N741 Final

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April 26, 2017

## Project

Title: Dialysis-Related Anemia and Readmission Rates

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Project data is available at: <https://github.com/EmoryN741/Jones_Alan.git>, <https://github.com/medman1025>, and <https://github.com/medman1025/Project-Milestone-1>

## Abstract

End-stage renal disease (ESRD) incidence continues to increase with more and more patients having to undergo hemodialysis treatments. Hemodialysis and ESRD are fraught with complications, including chronic anemia and a relatively high hospital readmission rate. The issues of anemia and readmission are known to be independent issues of concern for the population, but have not been heavily researched in tandem for any association. This project aims to begin the process of examining the existing data on anemia and readmission for ESRD patients. Medicare's dialysis facility datasets were used for the raw data, and R statistical software was used for the analysis and figure output. The 331 dialysis centers in Georgia and 117 dialysis centers in Minnesota were used for data. Some association was seen between subpar anemia scores and increased readmissions in both Georgia and Minnesota. There were also more subpar readmission scores reported in both Georgia and Minnesota than was expected. There was some difficulty in assessing the association since anemia scores do not greatly vary in value from a plotting standpoint. Future research is needed to better score anemia levels for easier analysis of the topic.

## Introduction and Background

End-stage renal disease (ESRD) has increased as a cause of worldwide mortality over the last 20 years, second only to HIV and AIDS, with rates continuing to increase annually by 4-5%. In the U.S., ESRD treatment exceeds 48 billion dollars annually, with dialysis and transplantation as the two treatment options for this population. Medicare coverage is extended to anyone requiring dialysis, and Medicare absorbs over 80% of dialysis costs in the U.S. at an annual average of $90,000 spent per patient. ESRD patients represent less than 1% of the U.S. Medicare population, but treatment costs for this population account for more than 7% of the entire Medicare budget. Hemodialysis is the most commonly administered treatment option, but it is fraught with high morbidity and mortality rates. After one year of treatment, patients on hemodialysis have an estimated 20-25% mortality rate, with a 5-year survival rate of 35%. This population also suffers from a high hospital readmission rate, even when compared to other patient groups with chronic disease conditions.

Although there are substantial mortality and morbidity issues, federal cost expenditures, and readmission concerns in this population, research remains in the fledgling stages of examining modifiable reasons for excessive hospital readmission related to hemodialysis or ESRD complications. One of the most common symptoms seen in patients who have ESRD is chronic anemia. Dialysis facilties are, in principle, expected to maintain anemia levels at a satisfactory level becuase the procedure itself is designed to increase blood levels. Supplementary blood transfusions are also relatively easy to perform while a patient is being actively dialyzed, if that becomes a necessary treatment to improve anemia symptoms. As a nurse on a medical nephrology unit, I saw many patients being frequently readmitted for similar diagnoses, with one of the most chronic reasons for hospitalization being anemia.

The purpose of this project is to see if any association can be observed between dialysis clinic performance in managing anemia and readmission rates. I am interested in seeing why these patients are readmitted frequently when dialysis centers are designed to treat the most common issues these patients typically face, such as anemia. The question of interest is: Is there an association between subpar anemia scores and higher than desired readmission rates? The hypothesis is that dialysis centers with subpar anemia management reporting scores that are less than 10 will report hospital readmission rates at a higher rate than expected. The theory behind the proposed question and hypothesis is that centers who do not deliver expected results in anemia management will leave patients more prone to complications that result in higher than expected readmission rates.

## Methodology

The data used in this project is available from the following 2 Medicare websites that are available for public download:

1. <https://data.medicare.gov/Dialysis-Facility-Compare/ESRD-QIP-Anemia-Management-Reporting-Payment-Year-/t6ez-29z5>
2. <https://data.medicare.gov/Dialysis-Facility-Compare/ESRD-QIP-Standardized-Readmission-Ratio-Payment-Ye/efv3-vm3n>

These two Medicare websites were relatively clean at the time of download. Since dialysis centers are largely reliant on Medicare funds, their data being readily available for Medicare reporting purposes is not surprising. Several filters, such as state, measure name, and reporting score, were available to limit the data to any desired values, and the filtered data was then available to download as a CSV file which was downloaded in an Excel file format and then imported into RStudio.

The original source of all available Medicare data regarding patient outcomes and facility scores is located at <https://data.medicare.gov>. Once at this homepage, you then choose 1 of 2 options: find a Medicare-apptoved provider or explore and download data that is available from Medicare. After choosing to explore and download data, one of the available categories of data is labeled 'Dialysis Facility Compare'. Data on an array of renal and dialysis measurements, ranging from adequacy to phosphorus levels to mineral metabolism reporting scores, is available from every dialysis facility in each of the 50 states that receives Medicare reimbursement for dialysis services.

The United States Renal Data System divides the United States into 18 separate networks based on population and geographic location. I chose to examine the data from two separate networks that were each in a different region of the country: Networks 6 and 11. For this project, I chose to use the one state in each network that had the highest proportion of dialysis clinics when compared to the population. In Network 6, that state was Georgia and in Network 11, that state was Minnesota. The United States Census Bureau lists the population of each state, respectively, as 10.31 million and 5.52 million as of July 2016. Medicare lists the amount of dialysis clinics in each state, respectively, as 336 and 117 as of January 2017. It is an interesting observation that Georgia has approximately double the population of Minnesota, yet has approximately triple the amount of dialysis clinics. Missing data is already accounted for in each dataset with n/a used to fill in the missing cell value. In the Anemia datasets, Georgia had 14 missing values and Minnesota had 9. In the Readmissions dataset, Georgia had 16 missing values and Minnesota had 12.

In R, I installed the "readxl" package to easily read Excel files, which is how these two datasets are presented. They were then converted to csv files that were easily imported into R in this format.

I examined the plots of the anemia management reporting scores and SRR (standardized readmission ratio) scores and have created histograms of the data to observe trends. Medicare sets the expected anemia management reporting score at a 10 on a scale from 1 to 10. Any number below 10 shows a deficiency in that dialysis center's performance on maintaining proper anemia levels. For both Georgia and Minnesota, the lowest value reported by any dialysis center was a 7. The SRR is a Medicare-produced ratio that compares the observed amount of readmissions to the expeced number of readmissions. Medicare defines the term readmission as an unexpected return to a hospital for emergency treatment within 30 days of a previous admission. Because the SSE is a ratio, a score of 1.0 is considered an expected score with the amount of observed readmissions equaling the amount of expected observations. Ratio values lower than 1.0 indicate that the dialysis center is doing better than expected on readmissions, and that readmission rates are lower than expected or predicted. Ratio values greater than 1.0 indicate that the dialysis center is not doing as well as expected on readmissions, and that readmission rates are higher than expected or predicted.

In regards to the SRR, almost all of the values hover to some degree around the central score of 1.0 which makes analyzing any plots, histograms, figures, etc. somewhat difficult to discern. To make analyzation easier, I created an Adjusted Readmission Value that converted the SRR data to numbers that would fall on a 1 to 10 scale. In this format, the SRR score of 1.0 corresponds to a value of 5 on the scale. Numbers between 5 and 10 correspond to the SRR numbers between 0.0 and 1.0. This means that numbers above 5 and going all the way to 10 indicate that the dialysis center is performing better than expected in regards to readmission rates. Likewise, numbers between 0 and 5 correspond to the SRR numbers above 1.0. This means that numbers below 5 and going all the way to 0 indicate that the dialysis center is performing worse than expected in regards to readmission rates.

