "Janet M. Bouknight, MD" "Virginia L. Houserman, MD" "Deidre D. Gu
##  $ ND_NumIntentRet1        : int  30 110 76 82 15 224 42 56 3 28 ...
##  $ ND_NumIntentRet2        : int  11 49 29 34 6 106 33 38 0 12 ...
##  $ ND_NumIntentRet3        : int  12 31 23 26 4 53 16 32 0 15 ...
##  $ ND_NumIntentRet4        : int  1 6 5 16 3 36 2 8 1 4 ...
##  $ ND_NumIntentRet5        : int  0 4 2 5 2 40 7 8 0 8 ...
##  $ ND_IntentRetLB1         : num  0.333 0.391 0.566 0.598 0.4 ...
##  $ ND_IntentRetLB2         : num  0.182 0.327 0.345 0.353 0 ...
##  $ ND_IntentRetLB3         : num  0.333 0.194 0.261 0.385 0 ...
##  $ ND_IntentRetLB4         : num  0 0 0 0 0 0.056 0.5 0 1 0.5 ...
##  $ ND_IntentRetLB5         : num  NA 0 0 0.2 0 ...
##  $ ND_IntentRetSingleLB1   : num  0.2 0.245 0.513 0.439 0.267 ...
##  $ ND_IntentRetSingleLB2   : num  0.182 0.163 0.345 0.235 0 ...
##  $ ND_IntentRetSingleLB3   : num  0.25 0.194 0.217 0.231 0 ...
##  $ ND_IntentRetSingleLB4   : num  0 0 0 0 0 0.028 0.5 0 1 0.5 ...
##  $ ND_IntentRetSingleLB5   : num  NA 0 0 0.2 0 0.05 0 0 NA 0.125 ...
##  $ ND_NumRetrieve1         : int  24 105 70 78 12 223 42 54 3 27 ...
##  $ ND_NumRetrieve2         : int  5 42 29 26 4 105 31 30 0 12 ...
##  $ ND_NumRetrieve3         : int  9 22 21 25 3 53 16 23 0 12 ...
##  $ ND_NumRetrieve4         : int  1 6 3 11 3 36 2 7 1 4 ...
##  $ ND_NumRetrieve5         : int  0 1 1 5 2 40 6 5 0 8 ...
##  $ ND_RetrieveLB1          : num  0.417 0.41 0.614 0.628 0.5 ...
##  $ ND_RetrieveLB2          : num  0.4 0.381 0.345 0.462 0 ...
##  $ ND_RetrieveLB3          : num  0.444 0.273 0.286 0.4 0 ...
##  $ ND_RetrieveLB4          : num  0 0 0 0 0 0.056 0.5 0 1 0.5 ...
##  $ ND_RetrieveLB5          : num  NA 0 0 0.2 0 ...
##  $ ND_RetrieveSingleLB1    : num  0.25 0.257 0.557 0.462 0.333 ...
##  $ ND_RetrieveSingleLB2    : num  0.4 0.19 0.345 0.308 0 ...
##  $ ND_RetrieveSingleLB3    : num  0.333 0.273 0.238 0.24 0 ...
##  $ ND_RetrieveSingleLB4    : num  0 0 0 0 0 0.028 0.5 0 1 0.5 ...
##  $ ND_RetrieveSingleLB5    : num  NA 0 0 0.2 0 0.05 0 0 NA 0.125 ...
##  $ ND_NumTrans1            : int  30 105 72 105 12 233 54 70 3 28 ...
##  $ ND_NumTrans2            : int  8 34 24 29 4 82 37 36 0 15 ...
##  $ ND_NumTrans3            : int  13 16 14 24 3 36 17 16 0 8 ...
##  $ ND_NumTrans4            : int  1 6 2 3 3 10 2 2 1 4 ...
##  $ ND_NumTrans5            : int  0 1 0 2 2 5 6 3 0 6 ...
##  $ ND_TransLB1             : num  0.333 0.41 0.597 0.467 0.5 ...
##  $ ND_TransLB2             : num  0.25 0.471 0.417 0.414 0 ...
##  $ ND_TransLB3             : num  0.308 0.375 0.429 0.417 0 ...
##  $ ND_TransLB4             : num  0 0 0 0 0 0.2 0.5 0 1 0.5 ...
##  $ ND_TransLB5             : num  NA 0 NA 0.5 0 ...
##  $ ND_TransSingleLB1       : num  0.2 0.257 0.542 0.343 0.333 ...
##  $ ND_TransSingleLB2       : num  0.25 0.235 0.417 0.276 0 ...
##  $ ND_TransSingleLB3       : num  0.231 0.375 0.357 0.25 0 ...
##  $ ND_TransSingleLB4       : num  0 0 0 0 0 0.1 0.5 0 1 0.5 ...
##  $ ND_TransSingleLB5       : num  NA 0 NA 0.5 0 ...
##  $ ND_IntentRetPerLB1      : num  3 2.6 1.8 1.7 2.5 1.6 1.8 1.8 1.5 2.3 ...
##  $ ND_IntentRetPerLB2      : num  5.5 3.1 2.9 2.8 NA 2.1 1.8 2.7 NA 1.7 ...
##  $ ND_IntentRetPerLB3      : num  3 5.2 3.8 2.6 NA 2.5 8 6.4 NA 5 ...
##  $ ND_IntentRetPerLB4      : num  NA NA NA NA NA 18 2 NA 1 2 ...
##  $ ND_IntentRetPerLB5      : num  NA NA NA 5 NA 13.3 7 NA NA 8 ...
##  $ NewND_1IntentRetLB1     : num  0.409 0.347 0.618 0.583 0.571 ...
##  $ NewND_1IntentRetLB2     : num  0.25 0.273 0.267 0.318 0 ...
##  $ NewND_1IntentRetLB3     : num  0.429 0.278 0.3 0.357 0 ...
##  $ NewND_1IntentRetLB4     : num  0 0 0 0 0 ...
##  $ NewND_1IntentRetLB5     : num  NA 0 0 0 NA ...
##  $ NewND_2IntentRetLB1     : num  0.409 0.44 0.636 0.683 0.714 ...
##  $ NewND_2IntentRetLB2     : num  0.25 0.364 0.4 0.364 0 ...
##  $ NewND_2IntentRetLB3     : num  0.429 0.278 0.4 0.357 0 ...
##  $ NewND_2IntentRetLB4     : num  0 0 0 0 0 ...
##  $ NewND_2IntentRetLB5     : num  NA 0 0 0 NA ...
##  $ NewND_AllIntentRetLB1   : num  0.409 0.44 0.636 0.7 0.714 ...
##  $ NewND_AllIntentRetLB2   : num  0.25 0.364 0.4 0.364 0 ...
##  $ NewND_AllIntentRetLB3   : num  0.429 0.278 0.5 0.357 0 ...
##  $ NewND_AllIntentRetLB4   : num  0 0 0 0 0 ...
##  $ NewND_AllIntentRetLB5   : num  NA 0 0 0 NA ...
##  $ NewND_IntentRetPerNew1  : num  1.2 1.2 1.1 1.2 1.3 1.2 1.1 1 2 1 ...
##  $ NewND_IntentRetPerNew2  : num  1 1.2 1.3 1.2 1.3 1.2 1.1 1.1 NA 1 ...
##  $ NewND_IntentRetPerNew3  : num  1.1 1.1 1.5 1.1 1.3 1.3 1.3 1.3 NA 1.2 ...
##  $ NewND_IntentRetPerNew4  : num  1 1 1 3 1 1.7 1 1.4 NA 1.3 ...
##  $ NewND_IntentRetPerNew5  : num  NA 1 1 2 NA 2.3 1 1 NA 1.8 ...
##  $ NewND_TransPerIntentRet1: num  1 1 1 1.2 0.8 1 1.3 1.3 1 1.1 ...
##  $ NewND_TransPerIntentRet2: num  1.3 0.7 0.8 0.8 0.6 0.8 1.1 1 NA 1.4 ...
##  $ NewND_TransPerIntentRet3: num  1 0.6 0.6 0.9 0.8 0.7 1 0.5 NA 0.6 ...
##  $ NewND_TransPerIntentRet4: num  1 1 0.3 0.2 1 0.2 1 0.3 NA 1 ...
##  $ NewND_TransPerIntentRet5: num  NA 0.5 0 0 NA 0.1 0.5 0.4 NA 0.7 ...
##  $ Donor_NumTrans1         : int  4 2 3 1 0 1 9 1 1 2 ...
##  $ Donor_NumTrans2         : int  4 3 2 11 0 0 1 4 1 2 ...
##  $ Donor_NumTrans3         : int  1 7 12 4 0 9 20 34 2 3 ...
##  $ Donor_NumTrans4         : int  0 9 1 2 0 0 5 0 1 2 ...
##  $ Donor_TransLB1          : num  0.75 0.5 0.667 1 NA ...
##  $ Donor_TransLB2          : num  0.5 0.667 0.5 0.455 NA ...
##  $ Donor_TransLB3          : num  0 0.571 0.667 0.25 NA ...
##  $ Donor_TransLB4          : num  NA 0.333 0 0.5 NA ...
##  $ Donor_TranSingleLB1     : num  0.5 0 0.667 1 NA ...
##  $ Donor_TranSingleLB2     : num  0.25 0.333 0.5 0.182 NA ...
##  $ Donor_TranSingleLB3     : num  0 0.571 0.583 0 NA ...
##  $ Donor_TranSingleLB4     : num  NA 0.111 0 0 NA ...
##  $ TotNumCycles1           : int  58 208 121 186 21 458 95 180 19 72 ...
##  $ TotNumCycles2           : int  19 104 52 58 11 195 72 83 12 40 ...
##  $ TotNumCycles3           : int  13 55 42 55 9 181 42 54 15 29 ...
##  $ TotNumCycles4           : int  7 22 13 21 3 59 10 21 3 11 ...
##  $ TotNumCycles5           : int  5 16 16 24 5 62 17 31 1 1 ...
##  $ TotNumCyclesAll         : int  102 405 244 344 49 955 236 369 50 153 ...
##  $ CycleCancel1            : num  0.086 0.144 0.041 0.102 0 0.011 0.032 0.017 0 0.028 ...
##  $ CycleCancel2            : num  0.1053 0.154 0.058 0.069 0.0909 ...
##  $ CycleCancel3            : num  0.154 0.218 0.143 0.127 0 ...
##  $ CycleCancel4            : num  0.143 0.318 0.154 0.286 0 ...
##  $ CycleCancel5            : num  0.4 0.375 0.375 0.292 0 ...
##  $ CycleCancelAll          : num  0.118 0.175 0.09 0.125 0.02 0.016 0.059 0.073 0.02 0.033 ...
##  $ CycleStop1              : num  0.034 0.13 0.041 0.177 0 ...
##  $ CycleStop2              : num  0 0.125 0.058 0.121 0.182 ...
##  $ CycleStop3              : num  0.0769 0.164 0.048 0.091 0 ...
##  $ CycleStop4              : num  0.143 0.227 0.154 0.143 0 ...
##  $ CycleStop5              : num  0 0.125 0.125 0.083 0.6 ...
##  $ CycleStopAll            : num  0.039 0.138 0.057 0.145 0.102 0.07 0.055 0.019 0.28 0.078 ...
##  $ CycleFertPres1          : num  0 0.024 0.05 0.038 0.143 ...
##  $ CycleFertPres2          : num  0.0526 0.067 0.019 0.017 0.0909 ...
##  $ CycleFertPres3          : num  0 0.091 0 0 0 0 0 0.037 0 0.069 ...
##  $ CycleFertPres4          : num  0 0 0 0.095 0.333 ...
##  $ CycleFertPres5          : num  0 0 0 0 0.2 0 0 0 0 0 ...
##  $ CycleFertPresAll        : num  0.01 0.042 0.029 0.029 0.122 0.014 0.008 0.027 0.02 0.033 ...
##  $ TransCarrier1           : num  0 0.016 0 0.025 0 0.004 0.013 0.011 0 0 ...
##  $ TransCarrier2           : num  0 0 0 0.023 0 0.022 0.053 0 0 0.107 ...
##  $ TransCarrier3           : num  0 0 0 0 0 0.015 0.057 0 0 0 ...
##  $ TransCarrier4           : num  0 0 0 0 0 0 0.125 0.125 NA 0 ...
##  $ TransCarrier5           : num  0 0 0 0.214 0 ...
##  $ TransCarrierAll         : num  0 0.009 0 0.031 0 0.012 0.037 0.016 0.034 0.028 ...
##  $ TransFrozEmb1           : num  0.255 0.541 0.787 0.58 0.385 ...
##  $ TransFrozEmb2           : num  0.438 0.588 0.871 0.5 0.167 ...