I changed several character variables to a numeric format so that easier analysis would be possible. I put the separate variables of "anemia" and "readmissions" into one additional excel file. This file was then put in csv format and was then separated (again) into Georgia only, Minnesota only, and Georgia and Minnesota together. Much of the R code is being knitted in this document to show full results, and the same code has been pushed to my Github repository for this project.

## Data Summary and Results

This data summary and results section shows the R code used in this project and displays the output for each individual chunk of R code. Produced tables of the data will following the figures produced by the R code. Following all R code, figures, and tables will be a brief discussion of the results. The following sections after this will further elaborate on the interpretation, conclusions, and limitations of the project.

library(readxl)

## Warning: package 'readxl' was built under R version 3.3.3

Anemia <- read\_excel("~/Anemia.xlsx")  
View(Anemia)

library(readxl)  
Readmissions <- read\_excel("~/Readmissions.xlsx")  
View(Readmissions)

summary(Anemia)

## Facility Name CMS Certification Number (CCN) Alternate CCN 1   
## Length:453 Min. :112312 Length:453   
## Class :character 1st Qu.:112659 Class :character   
## Mode :character Median :112795 Mode :character   
## Mean :154467   
## 3rd Qu.:242502   
## Max. :852504   
## Address1 Address2 City   
## Length:453 Length:453 Length:453   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
## State Zip Code Network Measure Name   
## Length:453 Min. :30004 Min. : 6.000 Length:453   
## Class :character 1st Qu.:30269 1st Qu.: 6.000 Class :character   
## Mode :character Median :30906 Median : 6.000 Mode :character   
## Mean :37224 Mean : 7.291   
## 3rd Qu.:55021 3rd Qu.:11.000   
## Max. :56751 Max. :11.000   
## Anemia Management Reporting Score  
## Length:453   
## Class :character   
## Mode :character   
##   
##   
##   
## State Avg Anemia Management Reporting Score  
## Min. :10   
## 1st Qu.:10   
## Median :10   
## Mean :10   
## 3rd Qu.:10   
## Max. :10   
## National Avg Anemia Management Reporting Score  
## Min. :10   
## 1st Qu.:10   
## Median :10   
## Mean :10   
## 3rd Qu.:10   
## Max. :10

summary(Readmissions)

## Facility Name CMS Certification Number (CCN) Alternate CCN 1   
## Length:453 Min. :112312 Length:453   
## Class :character 1st Qu.:112659 Class :character   
## Mode :character Median :112795 Mode :character   
## Mean :154467   
## 3rd Qu.:242502   
## Max. :852504   
## Address 1 Address 2 City   
## Length:453 Length:453 Length:453   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
## State Zip Code Network Measure Name   
## Length:453 Min. :30004 Min. : 6.000 Length:453   
## Class :character 1st Qu.:30269 1st Qu.: 6.000 Class :character   
## Mode :character Median :30906 Median : 6.000 Mode :character   
## Mean :37224 Mean : 7.291   
## 3rd Qu.:55021 3rd Qu.:11.000   
## Max. :56751 Max. :11.000   
## Achievement Measure Rate Achievement Measure Ratio SRR Measure Score   
## Length:453 Length:453 Length:453   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
## State Avg SRR Measure Score National Avg SRR Measure Score  
## Min. :5.000 Min. :5   
## 1st Qu.:5.000 1st Qu.:5   
## Median :5.000 Median :5   
## Mean :5.258 Mean :5   
## 3rd Qu.:6.000 3rd Qu.:5   
## Max. :6.000 Max. :5

variable.names(Anemia)

## [1] "Facility Name"   
## [2] "CMS Certification Number (CCN)"   
## [3] "Alternate CCN 1"   
## [4] "Address1"   
## [5] "Address2"   
## [6] "City"   
## [7] "State"   
## [8] "Zip Code"   
## [9] "Network"   
## [10] "Measure Name"   
## [11] "Anemia Management Reporting Score"   
## [12] "State Avg Anemia Management Reporting Score"   
## [13] "National Avg Anemia Management Reporting Score"

variable.names(Readmissions)

## [1] "Facility Name" "CMS Certification Number (CCN)"  
## [3] "Alternate CCN 1" "Address 1"   
## [5] "Address 2" "City"   
## [7] "State" "Zip Code"   
## [9] "Network" "Measure Name"   
## [11] "Achievement Measure Rate" "Achievement Measure Ratio"   
## [13] "SRR Measure Score" "State Avg SRR Measure Score"   
## [15] "National Avg SRR Measure Score"

is.character(Anemia$`Anemia Management Reporting Score`)

## [1] TRUE

as.numeric(Anemia$`Anemia Management Reporting Score`)

## Warning: NAs introduced by coercion

## [1] 10 9 10 10 10 10 8 10 10 10 10 10 10 10 10 10 10 9 10 10 10 10 10  
## [24] 10 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 10 10  
## [47] 10 10 10 10 10 10 NA 10 10 10 10 10 10 10 9 NA 10 10 9 8 10 NA 10  
## [70] 10 10 10 10 10 10 10 10 10 10 NA NA 10 10 10 10 NA 10 10 10 10 10 10  
## [93] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9 9 10 10 10 10 10  
## [116] 10 10 10 10 10 10 10 10 10 10 9 NA 10 9 10 10 10 10 10 10 9 10 10  
## [139] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 9 10 10 10 10  
## [162] 10 10 10 10 10 10 10 10 10 9 10 9 10 10 10 10 10 10 10 10 10 10 10  
## [185] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9  
## [208] 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 10 10 10 10 10 10 10  
## [231] 10 10 10 10 10 NA 10 9 10 9 10 10 10 8 10 10 10 10 10 10 10 10 10  
## [254] 10 10 10 10 9 10 10 10 10 10 10 10 10 10 10 10 10 10 10 NA 10 10 10  
## [277] 10 10 10 10 9 10 10 10 10 10 10 10 10 8 10 10 10 10 10 10 9 10 10  
## [300] NA 10 10 10 10 10 10 10 10 10 10 10 NA 10 10 10 10 10 9 10 10 NA NA  
## [323] 10 NA 10 10 10 10 10 10 10 10 NA 10 10 9 10 10 10 10 10 10 10 10 9  
## [346] 10 10 10 10 10 10 10 10 10 10 9 10 10 10 8 10 8 10 10 9 10 10 10  
## [369] 10 10 10 9 10 10 10 10 8 10 10 10 10 10 10 10 10 10 10 10 7 10 10  
## [392] 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 8 10 10 10 10 10 10  
## [415] 10 10 NA 10 NA NA NA NA NA NA 10 10 10 10 10 10 10 10 NA 10 10 10 10  
## [438] 10 10 10 10 10 10 10 10 NA 10 10 NA NA NA NA NA

is.character(Readmissions$`Achievement Measure Ratio`)

## [1] TRUE

as.numeric(Readmissions$`Achievement Measure Ratio`)