##  $ TransFrozEmb3           : num  0.3 0.519 0.95 0.553 0.667 ...
##  $ TransFrozEmb4           : num  0.2 0.8 0.625 0.375 0 ...
##  $ TransFrozEmb5           : num  0.667 0.75 0.714 0.429 0 ...
##  $ TransFrozEmbAll         : num  0.309 0.569 0.816 0.543 0.357 0.988 0.633 0.973 0.483 0.481 ...
##  $ TransICSI1              : num  0.468 0.885 0.8 0.966 1 0.746 0.893 0.931 1 0.929 ...
##  $ TransICSI2              : num  0.375 0.686 0.71 0.955 1 0.72 0.807 0.732 1 0.929 ...
##  $ TransICSI3              : num  0.7 0.704 0.6 0.895 1 ...
##  $ TransICSI4              : num  0.4 0.6 0.5 0.875 1 0.8 0.625 0.5 NA 1 ...
##  $ TransICSI5              : num  0.333 0.625 0.286 0.571 1 ...
##  $ TransICSIAll            : num  0.469 0.794 0.709 0.924 1 0.732 0.846 0.824 0.966 0.934 ...
##  $ TransPGT1               : num  0.021 0.082 0.453 0.059 0 ...
##  $ TransPGT2               : num  0 0.157 0.484 0 0 0.204 0.211 0.39 0.25 0.143 ...
##  $ TransPGT3               : num  0 0.111 0.65 0.158 0 ...
##  $ TransPGT4               : num  0 0.1 0.5 0.375 0 ...
##  $ TransPGT5               : num  0.3333 0 0.4286 0.0714 0 ...
##  $ TransPGTAll             : num  0.025 0.101 0.489 0.076 0 0.207 0.149 0.341 0.276 0.085 ...
##  $ ReasonMale              : num  0.3 0.6 0.37 0.43 0.35 0.28 0.71 0.5 0.46 0.29 ...
##  $ ReasonEndo              : num  0.25 0.27 0.24 0.16 0.31 0.07 0.1 0.08 0.02 0.12 ...
##  $ ReasonTubal             : num  0.12 0.21 0.17 0.18 0.35 0.1 0.2 0.17 0.3 0.2 ...
##  $ ReasonOvul              : num  0.37 0.15 0.08 0.22 0.39 0.17 0.15 0.16 0.12 0.12 ...
##  $ ReasonUterine           : num  0.1 0.03 0.08 0.03 0.41 0.04 0.04 0.02 0.08 0.08 ...
##  $ ReasonPGT               : num  0 0.06 0.04 0.05 0 0.72 0.01 0.09 0.08 0 ...
##  $ ReasonCarrier           : num  0 0.005 0 0.005 0 0.005 0 0.01 0.02 0.02 ...
##  $ ReasonDOR               : num  0.18 0.1 0.26 0.12 0.47 0.22 0.21 0.45 0.2 0.35 ...
##  $ ReasonBank              : num  0.05 0.17 0.28 0.1 0.35 0.99 0.09 0.46 0.12 0.2 ...
##  $ ReasonPregLoss          : num  0.04 0.06 0.01 0.02 0.04 0.07 0.04 0.01 0.12 0.03 ...
##  $ ReasonOtherInfert       : num  0.11 0.53 0.11 0.15 0.08 0.005 0.08 0.15 0.12 0.06 ...
##  $ ReasonNonInfert         : num  0 0.12 0.03 0.02 0 0.05 0.01 0.04 0.06 0.02 ...
##  $ ReasonUnexplained       : num  0.04 0.01 0.12 0.08 0 0.09 0.03 0.01 0.06 0.12 ...
##  $ DonorEggService         : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ DonatedEmbryoService    : chr  "No" "Yes" "Yes" "Yes" ...
##  $ EmbryoCryoService       : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ EggCryoService          : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ SingleWomenService      : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ GestCarrierService      : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ SARTmember              : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ LabAccred               : chr  "Yes" "Yes" "Yes" "Yes" ...
##  $ NumResearch             : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ CurrentStateAbbrev      : chr  "AL" "AL" "AL" "AL" ...
```

From those 165 variables, 17 are character strings, 25 are integers and 123 are non-integer numbers.

Character variables correspond to descriptive data as: clinic name, city of the clinic, state, name of the medical director, and the disponibility of several services(oocyte donation, embryo donation, oocyte cryopreservation, embryo cryopreservation, services for single women, gestational carriers, if the clinic is a member of SART (Society for Assisted Reproductive Technology), and if the clinic owns an accredited embryology laboratory). Many of these variables will work as factors.

Variables of type `integer`are:
OrderID: unique identifier for each register.
ND_NumIntentRet: number of intended oocyte retrievals (excluyendo donors). As in most of numerical variables in this table, this one is divided into five age categories, from less than 35 years old to more than 43 years old.
ND_NumRetrieve: number of oocyte retrievals (excluding donors). It doesn't match with intended retrievals because, sometimes, it is necessary to stop the retrieval process or a particular process is not successful.
ND_NumTrans: number of transfers (excluding donors). Transfer is the technique by with an embryo gronw in vitro is transferred from cultured to the patient uterus.
Donor_NumTrans: number of transfers from donor oocytes. This category is divided into four variables depending if the oocytes are fresh of frozen, fresh or frozen embryo, and embryo from donor.
TotNumCycles: total number of cycles. In assisted reproduction, the cycles include any process in which at least one of this conditions happen; 1) an assisted reproduction process is carried out, 2) the patient is subjected to ovarian stimulation or monitoring with the intent of having an ART procedure, or 3) frozen embryos have been thawed with the intent of transferring them to a patient.
NumResearch: number of excluded cycles for research.

Numeric variables are:
ND_IntentRetLB: Percentage of intended oocyte retrievals resulting in live births (exluding donors).
ND_IntentRetSingleLB: Percentage of intended oocyte retrievals resulting in singleton live births (excluding donors).
ND_RetrieveLB: Percentage of oocyte retrievals resulting in live births (excluding donors).
ND_RetrieveSingleLB: Percentage of oocyte retrievals resulting in singleton live births (excluding donors).
ND_TransLB: Percentage of transfers resulting in live births (excluding donors).
ND_TransSingleLB: Percentage of transfers resulting in singleton live births (excluding donors).
ND_IntentRetPerLB: Number of intended oocyte retrievals resulting in live births (excluding donors).
NewND_1IntentRetLB1: Percentage of new patients with live birth after one intended retrieval (excluding donors).
NewND_2IntentRetLB: Percentage of new patients with live birth after one or two intended retrievals (excluding donors).
NewND_AllIntentRetLB: Percentage of new patients with live birth after all intended retrievals (excluding donors).
NewND_IntentRetPerNew1: Average number of intended retrievals per new patient (excluding donors).
NewND_TransPerIntentRet1: Average number of transfers per intended retrieval (excluding donors).
Donor_TransLB: Percentage of transfers resulting in live births (only donors). This variable is divided in four variables according to the condition of the oocyte (fresh, frozen, frozen embryo, embryo from donor).
Donor_TranSingleLB: Percentage of transfers resulting in a singleton live birth (only donors). Divided in four variables according to the condition of the oocyte (fresh, frozen, frozen embryo, embryo from donor).
CycleCancel: Percentage of cycles canceled prior to retrieval or thawing.
CycleStop: Percentage of cycles canceled between retrieval and transfer or banking.
CycleFertPres: Percentage of cycles for fertility preservation.
TransCarrier: Percentage of transfers using gestational carrier.
TransFrozEmb: Percentage of transfers using frozen embryos.
TransICSI: Percentage of transfers of at least one embryo with ICSI.
TransPGT: Percentage of transfers of at least on embryo with PGT.
ReasonMale: Percentage of cycles for male factor reason.
ReasonEndo: Percentage of cycles for endometriosis reason.
ReasonTubal: Percentage of cycles for tubal factor reason.
ReasonOvul: Percentage of cycles for ovulatory disfunction reason.

ReasonUterine: Percentage of cycles for uterine factor reason.
ReasonPGT: Percentage of cycles for PGT reason.
ReasonCarrier: Percentage of cycles for gestational carrier reason.
ReasonDOR: Percentage of cycles for diminished ovarian reserve reason.
ReasonBank: Percentage of cycles for banking reason.
ReasonPregLoss: Percentage of cycles for recurrent pregnancy loss reason.
ReasonOtherInfert: Percentage of cycles for other infertility reason.
ReasonNonInfert: Percentage of cycles for other non-infertility reason.
ReasonUnexplained: Percentage of cycles for unexplained reason.

3. Probe questions

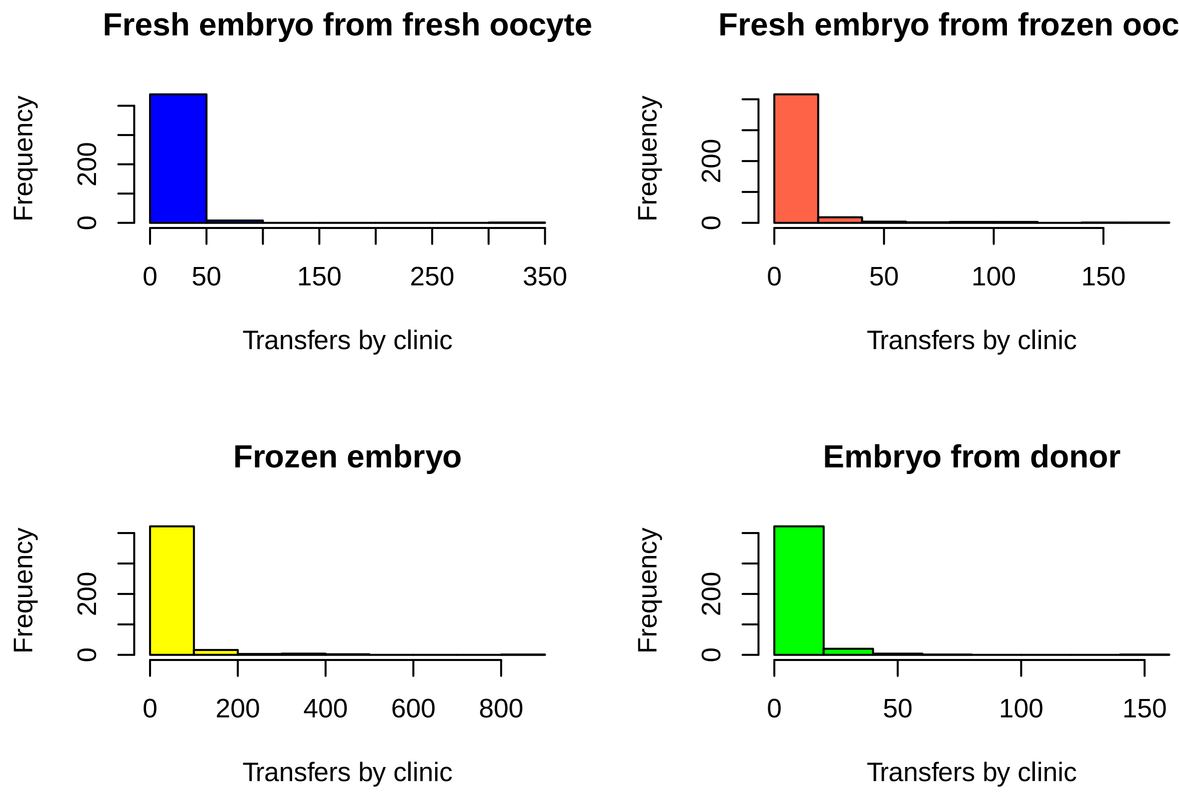
Basic numeric summary for the total number of cycles by clinic (withouth taking patient age into account):