## Warning: NAs introduced by coercion

## [1] 0.90 0.91 0.74 1.04 0.77 0.86 1.03 0.84 0.92 0.91 0.65 0.84 0.69 1.08  
## [15] 0.84 1.83 1.16 1.09 0.84 1.67 1.43 1.11 0.98 1.30 0.67 0.72 0.83 1.00  
## [29] 0.73 0.62 1.10 0.99 1.11 1.04 NA 1.14 0.74 0.92 0.76 0.71 0.23 0.99  
## [43] 0.80 1.26 1.18 0.98 1.16 1.14 0.93 1.28 1.21 0.76 NA 0.75 0.57 0.54  
## [57] 0.69 1.15 1.34 0.28 0.93 NA 0.79 1.02 0.97 0.88 0.98 NA 0.92 NA  
## [71] 0.61 0.87 0.59 0.91 0.49 0.40 0.95 0.86 1.33 NA NA 1.32 0.74 0.00  
## [85] 1.22 NA 1.26 0.75 1.20 1.18 0.59 0.81 0.80 0.92 1.04 0.64 1.14 0.58  
## [99] 1.46 0.70 1.26 0.68 1.34 1.43 1.00 1.03 0.17 1.16 0.57 1.01 1.30 1.07  
## [113] 0.84 1.17 1.39 0.81 0.80 0.94 1.30 0.83 1.68 0.80 1.49 1.15 0.83 0.99  
## [127] 0.76 1.13 0.97 1.05 0.80 0.67 1.37 1.35 0.82 1.43 1.33 1.22 1.42 1.32  
## [141] 1.08 0.82 1.37 1.06 0.82 1.06 1.28 1.11 0.90 1.24 1.06 0.68 1.16 0.94  
## [155] 1.10 0.86 0.90 1.25 0.70 1.13 0.43 1.24 0.47 0.99 0.84 0.83 1.50 0.62  
## [169] 1.53 0.76 0.47 1.28 0.86 0.82 0.85 0.94 1.13 0.74 0.73 0.81 0.76 0.85  
## [183] 1.34 0.32 1.08 0.93 1.12 0.58 0.75 0.52 1.27 1.19 0.89 1.26 1.24 1.25  
## [197] 0.73 1.01 1.24 1.28 0.67 0.93 0.79 1.01 1.10 1.25 1.05 0.80 0.76 0.49  
## [211] 0.90 1.19 0.98 1.01 0.83 0.89 0.76 1.10 1.16 1.06 1.17 0.89 1.09 1.23  
## [225] 0.97 0.48 1.17 1.35 0.86 1.21 0.93 0.80 0.72 0.98 1.31 NA 0.91 0.85  
## [239] NA 1.07 0.83 0.94 0.77 1.05 0.70 1.28 0.89 0.81 0.94 0.70 0.97 1.28  
## [253] 1.15 0.93 1.18 1.21 0.90 0.91 0.99 0.91 1.56 0.76 1.00 1.18 1.35 1.51  
## [267] 0.71 1.01 1.25 1.01 1.15 0.58 NA 1.06 1.59 0.93 0.34 0.21 0.85 1.16  
## [281] 0.72 0.69 0.85 0.76 0.69 NA 0.97 0.75 1.10 0.90 1.26 0.72 1.15 0.70  
## [295] 1.29 NA 0.96 0.36 1.12 NA 1.23 0.65 0.90 0.78 1.12 1.12 1.18 0.66  
## [309] 0.66 0.97 0.88 NA 0.81 0.86 1.20 1.09 0.91 1.19 0.65 0.98 0.71 NA  
## [323] 1.06 0.00 0.41 1.12 0.91 0.69 1.31 0.88 1.04 1.05 NA 0.75 0.88 0.98  
## [337] 0.61 0.87 1.18 0.69 1.20 1.07 0.90 0.71 1.15 0.00 1.10 0.89 1.30 0.82  
## [351] 0.88 1.47 0.46 0.63 0.89 1.43 0.99 0.81 1.04 0.68 0.75 0.82 0.92 0.36  
## [365] 1.04 1.21 NA 0.95 1.00 1.45 0.81 0.73 0.60 0.81 0.95 0.82 1.37 1.44  
## [379] 1.21 1.31 0.74 0.95 0.87 1.18 0.41 1.01 0.92 1.03 1.04 0.78 0.41 1.24  
## [393] 1.16 1.29 0.76 1.15 0.85 1.26 1.10 0.60 1.11 1.02 0.78 1.31 0.58 0.95  
## [407] 0.99 1.14 0.79 NA 1.11 1.08 0.89 0.78 0.71 0.83 0.68 0.76 0.64 NA  
## [421] 0.78 NA NA NA 0.77 0.58 0.46 NA 0.84 1.14 0.94 0.79 NA 0.00  
## [435] 1.21 0.81 NA 0.75 0.90 0.75 0.96 0.64 0.83 0.76 0.49 1.32 NA NA  
## [449] NA NA NA NA NA

is.character(Readmissions$`SRR Measure Score`)

## [1] TRUE

as.numeric(Readmissions$`SRR Measure Score`)

## Warning: NAs introduced by coercion

## [1] 6 6 8 4 8 6 5 7 6 6 9 7 9 3 7 0 2 3 7 0 0 3 5  
## [24] 2 9 8 7 4 8 10 3 4 3 4 NA 2 8 6 8 9 10 4 7 1 2 5  
## [47] 3 2 5 0 3 8 NA 8 10 10 9 2 0 10 6 NA 7 4 5 6 5 NA 6  
## [70] NA 10 6 10 6 10 10 5 6 0 NA NA 0 8 10 1 NA 1 8 1 2 10 7  
## [93] 7 6 4 10 2 10 0 9 1 9 0 0 4 4 10 2 10 4 0 3 7 2 0  
## [116] 7 7 6 0 7 0 7 0 2 7 4 8 2 5 4 7 9 0 0 7 0 0 1  
## [139] 0 0 3 7 0 3 7 3 0 3 6 1 3 9 2 5 3 6 6 3 9 2 10  
## [162] 1 10 4 7 7 0 10 0 8 10 0 6 7 7 5 2 8 8 7 8 7 0 10  
## [185] 3 5 3 10 8 10 0 2 6 1 1 1 8 4 1 0 9 5 7 4 3 1 4  
## [208] 7 8 10 6 3 5 5 7 6 8 3 2 3 2 6 3 1 5 10 2 0 6 1  
## [231] 5 7 8 5 1 NA 6 7 NA 3 7 5 8 4 9 0 6 7 5 9 5 0 2  
## [254] 5 3 1 6 6 4 6 0 8 4 2 0 0 9 4 1 4 2 10 NA 3 0 5  
## [277] 10 10 7 3 8 9 7 8 9 NA 5 8 3 6 1 8 2 9 2 NA 6 10 3  
## [300] NA 1 9 6 8 4 3 4 9 9 6 6 NA 7 6 1 3 6 2 9 5 9 NA  
## [323] 3 10 10 3 6 9 0 6 4 4 NA 8 6 5 10 6 2 9 1 4 6 9 2  
## [346] 10 3 6 0 7 6 0 10 10 6 0 4 7 4 9 8 7 6 10 4 3 NA 5  
## [369] 4 0 7 8 10 7 5 7 0 0 1 0 8 5 6 2 10 4 6 4 5 8 10  
## [392] 1 4 0 9 2 7 1 3 10 3 5 8 0 10 5 4 2 7 NA 3 3 6 8  
## [415] 9 7 9 8 10 NA 8 NA NA NA 8 10 10 NA 7 4 5 7 NA 10 1 7 NA  
## [438] 8 6 8 6 10 7 8 10 0 NA NA NA NA NA NA NA

na.omit(Readmissions$`SRR Measure Score`)