```
# Basic numeric summary
statistics <- c("average", "min.", "max.", "stdr.deviation", "C.V.", "25%", "50%", "75%")
variables <- c("TotNumCyclesAll")
df <- clinic_data
est_vector <- c()

for (var in variables) {
  df_subset <- df[,var] # Extracts column corresponding to the variable
  var_sd <- sd(df_subset, na.rm=TRUE) # standard deviation
  var_mean <- mean(df_subset, na.rm = TRUE) # average
  var_min <- min(df_subset,na.rm = TRUE)
  var_max <- max(df_subset, na.rm = TRUE)
  var_CV <- var_sd/var_mean # coefficient of variation
  var_percentile <- quantile(df_subset, probs=c(0.25, 0.5, 0.75), names=FALSE, na.rm = TRUE) # percenti
  est_vector = c(est_vector, var_mean, var_min, var_max, var_sd, var_CV, var_percentile) # Adding all r
  }

# Transform the vector with all the results into a matrix, and that into a dataframe.
testmatrix <- matrix(data=est_vector, ncol=length(statistics), byrow = TRUE,
                     dimnames = list(variables, statistics))
testdf <- as.data.frame(testmatrix)

testdf
```

```
##                   average min. max. stdr.deviation     C.V.    25% 50%
## TotNumCyclesAll 634.7879    3 9940       951.5676 1.499032 167.75 338
##                   75%
## TotNumCyclesAll 737.5
```

Frequency histogram displaying number of transfers from donor. Four graphs, each one for each of the starting states: fresh oocyte, frozen oocyte, frozen embryo, and donated embryo (in the other three cases it is only the oocyte which comes from a donor).

```
par(mfrow = c(2, 2)) # generate a 2x2 array for printing the graphs.

xlab <- "Transfers by clinic"
ylab <- "Frequency"

hist(clinic_data$Donor_NumTrans1,
     main = "Fresh embryo from fresh oocyte", xlab = xlab, ylab = ylab, col = "blue")
hist(clinic_data$Donor_NumTrans2,
     main = "Fresh embryo from frozen oocyte", xlab = xlab, ylab = ylab, col = "tomato")
hist(clinic_data$Donor_NumTrans3,
     main = "Frozen embryo", xlab = xlab, ylab = ylab, col = "yellow")
hist(clinic_data$Donor_NumTrans4,
     main = "Embryo from donor", xlab = xlab, ylab = ylab, col = "green")
```



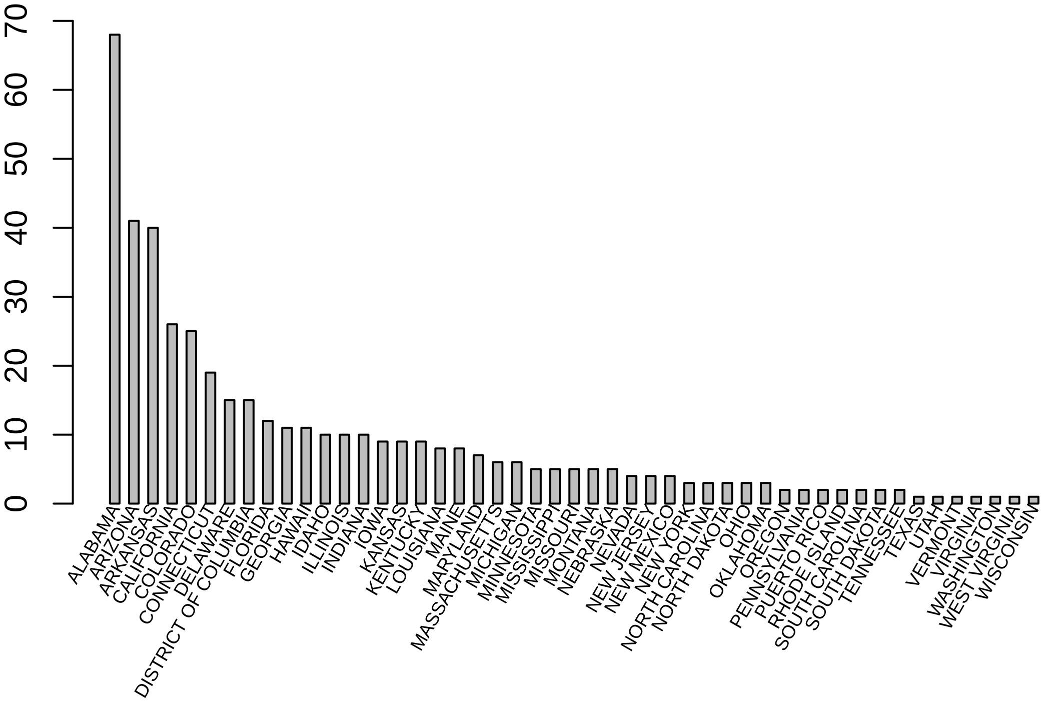
One of the variables is the state of accreditation for embryology laboratory. For this kind of data a table may be more usseful than a graph:

```
table(clinic_data$LabAccred)
```

```
##
##      No Pending     Yes
##      34       4     410
```

Nevertheless, for other qualitative data we could find more interesting to display them in a graph. For example, how many clinics offer ART, by state.

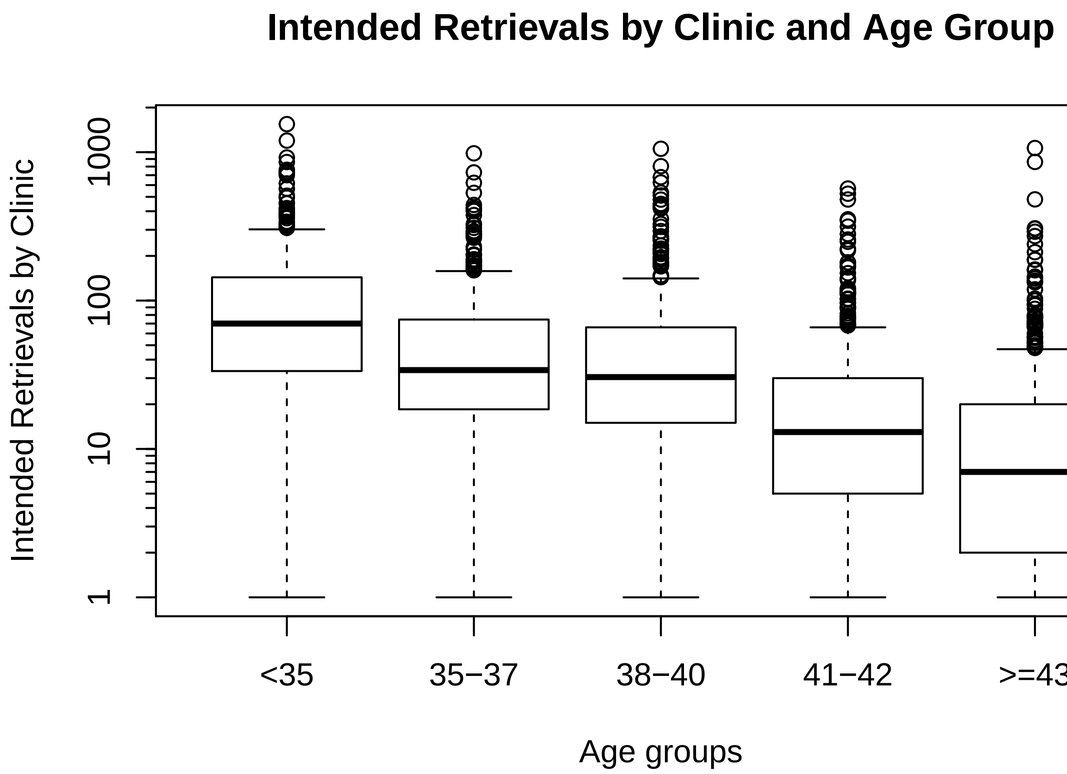
```
# Most of this code I adapted it from:
# https://stackoverflow.com/questions/10286473/rotating-x-axis-labels-in-r-for-barplot

par(mar = c(7, 4, 2, 2) + 0.2)

end_point <- 0.5 + length(unique(clinic_data$CurrentClinicState)) + length(unique(clinic_data$CurrentCli

barplot(sort(table(clinic_data$CurrentClinicState), decreasing = TRUE),
        # This adjust the maxim value in the y axis:
        ylim = c(0,5+max(table(clinic_data$CurrentClinicState))),
        xaxt = "n", # Avoids plotting the names in the x axis.
        space = 1)

text(seq(1.5,end_point,by=2), par("usr")[3]-0.25,
     srt = 60, adj= 1, xpd = TRUE,
     labels = paste(unique(clinic_data$CurrentClinicState)), cex=0.55)
```



Does the number of intended retrievals change with age? Let’s use a boxplot graphic:

```
# To avoid problems with the logarithm of 0, let's change the value 0 by value 1.
intended_retrievals <- clinic_data[,7:11]
intended_retrievals[intended_retrievals == 0] <- 1

boxplot(intended_retrievals,
        log = "y",
        yaxt = "n",  # Don't draw the ticks in y axis.
        xlab = "Age groups",
        ylab = "Intended Retrievals by Clinic",
        main = "Intended Retrievals by Clinic and Age Group",
        names = c("<35", "35-37", "38-40", "41-42", ">=43"))

# Establishes limits for y axis and, from base 10 logarithm,
# max and min values of the dataframe.
y1 <- floor(log10(range(intended_retrievals)))
# Vector with integer values from minimum to maximum for the axis.
pow <- seq(y1[1], y1[2]+1)
```

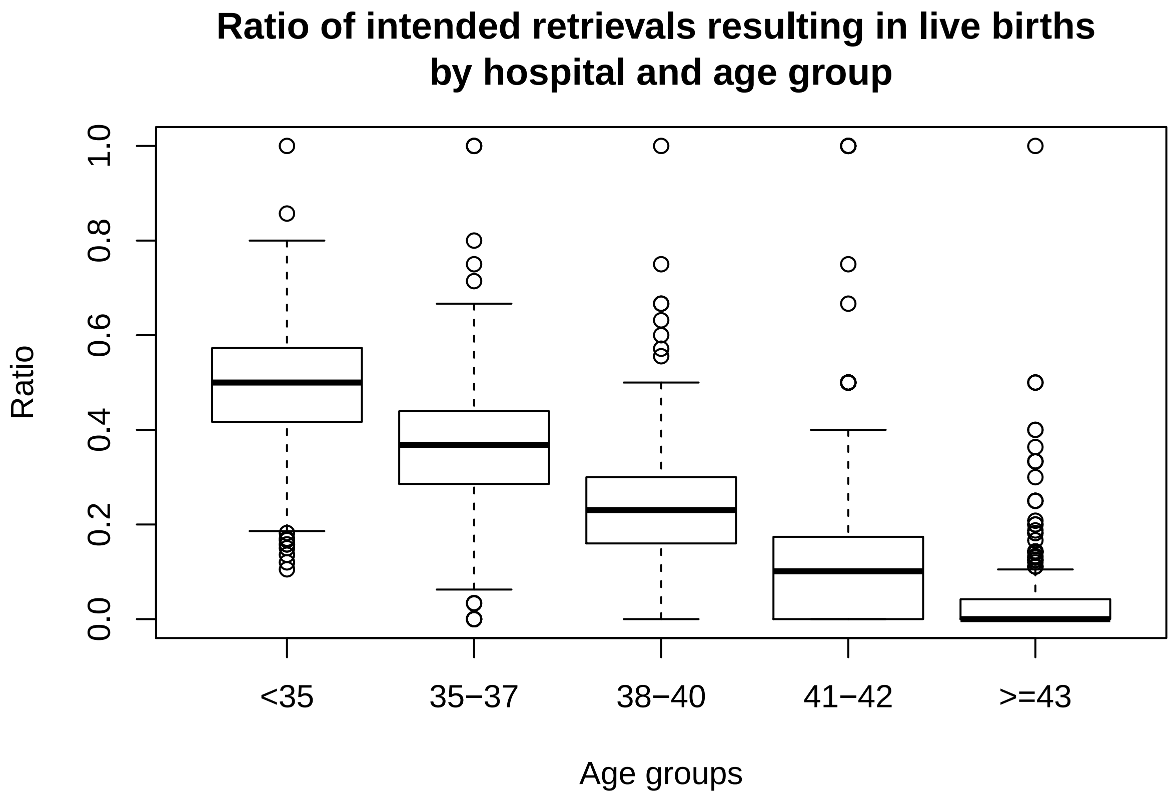
```r
# Vector with ticks' positions.
ticksat <- as.vector(sapply(pow, function(p) (1:10)*10^p))
# Drawing the axis (main ticks)
axis(2, 10^pow)
# Drawing the axis (secondary ticks)
axis(2, ticksat, labels = NA, tcl = -0.25, lwd = 0, lwd.ticks = 1)
```



I suspect that the median diminishes with age group because donor eggs are prefered for older women instead of retrieval of their own eggs.

Equally, we can wonder about the percentage of intended oocyte retrievals that results in live births. That would give a little guiding about if it is worth the effort of retrieve oocytes from patients of a relatively advanced age.

```r
# To avoid problems with the logarithm of 0, let's change the value 0 by value 1.
pct_int_ret <- clinic_data[,12:16]
# pct_int_ret[pct_int_ret == 0] <- 1

boxplot(pct_int_ret,
        xlab = "Age groups",
        ylab = "Ratio",
        main = bquote("Ratio of intended retrievals resulting in live births \nby hospital and age grou
        names = c("<35", "35-37", "38-40", "41-42", ">=43"))
```



As was suspected, this graph shows a marked descent in the ratio of intended oocyte retrieval resulting in live births when taking into account the age group of the patient.

4. Descriptive analysis

In this section we will accomplish a more thorough exploration of our variables, including a parametric summary of data, and graphic representations.

Services

Summary of services offered by the clinics.

```
# Columns including the data for the services: 155-160 and 162.
services <- clinic_data[c(155:160, 162)]

# Variables' names:
services_names <- c("Oocyte donation",
  "Embryo donation",
  "Embryo cryopreservation",
  "Oocyte cryopreservation",
  "Services for single women",
  "Gestational carriers",
  "Accredited embryo laboratory")

colnames(services) <- services_names
```

```r
lapply(services, table)
```

```
## $`Oocyte donation`
##
##  No Yes
##  49 399
##
## $`Embryo donation`
##
##  No Yes
## 169 279
##
## $`Embryo cryopreservation`
##
## Yes
## 448
##
## $`Oocyte cryopreservation`
##
##  No Yes
##   9 439
##
## $`Services for single women`
##
##  No Yes
##   4 444
##
## $`Gestational carriers`
##
##  No Yes
##  54 394
##
## $`Accredited embryo laboratory`
##
##      No Pending     Yes
##      34       4     410
```

Results from assisted reproduction techniques

Descriptive summary of numeric variables:

```r
variables <- colnames(clinic_data[c(7:154, 163)])
statistics <- c("average", "min.", "max.", "stdr.deviation", "C.V.", "25%", "50%", "75%")
est_vector <- c()

for (var in variables) {
    df_subset <- clinic_data[,var] # Extract value column for the corresponding variable
    var_sd <- sd(df_subset, na.rm=TRUE) # standard deviation
    var_mean <- mean(df_subset, na.rm = TRUE) # average
    var_min <- min(df_subset,na.rm = TRUE)
    var_max <- max(df_subset, na.rm = TRUE)
    var_CV <- var_sd/var_mean # coefficient of variation
    var_percentile <- quantile(df_subset, probs=c(0.25, 0.5, 0.75), names=FALSE, na.rm = TRUE) # percen
    est_vector = c(est_vector, var_mean, var_min, var_max, var_sd, var_CV, var_percentile) # Adding all
}

# Transform the vector with all the results into a matrix, and that into a dataframe.
testmatrix <- matrix(data=est_vector, ncol=length(statistics), byrow = TRUE,
                     dimnames = list(variables, statistics))
testdf <- as.data.frame(testmatrix)