## [1] "6" "6" "8" "4" "8" "6"   
## [7] "5" "7" "6" "6" "9" "7"   
## [13] "9" "3" "7" "0" "2" "3"   
## [19] "7" "0" "0" "3" "5" "2"   
## [25] "9" "8" "7" "4" "8" "10"   
## [31] "3" "4" "3" "4" "No Score" "2"   
## [37] "8" "6" "8" "9" "10" "4"   
## [43] "7" "1" "2" "5" "3" "2"   
## [49] "5" "0" "3" "8" "No Score" "8"   
## [55] "10" "10" "9" "2" "0" "10"   
## [61] "6" "No Score" "7" "4" "5" "6"   
## [67] "5" "No Score" "6" "No Score" "10" "6"   
## [73] "10" "6" "10" "10" "5" "6"   
## [79] "0" "No Score" "No Score" "0" "8" "10"   
## [85] "1" "No Score" "1" "8" "1" "2"   
## [91] "10" "7" "7" "6" "4" "10"   
## [97] "2" "10" "0" "9" "1" "9"   
## [103] "0" "0" "4" "4" "10" "2"   
## [109] "10" "4" "0" "3" "7" "2"   
## [115] "0" "7" "7" "6" "0" "7"   
## [121] "0" "7" "0" "2" "7" "4"   
## [127] "8" "2" "5" "4" "7" "9"   
## [133] "0" "0" "7" "0" "0" "1"   
## [139] "0" "0" "3" "7" "0" "3"   
## [145] "7" "3" "0" "3" "6" "1"   
## [151] "3" "9" "2" "5" "3" "6"   
## [157] "6" "3" "9" "2" "10" "1"   
## [163] "10" "4" "7" "7" "0" "10"   
## [169] "0" "8" "10" "0" "6" "7"   
## [175] "7" "5" "2" "8" "8" "7"   
## [181] "8" "7" "0" "10" "3" "5"   
## [187] "3" "10" "8" "10" "0" "2"   
## [193] "6" "1" "1" "1" "8" "4"   
## [199] "1" "0" "9" "5" "7" "4"   
## [205] "3" "1" "4" "7" "8" "10"   
## [211] "6" "3" "5" "5" "7" "6"   
## [217] "8" "3" "2" "3" "2" "6"   
## [223] "3" "1" "5" "10" "2" "0"   
## [229] "6" "1" "5" "7" "8" "5"   
## [235] "1" "No Score" "6" "7" "No Score" "3"   
## [241] "7" "5" "8" "4" "9" "0"   
## [247] "6" "7" "5" "9" "5" "0"   
## [253] "2" "5" "3" "1" "6" "6"   
## [259] "4" "6" "0" "8" "4" "2"   
## [265] "0" "0" "9" "4" "1" "4"   
## [271] "2" "10" "No Score" "3" "0" "5"   
## [277] "10" "10" "7" "3" "8" "9"   
## [283] "7" "8" "9" "No Score" "5" "8"   
## [289] "3" "6" "1" "8" "2" "9"   
## [295] "2" "No Score" "6" "10" "3" "No Score"  
## [301] "1" "9" "6" "8" "4" "3"   
## [307] "4" "9" "9" "6" "6" "No Score"  
## [313] "7" "6" "1" "3" "6" "2"   
## [319] "9" "5" "9" "No Score" "3" "10"   
## [325] "10" "3" "6" "9" "0" "6"   
## [331] "4" "4" "No Score" "8" "6" "5"   
## [337] "10" "6" "2" "9" "1" "4"   
## [343] "6" "9" "2" "10" "3" "6"   
## [349] "0" "7" "6" "0" "10" "10"   
## [355] "6" "0" "4" "7" "4" "9"   
## [361] "8" "7" "6" "10" "4" "3"   
## [367] "No Score" "5" "4" "0" "7" "8"   
## [373] "10" "7" "5" "7" "0" "0"   
## [379] "1" "0" "8" "5" "6" "2"   
## [385] "10" "4" "6" "4" "5" "8"   
## [391] "10" "1" "4" "0" "9" "2"   
## [397] "7" "1" "3" "10" "3" "5"   
## [403] "8" "0" "10" "5" "4" "2"   
## [409] "7" "No Score" "3" "3" "6" "8"   
## [415] "9" "7" "9" "8" "10" "No Score"  
## [421] "8" "No Score" "No Score" "No Score" "8" "10"   
## [427] "10" "No Score" "7" "4" "5" "7"   
## [433] "No Score" "10" "1" "7" "No Score" "8"   
## [439] "6" "8" "6" "10" "7" "8"   
## [445] "10" "0" "No Score" "No Score" "No Score" "No Score"  
## [451] "No Score" "No Score" "No Score"

na.omit(Readmissions$`Achievement Measure Ratio`)