testdf
```

```
##                               average      min.         max.
## ND_NumIntentRet1         117.02678571 0.0000000 1546.0000000
## ND_NumIntentRet2          64.72321429 0.0000000  983.0000000
## ND_NumIntentRet3          63.14062500 0.0000000 1054.0000000
## ND_NumIntentRet4          32.04910714 0.0000000  569.0000000
## ND_NumIntentRet5          25.90178571 0.0000000 1067.0000000
## ND_IntentRetLB1            0.49170486 0.1052632    1.0000000
## ND_IntentRetLB2            0.36227595 0.0000000    1.0000000
## ND_IntentRetLB3            0.23511779 0.0000000    1.0000000
## ND_IntentRetLB4            0.13372337 0.0000000    1.0000000
## ND_IntentRetLB5            0.03778441 0.0000000    1.0000000
## ND_IntentRetSingleLB1      0.39203041 0.0000000    0.8571429
## ND_IntentRetSingleLB2      0.29320079 0.0000000    1.0000000
## ND_IntentRetSingleLB3      0.19962193 0.0000000    1.0000000
## ND_IntentRetSingleLB4      0.12030290 0.0000000    1.0000000
## ND_IntentRetSingleLB5      0.03556929 0.0000000    1.0000000
## ND_NumRetrieve1          110.80580357 0.0000000 1463.0000000
## ND_NumRetrieve2           59.10491071 0.0000000  880.0000000
## ND_NumRetrieve3           55.56473214 0.0000000  934.0000000
## ND_NumRetrieve4           27.40401786 0.0000000  475.0000000
## ND_NumRetrieve5           20.80133929 0.0000000  861.0000000
## ND_RetrieveLB1             0.52010708 0.1200000    1.0000000
## ND_RetrieveLB2             0.39370184 0.0000000    1.0000000
## ND_RetrieveLB3             0.26646078 0.0000000    1.0000000
## ND_RetrieveLB4             0.15245762 0.0000000    1.0000000
## ND_RetrieveLB5             0.04406181 0.0000000    1.0000000
## ND_RetrieveSingleLB1       0.41475505 0.0000000    1.0000000
## ND_RetrieveSingleLB2       0.31828387 0.0000000    1.0000000
## ND_RetrieveSingleLB3       0.22570394 0.0000000    1.0000000
## ND_RetrieveSingleLB4       0.13755555 0.0000000    1.0000000
## ND_RetrieveSingleLB5       0.04143632 0.0000000    1.0000000
## ND_NumTrans1             124.34375000 0.0000000 1912.0000000
## ND_NumTrans2              56.52901786 0.0000000 1012.0000000
## ND_NumTrans3              41.51785714 0.0000000  864.0000000
## ND_NumTrans4              15.20089286 0.0000000  348.0000000
## ND_NumTrans5               7.97321429 0.0000000  297.0000000
## ND_TransLB1                0.47768128 0.1250000    1.0000000
## ND_TransLB2                0.41955422 0.0000000    1.0000000
## ND_TransLB3                0.35080077 0.0000000    1.0000000
## ND_TransLB4                0.27003269 0.0000000    1.0000000
## ND_TransLB5                0.11318822 0.0000000    1.0000000
## ND_TransSingleLB1          0.38056146 0.0000000    1.0000000
## ND_TransSingleLB2          0.34101308 0.0000000    1.0000000
## ND_TransSingleLB3          0.30077700 0.0000000    1.0000000
## ND_TransSingleLB4          0.24611972 0.0000000    1.0000000
## ND_TransSingleLB5          0.10778644 0.0000000    1.0000000
## ND_IntentRetPerLB1         2.24508009 1.0000000    9.5000000
## ND_IntentRetPerLB2         3.34941725 1.0000000   30.0000000
## ND_IntentRetPerLB3         5.32512077 1.0000000   39.0000000
## ND_IntentRetPerLB4         8.93015873 1.0000000   40.0000000
## ND_IntentRetPerLB5        23.23400000 1.0000000  153.5000000
## NewND_1IntentRetLB1        0.51348125 0.0000000    1.0000000
## NewND_1IntentRetLB2        0.38108610 0.0000000    1.0000000
## NewND_1IntentRetLB3        0.24374055 0.0000000    1.0000000
## NewND_1IntentRetLB4        0.12504474 0.0000000    1.0000000
## NewND_1IntentRetLB5        0.03543616 0.0000000    1.0000000
## NewND_2IntentRetLB1        0.56495541 0.0000000    1.0000000
## NewND_2IntentRetLB2        0.43827944 0.0000000    1.0000000
## NewND_2IntentRetLB3        0.29361847 0.0000000    1.0000000
## NewND_2IntentRetLB4        0.15789783 0.0000000    1.0000000
## NewND_2IntentRetLB5        0.04182682 0.0000000    1.0000000
## NewND_AllIntentRetLB1      0.57254861 0.0000000    1.0000000
## NewND_AllIntentRetLB2      0.44985226 0.0000000    1.0000000
## NewND_AllIntentRetLB3      0.30977865 0.0000000    1.0000000
## NewND_AllIntentRetLB4      0.16875269 0.0000000    1.0000000
## NewND_AllIntentRetLB5      0.04509496 0.0000000    1.0000000
## NewND_IntentRetPerNew1     1.15091743 1.0000000    2.0000000
## NewND_IntentRetPerNew2     1.23302540 1.0000000    2.5000000
## NewND_IntentRetPerNew3     1.32191142 1.0000000    3.0000000
## NewND_IntentRetPerNew4     1.38405797 1.0000000    3.0000000
## NewND_IntentRetPerNew5     1.38989362 1.0000000    7.0000000
## NewND_TransPerIntentRet1   1.05940367 0.5000000    1.8000000
## NewND_TransPerIntentRet2   0.89491917 0.2000000    2.0000000
## NewND_TransPerIntentRet3   0.71328671 0.0000000    2.4000000
## NewND_TransPerIntentRet4   0.54323671 0.0000000    2.0000000
## NewND_TransPerIntentRet5   0.41356383 0.0000000    2.0000000
## Donor_NumTrans1            7.18750000 0.0000000  327.0000000
## Donor_NumTrans2            6.78125000 0.0000000  170.0000000
## Donor_NumTrans3           32.10044643 0.0000000  803.0000000
## Donor_NumTrans4            4.66294643 0.0000000  148.0000000
## Donor_TransLB1             0.54607181 0.0000000    1.0000000
## Donor_TransLB2             0.47068627 0.0000000    1.0000000
## Donor_TransLB3             0.42794590 0.0000000    1.0000000
## Donor_TransLB4             0.44509260 0.0000000    1.0000000
## Donor_TranSingleLB1        0.42633188 0.0000000    1.0000000
## Donor_TranSingleLB2        0.34480621 0.0000000    1.0000000
## Donor_TranSingleLB3        0.36167715 0.0000000    1.0000000
## Donor_TranSingleLB4        0.38490039 0.0000000    1.0000000
## TotNumCycles1            238.76339286 0.0000000 2999.0000000
## TotNumCycles2            141.44866071 0.0000000 2310.0000000
## TotNumCycles3            123.22098214 0.0000000 2134.0000000
## TotNumCycles4             59.79464286 0.0000000 1128.0000000
## TotNumCycles5             71.56026786 0.0000000 1942.0000000
## TotNumCyclesAll          634.78794643 3.0000000 9940.0000000
## CycleCancel1               0.04996046 0.0000000    0.2750000
## CycleCancel2               0.07025175 0.0000000    0.5000000
## CycleCancel3               0.08873656 0.0000000    0.5000000
## CycleCancel4               0.10410946 0.0000000    1.0000000
## CycleCancel5               0.12110178 0.0000000    1.0000000
## CycleCancelAll             0.07182499 0.0000000    0.2830000
## CycleStop1                 0.08328022 0.0000000    0.4400000
## CycleStop2                 0.08090211 0.0000000    0.5000000
## CycleStop3                 0.10467436 0.0000000    0.6111111
## CycleStop4                 0.12990330 0.0000000    0.7830000
## CycleStop5                 0.12113899 0.0000000    1.0000000
## CycleStopAll               0.09640971 0.0000000    0.4760000
## CycleFertPres1             0.04889588 0.0000000    1.0000000
## CycleFertPres2             0.05418340 0.0000000    0.9140000
## CycleFertPres3             0.04853358 0.0000000    0.8550000
## CycleFertPres4             0.03420350 0.0000000    0.8000000
## CycleFertPres5             0.01961859 0.0000000    0.6920000
## CycleFertPresAll           0.04611031 0.0000000    0.8660000
## TransCarrier1              0.02847275 0.0000000    0.5570000
## TransCarrier2              0.03051214 0.0000000    0.7310000
## TransCarrier3              0.03296724 0.0000000    0.6270000
## TransCarrier4              0.04246710 0.0000000    0.7780000
## TransCarrier5              0.07889901 0.0000000    1.0000000
## TransCarrierAll            0.03732813 0.0000000    0.6790000
## TransFrozEmb1              0.67584081 0.0000000    1.0000000
## TransFrozEmb2              0.68463776 0.0000000    1.0000000
## TransFrozEmb3              0.67134288 0.0000000    1.0000000
## TransFrozEmb4              0.63410265 0.0000000    1.0000000
## TransFrozEmb5              0.64514223 0.0000000    1.0000000
## TransFrozEmbAll            0.67198728 0.0000000    1.0000000
## TransICSI1                 0.77855604 0.0000000    1.0000000
## TransICSI2                 0.76168018 0.0000000    1.0000000
## TransICSI3                 0.74600625 0.0000000    1.0000000
## TransICSI4                 0.72084561 0.0000000    1.0000000
## TransICSI5                 0.65432835 0.0000000    1.0000000
## TransICSIAll               0.75117662 0.0000000    1.0000000
## TransPGT1                  0.28856170 0.0000000    1.0000000
## TransPGT2                  0.32202896 0.0000000    1.0000000
## TransPGT3                  0.34352202 0.0000000    1.0000000
## TransPGT4                  0.30950212 0.0000000    1.0000000
## TransPGT5                  0.24399528 0.0000000    1.0000000
## TransPGTAll                0.30155142 0.0000000    1.0000000
## ReasonMale                 0.29690848 0.0000000    0.8600000
## ReasonEndo                 0.08424107 0.0000000    0.5600000
## ReasonTubal                0.13062500 0.0000000    0.4400000
## ReasonOvul                 0.16747768 0.0000000    0.8800000
## ReasonUterine              0.06073661 0.0000000    0.7900000
## ReasonPGT                  0.09017857 0.0000000    0.9500000
## ReasonCarrier              0.01036830 0.0000000    0.2100000
## ReasonDOR                  0.28280134 0.0000000    0.8300000
## ReasonBank                 0.27523437 0.0000000    0.9900000
## ReasonPregLoss             0.03911830 0.0000000    0.3700000
## ReasonOtherInfert          0.18568080 0.0000000    0.9100000
## ReasonNonInfert            0.03738839 0.0000000    0.6700000
## ReasonUnexplained          0.10792411 0.0000000    0.7900000
## NumResearch                0.04017857 0.0000000   18.0000000
##                          stdr.deviation       C.V.          25%
## ND_NumIntentRet1           152.35333416  1.3018672  33.75000000
## ND_NumIntentRet2            94.22947475  1.4558837  18.75000000
## ND_NumIntentRet3           104.92396459  1.6617505  15.00000000
## ND_NumIntentRet4            61.98392156  1.9340296   5.00000000
## ND_NumIntentRet5            78.26241750  3.0215066   2.00000000
## ND_IntentRetLB1              0.12826263  0.2608529   0.41700000
## ND_IntentRetLB2              0.14051126  0.3878570   0.28571429
## ND_IntentRetLB3              0.12550900  0.5338133   0.16097368
## ND_IntentRetLB4              0.15890220  1.1882904   0.00000000
## ND_IntentRetLB5              0.09053067  2.3959791   0.00000000
## ND_IntentRetSingleLB1        0.11587418  0.2955745   0.32800000
## ND_IntentRetSingleLB2        0.13319782  0.4542887   0.21126316
## ND_IntentRetSingleLB3        0.11709331  0.5865754   0.13250000
## ND_IntentRetSingleLB4        0.15475206  1.2863535   0.00000000
## ND_IntentRetSingleLB5        0.08864536  2.4921878   0.00000000
## ND_NumRetrieve1            144.88293589  1.3075392  32.00000000
## ND_NumRetrieve2             85.51939049  1.4469084  16.75000000
## ND_NumRetrieve3             92.94257594  1.6726901  13.00000000
## ND_NumRetrieve4             53.11655903  1.9382763   4.00000000
## ND_NumRetrieve5             63.14326807  3.0355386   2.00000000
## ND_RetrieveLB1               0.13343462  0.2565522   0.44400000
## ND_RetrieveLB2               0.14673906  0.3727162   0.30950000
## ND_RetrieveLB3               0.13666465  0.5128884   0.18195455
## ND_RetrieveLB4               0.16724793  1.0970126   0.00000000
## ND_RetrieveLB5               0.09732785  2.2088936   0.00000000
## ND_RetrieveSingleLB1         0.12245353  0.2952430   0.34100000
## ND_RetrieveSingleLB2         0.13802944  0.4336677   0.23664706
## ND_RetrieveSingleLB3         0.12597214  0.5581300   0.15250000
## ND_RetrieveSingleLB4         0.16331761  1.1872847   0.00000000
## ND_RetrieveSingleLB5         0.09546119  2.3038046   0.00000000
## ND_NumTrans1               171.49015966  1.3791619  33.00000000
## ND_NumTrans2                86.30684584  1.5267707  16.00000000
## ND_NumTrans3                71.94401653  1.7328451  10.00000000
## ND_NumTrans4                30.72865730  2.0215034   2.00000000
## ND_NumTrans5                20.61903719  2.5860383   1.00000000
## ND_TransLB1                  0.12137419  0.2540903   0.41300000
## ND_TransLB2                  0.14763914  0.3518953   0.33333333
## ND_TransLB3                  0.17748442  0.5059408   0.25000000
## ND_TransLB4                  0.24745085  0.9163737   0.08333333
## ND_TransLB5                  0.19537729  1.7261274   0.00000000
## ND_TransSingleLB1            0.10928429  0.2871659   0.31800000
## ND_TransSingleLB2            0.14642203  0.4293736   0.25800000
## ND_TransSingleLB3            0.17322397  0.5759216   0.20000000
## ND_TransSingleLB4            0.24128136  0.9803414   0.04200000
## ND_TransSingleLB5            0.19251090  1.7860401   0.00000000
## ND_IntentRetPerLB1           0.94994196  0.4231216   1.70000000
## ND_IntentRetPerLB2           2.58696966  0.7723641   2.30000000
## ND_IntentRetPerLB3           4.20713643  0.7900547   3.30000000
## ND_IntentRetPerLB4           6.41057136  0.7178564   4.85000000
## ND_IntentRetPerLB5          23.10966511  0.9946486   9.12500000
## NewND_1IntentRetLB1          0.13900405  0.2707091   0.43575000
## NewND_1IntentRetLB2          0.16656982  0.4370923   0.28200000
## NewND_1IntentRetLB3          0.15010828  0.6158527   0.15384615
## NewND_1IntentRetLB4          0.17076124  1.3656011   0.00000000
## NewND_1IntentRetLB5          0.09725923  2.7446320   0.00000000
## NewND_2IntentRetLB1          0.13975057  0.2473657   0.49850000
## NewND_2IntentRetLB2          0.16900159  0.3856024   0.34500000
## NewND_2IntentRetLB3          0.17103208  0.5824977   0.20000000
## NewND_2IntentRetLB4          0.18515606  1.1726321   0.00000000
## NewND_2IntentRetLB5          0.10202515  2.4392283   0.00000000
## NewND_AllIntentRetLB1        0.13988339  0.2443171   0.50000000
## NewND_AllIntentRetLB2        0.17093795  0.3799869   0.35714286
## NewND_AllIntentRetLB3        0.17475987  0.5641443   0.21428571
## NewND_AllIntentRetLB4        0.19060909  1.1295174   0.00000000
## NewND_AllIntentRetLB5        0.10665315  2.3650789   0.00000000
## NewND_IntentRetPerNew1       0.12621486  0.1096646   1.10000000
## NewND_IntentRetPerNew2       0.18344527  0.1487766   1.10000000
## NewND_IntentRetPerNew3       0.24767155  0.1873587   1.20000000
## NewND_IntentRetPerNew4       0.35888846  0.2593016   1.10000000
## NewND_IntentRetPerNew5       0.53446945  0.3845398   1.00000000
## NewND_TransPerIntentRet1     0.19411719  0.1832325   0.90000000
## NewND_TransPerIntentRet2     0.24948476  0.2787791   0.70000000
## NewND_TransPerIntentRet3     0.28032969  0.3930112   0.50000000
## NewND_TransPerIntentRet4     0.32970771  0.6069319   0.30000000
## NewND_TransPerIntentRet5     0.36704523  0.8875177   0.10000000
## Donor_NumTrans1             18.94418093  2.6357121   0.00000000
## Donor_NumTrans2             17.45730250  2.5743488   0.00000000
## Donor_NumTrans3             66.62524127  2.0755238   4.00000000
## Donor_NumTrans4             11.03057627  2.3655807   0.00000000
## Donor_TransLB1               0.30595779  0.5602886   0.36725000
## Donor_TransLB2               0.30538201  0.6488016   0.28928571
## Donor_TransLB3               0.21281366  0.4972911   0.33300000
## Donor_TransLB4               0.31832731  0.7151934   0.25000000
## Donor_TranSingleLB1          0.31191789  0.7316316   0.20000000
## Donor_TranSingleLB2          0.27455189  0.7962498   0.03125000
## Donor_TranSingleLB3          0.20603715  0.5696715   0.25000000
## Donor_TranSingleLB4          0.32274777  0.8385228   0.11274510
## TotNumCycles1              320.78208023  1.3435145  65.50000000
## TotNumCycles2              213.10772197  1.5066083  37.75000000
## TotNumCycles3              201.81128981  1.6377997  26.75000000
## TotNumCycles4              108.49869438  1.8145220  12.00000000
## TotNumCycles5              161.66470655  2.2591406  10.00000000
## TotNumCyclesAll            951.56764200  1.4990323 167.75000000
## CycleCancel1                 0.03778707  0.7563396   0.02250000
## CycleCancel2                 0.05848232  0.8324678   0.02700000
## CycleCancel3                 0.07075268  0.7973340   0.03650000
## CycleCancel4                 0.09914091  0.9522757   0.03250000
## CycleCancel5                 0.12931714  1.0678385   0.02300000
## CycleCancelAll               0.04422993  0.6158013   0.03975000
## CycleStop1                   0.07109341  0.8536650   0.03400000
## CycleStop2                   0.06861755  0.8481553   0.03300000
## CycleStop3                   0.08758025  0.8366925   0.04700000
## CycleStop4                   0.11183942  0.8609437   0.04750000
## CycleStop5                   0.12479568  1.0301859   0.03675000
## CycleStopAll                 0.06285647  0.6519723   0.05375000
## CycleFertPres1               0.09389332  1.9202706   0.00500000
## CycleFertPres2               0.08765429  1.6177333   0.00000000
## CycleFertPres3               0.08875892  1.8288147   0.00000000
## CycleFertPres4               0.08225420  2.4048476   0.00000000
## CycleFertPres5               0.06126952  3.1230334   0.00000000
## CycleFertPresAll             0.07623304  1.6532753   0.00900000
## TransCarrier1                0.06270773  2.2023766   0.00000000
## TransCarrier2                0.07689648  2.5201926   0.00000000
## TransCarrier3                0.07429517  2.2536056   0.00000000
## TransCarrier4                0.10019312  2.3593114   0.00000000
## TransCarrier5                0.14655421  1.8574912   0.00000000
## TransCarrierAll              0.07730452  2.0709456   0.00000000
## TransFrozEmb1                0.22817502  0.3376165   0.51600000
## TransFrozEmb2                0.23307689  0.3404383   0.52650000
## TransFrozEmb3                0.24485655  0.3647265   0.50000000
## TransFrozEmb4                0.27799533  0.4384075   0.47000000
## TransFrozEmb5                0.27150198  0.4208405   0.50000000
## TransFrozEmbAll              0.21513264  0.3201439   0.51900000
## TransICSI1                   0.19862840  0.2551241   0.68500000
## TransICSI2                   0.21273188  0.2792929   0.65100000
## TransICSI3                   0.21752579  0.2915871   0.64285714
## TransICSI4                   0.25326372  0.3513425   0.57142857
## TransICSI5                   0.25995390  0.3972836   0.50000000
## TransICSIAll                 0.19642549  0.2614904   0.65425000
## TransPGT1                    0.26590590  0.9214872   0.07800000
## TransPGT2                    0.27492786  0.8537365   0.09100000
## TransPGT3                    0.27654799  0.8050371   0.10526316
## TransPGT4                    0.28940973  0.9350816   0.05031579
## TransPGT5                    