## [1] "0.9" "0.91" "0.74"   
## [4] "1.04" "0.77" "0.86"   
## [7] "1.03" "0.84" "0.92"   
## [10] "0.91" "0.65" "0.84"   
## [13] "0.69" "1.08" "0.84"   
## [16] "1.83" "1.1599999999999999" "1.0900000000000001"   
## [19] "0.84" "1.67" "1.43"   
## [22] "1.1100000000000001" "0.98" "1.3"   
## [25] "0.67" "0.72" "0.83"   
## [28] "1" "0.73" "0.62"   
## [31] "1.1000000000000001" "0.99" "1.1100000000000001"   
## [34] "1.04" "No Rate" "1.1399999999999999"   
## [37] "0.74" "0.92" "0.76"   
## [40] "0.71" "0.23" "0.99"   
## [43] "0.8" "1.26" "1.18"   
## [46] "0.98" "1.1599999999999999" "1.1399999999999999"   
## [49] "0.93" "1.28" "1.21"   
## [52] "0.76" "No Rate" "0.75"   
## [55] "0.56999999999999995" "0.54" "0.69"   
## [58] "1.1499999999999999" "1.34" "0.28000000000000003"  
## [61] "0.93" "No Rate" "0.79"   
## [64] "1.02" "0.97" "0.88"   
## [67] "0.98" "No Rate" "0.92"   
## [70] "No Rate" "0.61" "0.87"   
## [73] "0.59" "0.91" "0.49"   
## [76] "0.4" "0.95" "0.86"   
## [79] "1.33" "No Rate" "No Rate"   
## [82] "1.32" "0.74" "0"   
## [85] "1.22" "No Rate" "1.26"   
## [88] "0.75" "1.2" "1.18"   
## [91] "0.59" "0.81" "0.8"   
## [94] "0.92" "1.04" "0.64"   
## [97] "1.1399999999999999" "0.57999999999999996" "1.46"   
## [100] "0.7" "1.26" "0.68"   
## [103] "1.34" "1.43" "1"   
## [106] "1.03" "0.17" "1.1599999999999999"   
## [109] "0.56999999999999995" "1.01" "1.3"   
## [112] "1.07" "0.84" "1.17"   
## [115] "1.39" "0.81" "0.8"   
## [118] "0.94" "1.3" "0.83"   
## [121] "1.68" "0.8" "1.49"   
## [124] "1.1499999999999999" "0.83" "0.99"   
## [127] "0.76" "1.1299999999999999" "0.97"   
## [130] "1.05" "0.8" "0.67"   
## [133] "1.37" "1.35" "0.82"   
## [136] "1.43" "1.33" "1.22"   
## [139] "1.42" "1.32" "1.08"   
## [142] "0.82" "1.37" "1.06"   
## [145] "0.82" "1.06" "1.28"   
## [148] "1.1100000000000001" "0.9" "1.24"   
## [151] "1.06" "0.68" "1.1599999999999999"   
## [154] "0.94" "1.1000000000000001" "0.86"   
## [157] "0.9" "1.25" "0.7"   
## [160] "1.1299999999999999" "0.43" "1.24"   
## [163] "0.47" "0.99" "0.84"   
## [166] "0.83" "1.5" "0.62"   
## [169] "1.53" "0.76" "0.47"   
## [172] "1.28" "0.86" "0.82"   
## [175] "0.85" "0.94" "1.1299999999999999"   
## [178] "0.74" "0.73" "0.81"   
## [181] "0.76" "0.85" "1.34"   
## [184] "0.32" "1.08" "0.93"   
## [187] "1.1200000000000001" "0.57999999999999996" "0.75"   
## [190] "0.52" "1.27" "1.19"   
## [193] "0.89" "1.26" "1.24"   
## [196] "1.25" "0.73" "1.01"   
## [199] "1.24" "1.28" "0.67"   
## [202] "0.93" "0.79" "1.01"   
## [205] "1.1000000000000001" "1.25" "1.05"   
## [208] "0.8" "0.76" "0.49"   
## [211] "0.9" "1.19" "0.98"   
## [214] "1.01" "0.83" "0.89"   
## [217] "0.76" "1.1000000000000001" "1.1599999999999999"   
## [220] "1.06" "1.17" "0.89"   
## [223] "1.0900000000000001" "1.23" "0.97"   
## [226] "0.48" "1.17" "1.35"   
## [229] "0.86" "1.21" "0.93"   
## [232] "0.8" "0.72" "0.98"   
## [235] "1.31" "No Rate" "0.91"   
## [238] "0.85" "No Rate" "1.07"   
## [241] "0.83" "0.94" "0.77"   
## [244] "1.05" "0.7" "1.28"   
## [247] "0.89" "0.81" "0.94"   
## [250] "0.7" "0.97" "1.28"   
## [253] "1.1499999999999999" "0.93" "1.18"   
## [256] "1.21" "0.9" "0.91"   
## [259] "0.99" "0.91" "1.56"   
## [262] "0.76" "1" "1.18"   
## [265] "1.35" "1.51" "0.71"   
## [268] "1.01" "1.25" "1.01"   
## [271] "1.1499999999999999" "0.57999999999999996" "No Rate"   
## [274] "1.06" "1.59" "0.93"   
## [277] "0.34" "0.21" "0.85"   
## [280] "1.1599999999999999" "0.72" "0.69"   
## [283] "0.85" "0.76" "0.69"   
## [286] "No Rate" "0.97" "0.75"   
## [289] "1.1000000000000001" "0.9" "1.26"   
## [292] "0.72" "1.1499999999999999" "0.7"   
## [295] "1.29" "No Rate" "0.96"   
## [298] "0.36" "1.1200000000000001" "No Rate"   
## [301] "1.23" "0.65" "0.9"   
## [304] "0.78" "1.1200000000000001" "1.1200000000000001"   
## [307] "1.18" "0.66" "0.66"   
## [310] "0.97" "0.88" "No Rate"   
## [313] "0.81" "0.86" "1.2"   
## [316] "1.0900000000000001" "0.91" "1.19"   
## [319] "0.65" "0.98" "0.71"   
## [322] "No Rate" "1.06" "0"   
## [325] "0.41" "1.1200000000000001" "0.91"   
## [328] "0.69" "1.31" "0.88"   
## [331] "1.04" "1.05" "No Rate"   
## [334] "0.75" "0.88" "0.98"   
## [337] "0.61" "0.87" "1.18"   
## [340] "0.69" "1.2" "1.07"   
## [343] "0.9" "0.71" "1.1499999999999999"   
## [346] "0" "1.1000000000000001" "0.89"   
## [349] "1.3" "0.82" "0.88"   
## [352] "1.47" "0.46" "0.63"   
## [355] "0.89" "1.43" "0.99"   
## [358] "0.81" "1.04" "0.68"   
## [361] "0.75" "0.82" "0.92"   
## [364] "0.36" "1.04" "1.21"   
## [367] "No Rate" "0.95" "1"   
## [370] "1.45" "0.81" "0.73"   
## [373] "0.6" "0.81" "0.95"   
## [376] "0.82" "1.37" "1.44"   
## [379] "1.21" "1.31" "0.74"   
## [382] "0.95" "0.87" "1.18"   
## [385] "0.41" "1.01" "0.92"   
## [388] "1.03" "1.04" "0.78"   
## [391] "0.41" "1.24" "1.1599999999999999"   
## [394] "1.29" "0.76" "1.1499999999999999"   
## [397] "0.85" "1.26" "1.1000000000000001"   
## [400] "0.6" "1.1100000000000001" "1.02"   
## [403] "0.78" "1.31" "0.57999999999999996"  
## [406] "0.95" "0.99" "1.1399999999999999"   
## [409] "0.79" "No Rate" "1.1100000000000001"   
## [412] "1.08" "0.89" "0.78"   
## [415] "0.71" "0.83" "0.68"   
## [418] "0.76" "0.64" "No Rate"   
## [421] "0.78" "No Rate" "No Rate"   
## [424] "No Rate" "0.77" "0.57999999999999996"  
## [427] "0.46" "No Rate" "0.84"   
## [430] "1.1399999999999999" "0.94" "0.79"   
## [433] "No Rate" "0" "1.21"   
## [436] "0.81" "No Rate" "0.75"   
## [439] "0.9" "0.75" "0.96"   
## [442] "0.64" "0.83" "0.76"   
## [445] "0.49" "1.32" "No Rate"   
## [448] "No Rate" "No Rate" "No Rate"   
## [451] "No Rate" "No Rate" "No Rate"

Readmissions$`SRR Measure Score` <- as.numeric(Readmissions$`SRR Measure Score`)

## Warning: NAs introduced by coercion

suppressWarnings(as.numeric(Readmissions$`SRR Measure Score`))