0.27089874  1.1102622   0.00000000
## TransPGTAll                  0.25697332  0.8521708   0.08975000
## ReasonMale                   0.13815534  0.4653129   0.21000000
## ReasonEndo                   0.07785781  0.9242263   0.04000000
## ReasonTubal                  0.07981768  0.6110444   0.07000000
## ReasonOvul                   0.12604773  0.7526241   0.09000000
## ReasonUterine                0.07832713  1.2896197   0.02000000
## ReasonPGT                    0.14039801  1.5568888   0.01000000
## ReasonCarrier                0.02404853  2.3194273   0.00000000
## ReasonDOR                    0.14640173  0.5176840   0.18000000
## ReasonBank                   0.18251169  0.6631137   0.14000000
## ReasonPregLoss               0.04209494  1.0760931   0.01000000
## ReasonOtherInfert            0.16740497  0.9015739   0.07000000
## ReasonNonInfert              0.06312153  1.6882654   0.01000000
## ReasonUnexplained            0.10450929  0.9683591   0.03000000
## NumResearch                  0.85042006 21.1660105   0.00000000
##                                   50%          75%
## ND_NumIntentRet1          70.00000000 143.25000000
## ND_NumIntentRet2          34.00000000  74.25000000
## ND_NumIntentRet3          30.50000000  66.00000000
## ND_NumIntentRet4          13.00000000  30.00000000
## ND_NumIntentRet5           7.00000000  20.00000000
## ND_IntentRetLB1            0.50000000   0.57300000
## ND_IntentRetLB2            0.36842105   0.43950000
## ND_IntentRetLB3            0.23038462   0.30000000
## ND_IntentRetLB4            0.10100000   0.17400000
## ND_IntentRetLB5            0.00000000   0.04200000
## ND_IntentRetSingleLB1      0.39400000   0.46900000
## ND_IntentRetSingleLB2      0.29500000   0.35950000
## ND_IntentRetSingleLB3      0.19750000   0.25000000
## ND_IntentRetSingleLB4      0.08333333   0.16666667
## ND_IntentRetSingleLB5      0.00000000   0.03725000
## ND_NumRetrieve1           67.00000000 136.00000000
## ND_NumRetrieve2           31.00000000  69.00000000
## ND_NumRetrieve3           26.00000000  58.25000000
## ND_NumRetrieve4           11.00000000  27.00000000
## ND_NumRetrieve5            6.00000000  16.00000000
## ND_RetrieveLB1             0.53200000   0.60500000
## ND_RetrieveLB2             0.40000000   0.48350000
## ND_RetrieveLB3             0.26315789   0.33333333
## ND_RetrieveLB4             0.12300000   0.20000000
## ND_RetrieveLB5             0.00000000   0.05272368
## ND_RetrieveSingleLB1       0.42000000   0.49100000
## ND_RetrieveSingleLB2       0.32400000   0.39450000
## ND_RetrieveSingleLB3       0.22200000   0.28571429
## ND_RetrieveSingleLB4       0.10413158   0.18350000
## ND_RetrieveSingleLB5       0.00000000   0.04725000
## ND_NumTrans1              72.50000000 157.75000000
## ND_NumTrans2              30.00000000  68.50000000
## ND_NumTrans3              20.00000000  45.00000000
## ND_NumTrans4               6.00000000  15.00000000
## ND_NumTrans5               2.00000000   7.00000000
## ND_TransLB1                0.47300000   0.54700000
## ND_TransLB2                0.41700000   0.50000000
## ND_TransLB3                0.34200000   0.43625000
## ND_TransLB4                0.22500000   0.38100000
## ND_TransLB5                0.00000000   0.14871154
## ND_TransSingleLB1          0.38100000   0.44400000
## ND_TransSingleLB2          0.33333333   0.41950000
## ND_TransSingleLB3          0.28571429   0.38750000
## ND_TransSingleLB4          0.20000000   0.33333333
## ND_TransSingleLB5          0.00000000   0.14285714
## ND_IntentRetPerLB1         2.00000000   2.40000000
## ND_IntentRetPerLB2         2.70000000   3.50000000
## ND_IntentRetPerLB3         4.30000000   5.70000000
## ND_IntentRetPerLB4         7.00000000  11.00000000
## ND_IntentRetPerLB5        17.00000000  28.00000000
## NewND_1IntentRetLB1        0.52700000   0.60050000
## NewND_1IntentRetLB2        0.38888889   0.48100000
## NewND_1IntentRetLB3        0.24000000   0.33333333
## NewND_1IntentRetLB4        0.08333333   0.20000000
## NewND_1IntentRetLB5        0.00000000   0.00000000
## NewND_2IntentRetLB1        0.58100000   0.66225000
## NewND_2IntentRetLB2        0.44444444   0.54545455
## NewND_2IntentRetLB3        0.29200000   0.38100000
## NewND_2IntentRetLB4        0.12500000   0.23094231
## NewND_2IntentRetLB5        0.00000000   0.03225000
## NewND_AllIntentRetLB1      0.58711765   0.66666667
## NewND_AllIntentRetLB2      0.45500000   0.55900000
## NewND_AllIntentRetLB3      0.31000000   0.40000000
## NewND_AllIntentRetLB4      0.14285714   0.25000000
## NewND_AllIntentRetLB5      0.00000000   0.04200000
## NewND_IntentRetPerNew1     1.10000000   1.20000000
## NewND_IntentRetPerNew2     1.20000000   1.30000000
## NewND_IntentRetPerNew3     1.30000000   1.40000000
## NewND_IntentRetPerNew4     1.30000000   1.60000000
## NewND_IntentRetPerNew5     1.30000000   1.60000000
## NewND_TransPerIntentRet1   1.10000000   1.20000000
## NewND_TransPerIntentRet2   0.90000000   1.00000000
## NewND_TransPerIntentRet3   0.70000000   0.90000000
## NewND_TransPerIntentRet4   0.50000000   0.70000000
## NewND_TransPerIntentRet5   0.30000000   0.60000000
## Donor_NumTrans1            2.00000000   7.25000000
## Donor_NumTrans2            1.00000000   6.00000000
## Donor_NumTrans3           14.00000000  31.00000000
## Donor_NumTrans4            1.00000000   4.00000000
## Donor_TransLB1             0.54922727   0.75000000
## Donor_TransLB2             0.50000000   0.63527273
## Donor_TransLB3             0.43800000   0.54700000
## Donor_TransLB4             0.45322222   0.60000000
## Donor_TranSingleLB1        0.41238235   0.60000000
## Donor_TranSingleLB2        0.33666667   0.50000000
## Donor_TranSingleLB3        0.36842105   0.48850000
## Donor_TranSingleLB4        0.33333333   0.56150000
## TotNumCycles1            139.50000000 291.75000000
## TotNumCycles2             73.00000000 162.25000000
## TotNumCycles3             58.50000000 134.50000000
## TotNumCycles4             26.50000000  62.00000000
## TotNumCycles5             26.50000000  64.25000000
## TotNumCyclesAll          338.00000000 737.50000000
## CycleCancel1               0.04800000   0.07121429
## CycleCancel2               0.06350000   0.10075000
## CycleCancel3               0.08333333   0.12550000
## CycleCancel4               0.08800000   0.15392308
## CycleCancel5               0.10000000   0.17100000
## CycleCancelAll             0.07000000   0.09900000
## CycleStop1                 0.06500000   0.11200000
## CycleStop2                 0.06800000   0.10875000
## CycleStop3                 0.08900000   0.13850000
## CycleStop4                 0.11400000   0.18181818
## CycleStop5                 0.09500000   0.16316667
## CycleStopAll               0.08366667   0.12800000
## CycleFertPres1             0.02100000   0.05300000
## CycleFertPres2             0.02650000   0.06700000
## CycleFertPres3             0.02300000   0.05900000
## CycleFertPres4             0.00000000   0.03550000
## CycleFertPres5             0.00000000   0.01000000
## CycleFertPresAll           0.02200000   0.05025000
## TransCarrier1              0.01000000   0.02800000
## TransCarrier2              0.00000000   0.03050000
## TransCarrier3              0.00000000   0.03600000
## TransCarrier4              0.00000000   0.03650000
## TransCarrier5              0.00000000   0.09150000
## TransCarrierAll            0.01750000   0.03400000
## TransFrozEmb1              0.67500000   0.88000000
## TransFrozEmb2              0.68800000   0.88750000
## TransFrozEmb3              0.68400000   0.88600000
## TransFrozEmb4              0.66666667   0.85714286
## TransFrozEmb5              0.66666667   0.86775000
## TransFrozEmbAll            0.66600000   0.85450000
## TransICSI1                 0.83333333   0.92900000
## TransICSI2                 0.81700000   0.92150000
## TransICSI3                 0.78947368   0.90800000
## TransICSI4                 0.77400000   0.92678571
## TransICSI5                 0.68585526   0.85050000
## TransICSIAll               0.79800000   0.89700000
## TransPGT1                  0.20000000   0.43400000
## TransPGT2                  0.24200000   0.51350000
## TransPGT3                  0.27700000   0.55555556
## TransPGT4                  0.23300000   0.50000000
## TransPGT5                  0.14285714   0.38125000
## TransPGTAll                0.22500000   0.46125000
## ReasonMale                 0.28000000   0.38000000
## ReasonEndo                 0.06000000   0.10000000
## ReasonTubal                0.12000000   0.17000000
## ReasonOvul                 0.14000000   0.21000000
## ReasonUterine              0.04000000   0.08000000
## ReasonPGT                  0.04000000   0.09000000
## ReasonCarrier              0.00500000   0.01000000
## ReasonDOR                  0.27000000   0.36250000
## ReasonBank                 0.26000000   0.38000000
## ReasonPregLoss             0.03000000   0.05000000
## ReasonOtherInfert          0.14000000   0.25000000
## ReasonNonInfert            0.02000000   0.04000000
## ReasonUnexplained          0.08000000   0.15000000
## NumResearch                0.00000000   0.00000000
```

Graphic representations

Retrievals

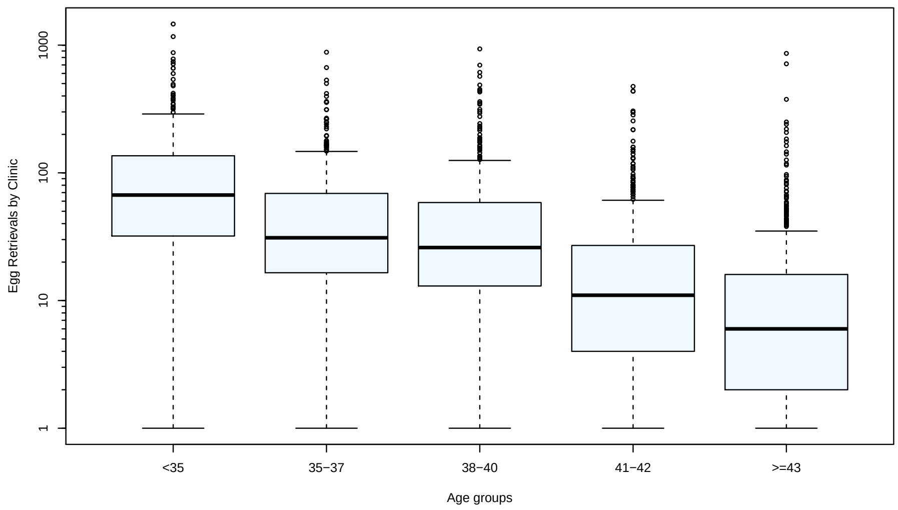
Egg retrieval is a procedure to collect the eggs contained in the ovarian follicles.