## [1] 6 6 8 4 8 6 5 7 6 6 9 7 9 3 7 0 2 3 7 0 0 3 5  
## [24] 2 9 8 7 4 8 10 3 4 3 4 NA 2 8 6 8 9 10 4 7 1 2 5  
## [47] 3 2 5 0 3 8 NA 8 10 10 9 2 0 10 6 NA 7 4 5 6 5 NA 6  
## [70] NA 10 6 10 6 10 10 5 6 0 NA NA 0 8 10 1 NA 1 8 1 2 10 7  
## [93] 7 6 4 10 2 10 0 9 1 9 0 0 4 4 10 2 10 4 0 3 7 2 0  
## [116] 7 7 6 0 7 0 7 0 2 7 4 8 2 5 4 7 9 0 0 7 0 0 1  
## [139] 0 0 3 7 0 3 7 3 0 3 6 1 3 9 2 5 3 6 6 3 9 2 10  
## [162] 1 10 4 7 7 0 10 0 8 10 0 6 7 7 5 2 8 8 7 8 7 0 10  
## [185] 3 5 3 10 8 10 0 2 6 1 1 1 8 4 1 0 9 5 7 4 3 1 4  
## [208] 7 8 10 6 3 5 5 7 6 8 3 2 3 2 6 3 1 5 10 2 0 6 1  
## [231] 5 7 8 5 1 NA 6 7 NA 3 7 5 8 4 9 0 6 7 5 9 5 0 2  
## [254] 5 3 1 6 6 4 6 0 8 4 2 0 0 9 4 1 4 2 10 NA 3 0 5  
## [277] 10 10 7 3 8 9 7 8 9 NA 5 8 3 6 1 8 2 9 2 NA 6 10 3  
## [300] NA 1 9 6 8 4 3 4 9 9 6 6 NA 7 6 1 3 6 2 9 5 9 NA  
## [323] 3 10 10 3 6 9 0 6 4 4 NA 8 6 5 10 6 2 9 1 4 6 9 2  
## [346] 10 3 6 0 7 6 0 10 10 6 0 4 7 4 9 8 7 6 10 4 3 NA 5  
## [369] 4 0 7 8 10 7 5 7 0 0 1 0 8 5 6 2 10 4 6 4 5 8 10  
## [392] 1 4 0 9 2 7 1 3 10 3 5 8 0 10 5 4 2 7 NA 3 3 6 8  
## [415] 9 7 9 8 10 NA 8 NA NA NA 8 10 10 NA 7 4 5 7 NA 10 1 7 NA  
## [438] 8 6 8 6 10 7 8 10 0 NA NA NA NA NA NA NA

Readmissions$`Achievement Measure Ratio` <- as.numeric(Readmissions$`Achievement Measure Ratio`)

## Warning: NAs introduced by coercion

suppressWarnings(as.numeric(Readmissions$`Achievement Measure Ratio`))

## [1] 0.90 0.91 0.74 1.04 0.77 0.86 1.03 0.84 0.92 0.91 0.65 0.84 0.69 1.08  
## [15] 0.84 1.83 1.16 1.09 0.84 1.67 1.43 1.11 0.98 1.30 0.67 0.72 0.83 1.00  
## [29] 0.73 0.62 1.10 0.99 1.11 1.04 NA 1.14 0.74 0.92 0.76 0.71 0.23 0.99  
## [43] 0.80 1.26 1.18 0.98 1.16 1.14 0.93 1.28 1.21 0.76 NA 0.75 0.57 0.54  
## [57] 0.69 1.15 1.34 0.28 0.93 NA 0.79 1.02 0.97 0.88 0.98 NA 0.92 NA  
## [71] 0.61 0.87 0.59 0.91 0.49 0.40 0.95 0.86 1.33 NA NA 1.32 0.74 0.00  
## [85] 1.22 NA 1.26 0.75 1.20 1.18 0.59 0.81 0.80 0.92 1.04 0.64 1.14 0.58  
## [99] 1.46 0.70 1.26 0.68 1.34 1.43 1.00 1.03 0.17 1.16 0.57 1.01 1.30 1.07  
## [113] 0.84 1.17 1.39 0.81 0.80 0.94 1.30 0.83 1.68 0.80 1.49 1.15 0.83 0.99  
## [127] 0.76 1.13 0.97 1.05 0.80 0.67 1.37 1.35 0.82 1.43 1.33 1.22 1.42 1.32  
## [141] 1.08 0.82 1.37 1.06 0.82 1.06 1.28 1.11 0.90 1.24 1.06 0.68 1.16 0.94  
## [155] 1.10 0.86 0.90 1.25 0.70 1.13 0.43 1.24 0.47 0.99 0.84 0.83 1.50 0.62  
## [169] 1.53 0.76 0.47 1.28 0.86 0.82 0.85 0.94 1.13 0.74 0.73 0.81 0.76 0.85  
## [183] 1.34 0.32 1.08 0.93 1.12 0.58 0.75 0.52 1.27 1.19 0.89 1.26 1.24 1.25  
## [197] 0.73 1.01 1.24 1.28 0.67 0.93 0.79 1.01 1.10 1.25 1.05 0.80 0.76 0.49  
## [211] 0.90 1.19 0.98 1.01 0.83 0.89 0.76 1.10 1.16 1.06 1.17 0.89 1.09 1.23  
## [225] 0.97 0.48 1.17 1.35 0.86 1.21 0.93 0.80 0.72 0.98 1.31 NA 0.91 0.85  
## [239] NA 1.07 0.83 0.94 0.77 1.05 0.70 1.28 0.89 0.81 0.94 0.70 0.97 1.28  
## [253] 1.15 0.93 1.18 1.21 0.90 0.91 0.99 0.91 1.56 0.76 1.00 1.18 1.35 1.51  
## [267] 0.71 1.01 1.25 1.01 1.15 0.58 NA 1.06 1.59 0.93 0.34 0.21 0.85 1.16  
## [281] 0.72 0.69 0.85 0.76 0.69 NA 0.97 0.75 1.10 0.90 1.26 0.72 1.15 0.70  
## [295] 1.29 NA 0.96 0.36 1.12 NA 1.23 0.65 0.90 0.78 1.12 1.12 1.18 0.66  
## [309] 0.66 0.97 0.88 NA 0.81 0.86 1.20 1.09 0.91 1.19 0.65 0.98 0.71 NA  
## [323] 1.06 0.00 0.41 1.12 0.91 0.69 1.31 0.88 1.04 1.05 NA 0.75 0.88 0.98  
## [337] 0.61 0.87 1.18 0.69 1.20 1.07 0.90 0.71 1.15 0.00 1.10 0.89 1.30 0.82  
## [351] 0.88 1.47 0.46 0.63 0.89 1.43 0.99 0.81 1.04 0.68 0.75 0.82 0.92 0.36  
## [365] 1.04 1.21 NA 0.95 1.00 1.45 0.81 0.73 0.60 0.81 0.95 0.82 1.37 1.44  
## [379] 1.21 1.31 0.74 0.95 0.87 1.18 0.41 1.01 0.92 1.03 1.04 0.78 0.41 1.24  
## [393] 1.16 1.29 0.76 1.15 0.85 1.26 1.10 0.60 1.11 1.02 0.78 1.31 0.58 0.95  
## [407] 0.99 1.14 0.79 NA 1.11 1.08 0.89 0.78 0.71 0.83 0.68 0.76 0.64 NA  
## [421] 0.78 NA NA NA 0.77 0.58 0.46 NA 0.84 1.14 0.94 0.79 NA 0.00  
## [435] 1.21 0.81 NA 0.75 0.90 0.75 0.96 0.64 0.83 0.76 0.49 1.32 NA NA  
## [449] NA NA NA NA NA

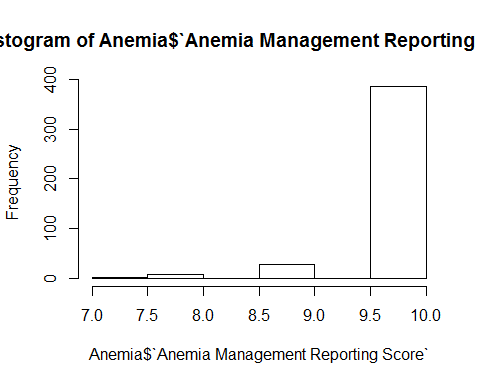
Anemia$`Anemia Management Reporting Score` <- as.numeric(Anemia$`Anemia Management Reporting Score`)