```
# Since I think I am going to need this code several times, I will wrap it into a function.

log_boxplot <- function(x, ...){
  # To avoid problems with the logarithm of 0, let's change the value 0 by value 1.
  x[x == 0] <- 1

  boxplot(x,
        log = "y",
        yaxt = "n",  # Do not draw ticks in y axis.
        ...) # Additional arguments to be passed to the function boxplot.

# Establishes limits for y axis and, from base 10 logarithm,
# max and min values of the dataframe.
  y1 <- floor(log10(range(x)))
# Vector with integer values from minimum to maximum for the axis.
  pow <- seq(y1[1], y1[2]+1)
# Vector with ticks' positions.
  ticksat <- as.vector(sapply(pow, function(p) (1:10)*10^p))
# Drawing the axis (main ticks)
  axis(2, 10^pow)
# Drawing the axis (secondary ticks)
```

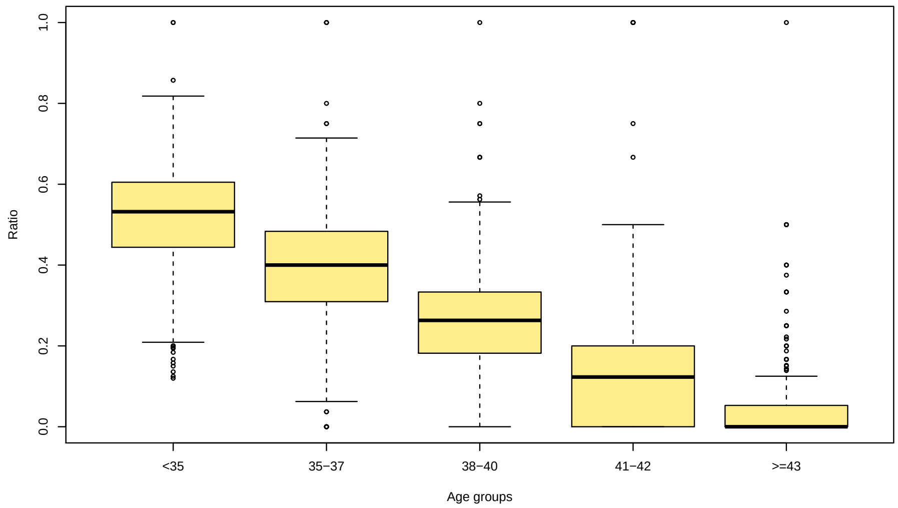
```
  axis(2, ticksat, labels = NA, tcl = -0.25, lwd = 0, lwd.ticks = 1)
}
```

```
# Let's actually draw the graphs.

par(mfcol = c(3, 1))

# Egg retrievals by clinic
x <- clinic_data[,22:26]
log_boxplot(x,xlab = "Age groups", ylab = "Egg Retrievals by Clinic",
        main = "Egg Retrievals by Clinic and Age Group",
        names = c("<35", "35-37", "38-40", "41-42", ">=43"),
        col = "aliceblue")

# Ratio of retrievals resulting in live births
boxplot(clinic_data[c(27:31)],
        xlab = "Age groups",
        ylab = "Ratio",
        main = bquote("Ratio of Retrievals Resulting in Live Births \nby Hospital and Age Group"),
        names = c("<35", "35-37", "38-40", "41-42", ">=43"),
        col = "lightgoldenrod1")

# Ratio of retrievals resulting in singleton live births
boxplot(clinic_data[c(32:36)],
        xlab = "Age groups",
        ylab = "Ratio",
        main = bquote("Ratio of Retrievals Resulting in Singleton Live Births \nby Hospital and Age Grou
        names = c("<35", "35-37", "38-40", "41-42", ">=43"),
        col = "coral")
```

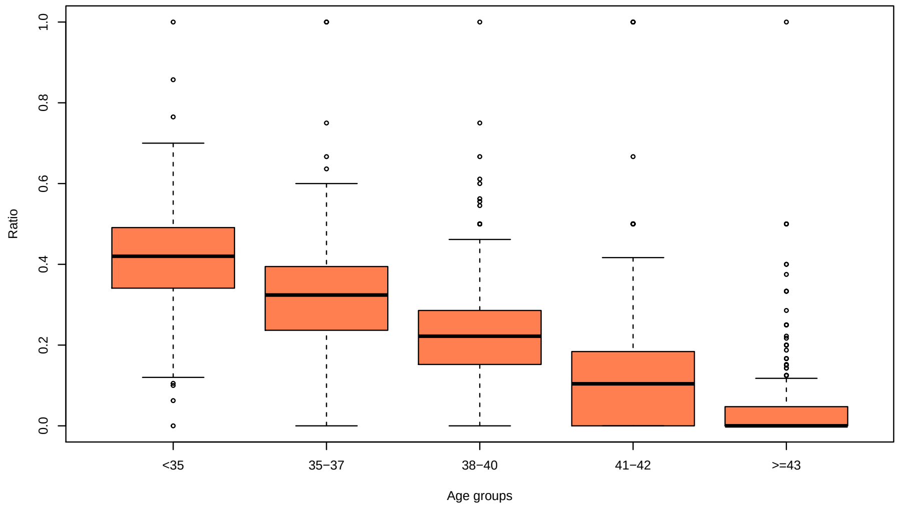
Egg Retrievals by Clinic and Age Group



Ratio of Retrievals Resulting in Live Births
by Hospital and Age Group



Ratio of Retrievals Resulting in Singleton Live Births
by Hospital and Age Group



I have had some problems with this image. Labels and points are more little than I wanted, but at least I have managed to include all three graphs into the same image.

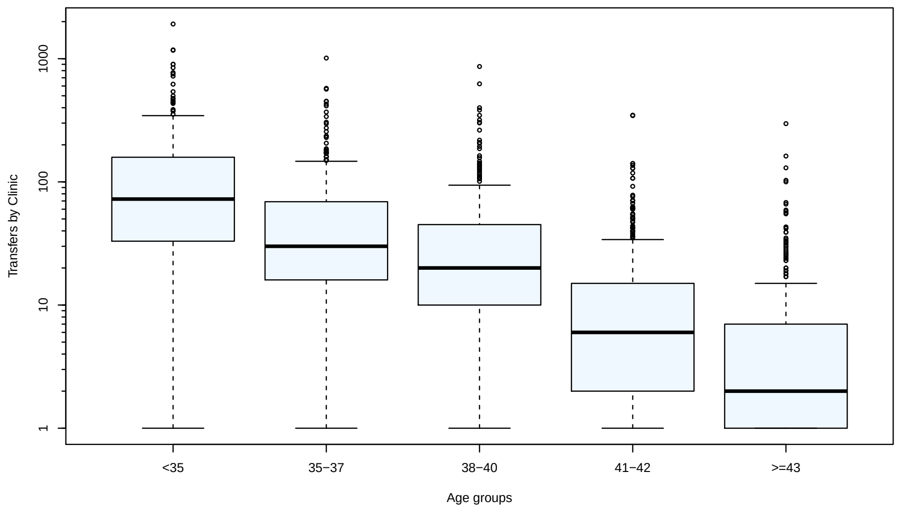
Transfers

Transfer is a procedure in which an embryo is transferred, from laboratory culture, to the uterus.

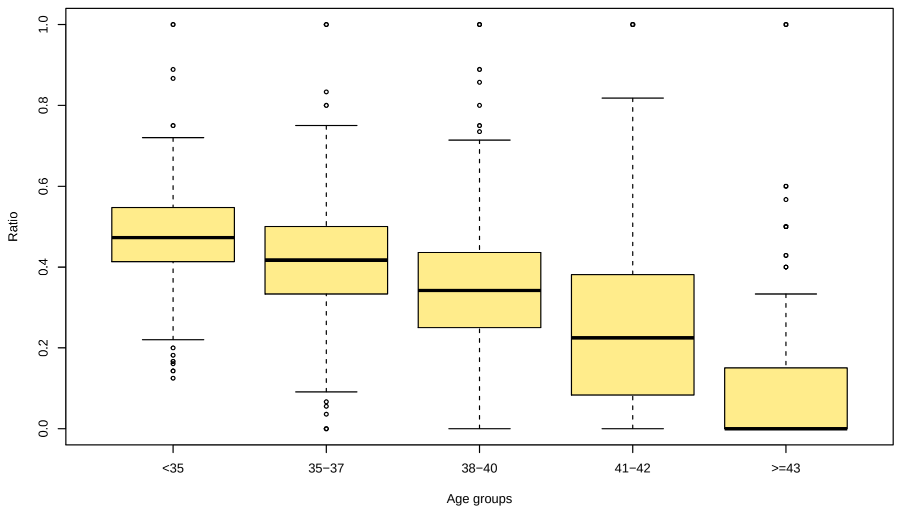
Like above, we will represent number of transfers, percentage of transfers resulting in live births, and those resulting in singleton live births.

```r
par(mfcol = c(3, 1))

# Number of transfers
x <- clinic_data[,37:41]
log_boxplot(x,xlab = "Age groups", ylab = "Transfers by Clinic",
        main = "Number of Transfers by Clinic and Age Group",
        names = c("<35", "35-37", "38-40", "41-42", ">=43"),
        col = "aliceblue")

# Ratio of transfers resulting in live births
boxplot(clinic_data[c(42:46)],
        xlab = "Age groups",
        ylab = "Ratio",
        main = bquote("Ratio of Transfers Resulting in Live Births \nby Hospital and Age Group"),
        names = c("<35", "35-37", "38-40", "41-42", ">=43"),
        col = "lightgoldenrod1")

# Ratio of transfers resulting in singleton live births
boxplot(clinic_data[c(47:51)],
        xlab = "Age groups",
        ylab = "Ratio",
        main = bquote("Ratio of Transfers Resulting in Singleton Live Births \nby Hospital and Age Grou
        names = c("<35", "35-37", "38-40", "41-42", ">=43"),
        col = "coral")
```

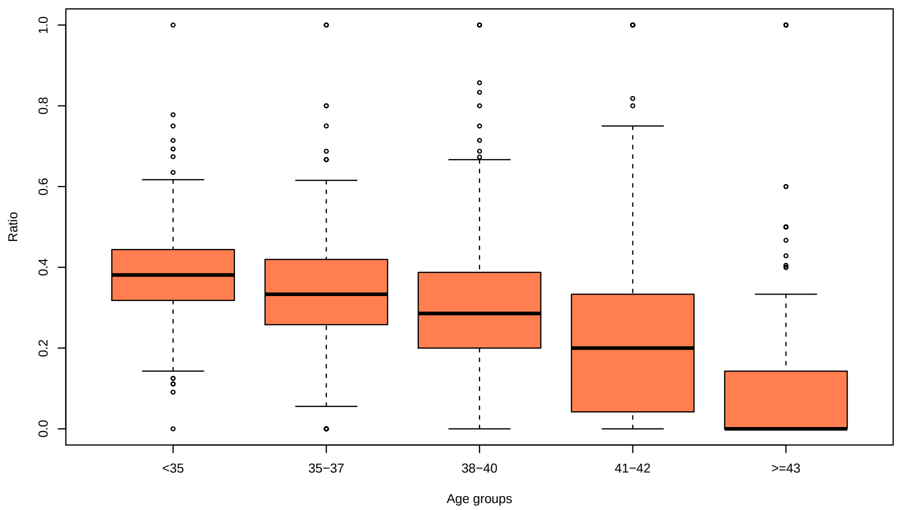
Number of Transfers by Clinic and Age Group



Ratio of Transfers Resulting in Live Births
by Hospital and Age Group



Ratio of Transfers Resulting in Singleton Live Births
by Hospital and Age Group



Look at the median value of the percentage of transfers resulting in live births for the >=43 years age group. It is zero. If we look up the value of the mean, it is a just bit better with 0.11.

All in all, even the median ratio for the youngest age group is not that great, a tad under 0.5 (0.48).