## Warning: NAs introduced by coercion

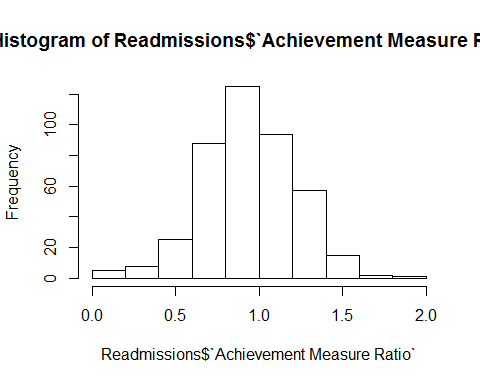
suppressWarnings(as.numeric(Anemia$`Anemia Management Reporting Score`))

## [1] 10 9 10 10 10 10 8 10 10 10 10 10 10 10 10 10 10 9 10 10 10 10 10  
## [24] 10 7 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 10 10  
## [47] 10 10 10 10 10 10 NA 10 10 10 10 10 10 10 9 NA 10 10 9 8 10 NA 10  
## [70] 10 10 10 10 10 10 10 10 10 10 NA NA 10 10 10 10 NA 10 10 10 10 10 10  
## [93] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9 9 10 10 10 10 10  
## [116] 10 10 10 10 10 10 10 10 10 10 9 NA 10 9 10 10 10 10 10 10 9 10 10  
## [139] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 9 10 10 10 10  
## [162] 10 10 10 10 10 10 10 10 10 9 10 9 10 10 10 10 10 10 10 10 10 10 10  
## [185] 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 9  
## [208] 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 10 10 10 10 10 10 10  
## [231] 10 10 10 10 10 NA 10 9 10 9 10 10 10 8 10 10 10 10 10 10 10 10 10  
## [254] 10 10 10 10 9 10 10 10 10 10 10 10 10 10 10 10 10 10 10 NA 10 10 10  
## [277] 10 10 10 10 9 10 10 10 10 10 10 10 10 8 10 10 10 10 10 10 9 10 10  
## [300] NA 10 10 10 10 10 10 10 10 10 10 10 NA 10 10 10 10 10 9 10 10 NA NA  
## [323] 10 NA 10 10 10 10 10 10 10 10 NA 10 10 9 10 10 10 10 10 10 10 10 9  
## [346] 10 10 10 10 10 10 10 10 10 10 9 10 10 10 8 10 8 10 10 9 10 10 10  
## [369] 10 10 10 9 10 10 10 10 8 10 10 10 10 10 10 10 10 10 10 10 7 10 10  
## [392] 10 10 10 10 10 10 10 10 10 10 10 10 10 9 10 10 8 10 10 10 10 10 10  
## [415] 10 10 NA 10 NA NA NA NA NA NA 10 10 10 10 10 10 10 10 NA 10 10 10 10  
## [438] 10 10 10 10 10 10 10 10 NA 10 10 NA NA NA NA NA

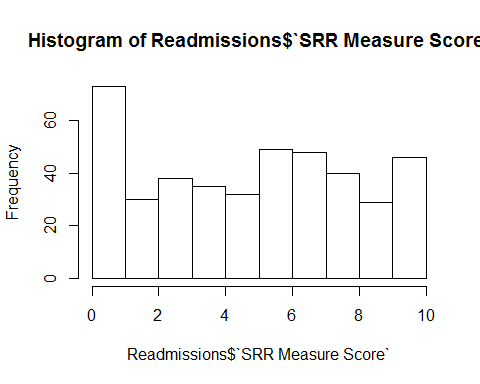
hist(Anemia$`Anemia Management Reporting Score`)



hist(Readmissions$`Achievement Measure Ratio`)



hist(Readmissions$`SRR Measure Score`)



library(readxl)  
Graph\_GA\_and\_MN <- read\_excel("~/Graph GA and MN.xlsx",   
 col\_types = c("numeric", "numeric"))

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [36, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [54, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [54, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [63, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [63, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [69, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [69, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [71, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [81, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [81, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [82, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [82, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [87, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [87, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [128, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [237, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [237, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [240, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [274, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [274, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [287, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [297, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [301, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [301, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [313, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [313, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [322, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [323, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [323, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [325, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [334, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [334, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [368, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [411, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [418, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [420, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [421, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [421, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [422, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [423, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [423, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [424, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [424, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [425, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [425, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [429, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [434, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [434, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [438, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [447, 1]: expecting numeric: got 'No Score'

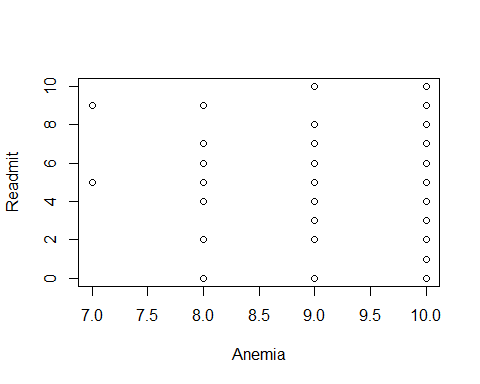
## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [448, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [449, 2]: expecting numeric: got 'No Score'

View(Graph\_GA\_and\_MN)  
suppressWarnings(Graph\_GA\_and\_MN)

## Anemia Readmit  
## 1 10 6  
## 2 9 6  
## 3 10 8  
## 4 10 4  
## 5 10 8  
## 6 10 6  
## 7 8 5  
## 8 10 7  
## 9 10 6  
## 10 10 6  
## 11 10 9  
## 12 10 7  
## 13 10 9  
## 14 10 3  
## 15 10 7  
## 16 10 0  
## 17 10 2  
## 18 9 3  
## 19 10 7  
## 20 10 0  
## 21 10 0  
## 22 10 3  
## 23 10 5  
## 24 10 2  
## 25 7 9  
## 26 10 8  
## 27 10 7  
## 28 10 4  
## 29 10 8  
## 30 10 10  
## 31 10 3  
## 32 10 4  
## 33 10 3  
## 34 10 4  
## 35 10 NA  
## 36 10 2  
## 37 10 8  
## 38 10 6  
## 39 10 8  
## 40 10 9  
## 41 10 10  
## 42 9 4  
## 43 10 7  
## 44 10 1  
## 45 10 2  
## 46 10 5  
## 47 10 3  
## 48 10 2  
## 49 10 5  
## 50 10 0  
## 51 10 3  
## 52 10 8  
## 53 NA NA  
## 54 10 8  
## 55 10 10  
## 56 10 10  
## 57 10 9  
## 58 10 2  
## 59 10 0  
## 60 10 10  
## 61 9 6  
## 62 NA NA  
## 63 10 7  
## 64 10 4  
## 65 9 5  
## 66 8 6  
## 67 10 5  
## 68 NA NA  
## 69 10 6  
## 70 10 NA  
## 71 10 10  
## 72 10 6  
## 73 10 10  
## 74 10 6  
## 75 10 10  
## 76 10 10  
## 77 10 5  
## 78 10 6  
## 79 10 0  
## 80 NA NA  
## 81 NA NA  
## 82 10 0  
## 83 10 8  
## 84 10 10  
## 85 10 1  
## 86 NA NA  
## 87 10 1  
## 88 10 8  
## 89 10 1  
## 90 10 2  
## 91 10 10  
## 92 10 7  
## 93 10 7  
## 94 10 6  
## 95 10 4  
## 96 10 10  
## 97 10 2  
## 98 10 10  
## 99 10 0  
## 100 10 9  
## 101 10 1  
## 102 10 9  
## 103 10 0  
## 104 10 0  
## 105 10 4  
## 106 10 4  
## 107 10 10  
## 108 10 2  
## 109 9 10  
## 110 9 4  
## 111 10 0  
## 112 10 3  
## 113 10 7  
## 114 10 2  
## 115 10 0  
## 116 10 7  
## 117 10 7  
## 118 10 6  
## 119 10 0  
## 120 10 7  
## 121 10 0  
## 122 10 7  
## 123 10 0  
## 124 10 2  
## 125 10 7  
## 126 9 4  
## 127 NA 8  
## 128 10 2  
## 129 9 5  
## 130 10 4  
## 131 10 7  
## 132 10 9  
## 133 10 0  
## 134 10 0  
## 135 10 7  
## 136 9 0  
## 137 10 0  
## 138 10 1  
## 139 10 0  
## 140 10 0  
## 141 10 3  
## 142 10 7  
## 143 10 0  
## 144 10 3  
## 145 10 7  
## 146 10 3  
## 147 10 0  
## 148 10 3  
## 149 10 6  
## 150 10 1  
## 151 10 3  
## 152 10 9  
## 153 10 2  
## 154 9 5  
## 155 10 3  
## 156 10 6  
## 157 9 6  
## 158 10 3  
## 159 10 9  
## 160 10 2  
## 161 10 10  
## 162 10 1  
## 163 10 10  
## 164 10 4  
## 165 10 7  
## 166 10 7  
## 167 10 0  
## 168 10 10  
## 169 10 0  
## 170 10 8  
## 171 9 10  
## 172 10 0  
## 173 9 6  
## 174 10 7  
## 175 10 7  
## 176 10 5  
## 177 10 2  
## 178 10 8  
## 179 10 8  
## 180 10 7  
## 181 10 8  
## 182 10 7  
## 183 10 0  
## 184 10 10  
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## 186 10 5  
## 187 10 3  
## 188 10 10  
## 189 10 8  
## 190 10 10  
## 191 10 0  
## 192 10 2  
## 193 10 6  
## 194 10 1  
## 195 10 1  
## 196 10 1  
## 197 10 8  
## 198 10 4  
## 199 10 1  
## 200 10 0  
## 201 10 9  
## 202 10 5  
## 203 10 7  
## 204 10 4  
## 205 10 3  
## 206 10 1  
## 207 9 4  
## 208 10 7  
## 209 10 8  
## 210 10 10  
## 211 10 6  
## 212 10 3  
## 213 10 5  
## 214 10 5  
## 215 10 7  
## 216 10 6  
## 217 10 8  
## 218 10 3  
## 219 10 2  
## 220 10 3  
## 221 9 2  
## 222 10 6  
## 223 10 3  
## 224 10 1  
## 225 10 5  
## 226 10 10  
## 227 10 2  
## 228 10 0  
## 229 10 6  
## 230 10 1  
## 231 10 5  
## 232 10 7  
## 233 10 8  
## 234 10 5  
## 235 10 1  
## 236 NA NA  
## 237 10 6  
## 238 9 7  
## 239 10 NA  
## 240 9 3  
## 241 10 7  
## 242 10 5  
## 243 10 8  
## 244 8 4  
## 245 10 9  
## 246 10 0  
## 247 10 6  
## 248 10 7  
## 249 10 5  
## 250 10 9  
## 251 10 5  
## 252 10 0  
## 253 10 2  
## 254 10 5  
## 255 10 3  
## 256 10 1  
## 257 10 6  
## 258 9 6  
## 259 10 4  
## 260 10 6  
## 261 10 0  
## 262 10 8  
## 263 10 4  
## 264 10 2  
## 265 10 0  
## 266 10 0  
## 267 10 9  
## 268 10 4  
## 269 10 1  
## 270 10 4  
## 271 10 2  
## 272 10 10  
## 273 NA NA  
## 274 10 3  
## 275 10 0  
## 276 10 5  
## 277 10 10  
## 278 10 10  
## 279 10 7  
## 280 10 3  
## 281 9 8  
## 282 10 9  
## 283 10 7  
## 284 10 8  
## 285 10 9  
## 286 10 NA  
## 287 10 5  
## 288 10 8  
## 289 10 3  
## 290 8 6  
## 291 10 1  
## 292 10 8  
## 293 10 2  
## 294 10 9  
## 295 10 2  
## 296 10 NA  
## 297 9 6  
## 298 10 10  
## 299 10 3  
## 300 NA NA  
## 301 10 1  
## 302 10 9  
## 303 10 6  
## 304 10 8  
## 305 10 4  
## 306 10 3  
## 307 10 4  
## 308 10 9  
## 309 10 9  
## 310 10 6  
## 311 10 6  
## 312 NA NA  
## 313 10 7  
## 314 10 6  
## 315 10 1  
## 316 10 3  
## 317 10 6  
## 318 9 2  
## 319 10 9  
## 320 10 5  
## 321 NA 9  
## 322 NA NA  
## 323 10 3  
## 324 NA 10  
## 325 10 10  
## 326 10 3  
## 327 10 6  
## 328 10 9  
## 329 10 0  
## 330 10 6  
## 331 10 4  
## 332 10 4  
## 333 NA NA  
## 334 10 8  
## 335 10 6  
## 336 9 5  
## 337 10 10  
## 338 10 6  
## 339 10 2  
## 340 10 9  
## 341 10 1  
## 342 10 4  
## 343 10 6  
## 344 10 9  
## 345 9 2  
## 346 10 10  
## 347 10 3  
## 348 10 6  
## 349 10 0  
## 350 10 7  
## 351 10 6  
## 352 10 0  
## 353 10 10  
## 354 10 10  
## 355 10 6  
## 356 9 0  
## 357 10 4  
## 358 10 7  
## 359 10 4  
## 360 8 9  
## 361 10 8  
## 362 8 7  
## 363 10 6  
## 364 10 10  
## 365 9 4  
## 366 10 3  
## 367 10 NA  
## 368 10 5  
## 369 10 4  
## 370 10 0  
## 371 10 7  
## 372 9 8  
## 373 10 10  
## 374 10 7  
## 375 10 5  
## 376 10 7  
## 377 8 0  
## 378 10 0  
## 379 10 1  
## 380 10 0  
## 381 10 8  
## 382 10 5  
## 383 10 6  
## 384 10 2  
## 385 10 10  
## 386 10 4  
## 387 10 6  
## 388 10 4  
## 389 7 5  
## 390 10 8  
## 391 10 10  
## 392 10 1  
## 393 10 4  
## 394 10 0  
## 395 10 9  
## 396 10 2  
## 397 10 7  
## 398 10 1  
## 399 10 3  
## 400 10 10  
## 401 10 3  
## 402 10 5  
## 403 10 8  
## 404 10 0  
## 405 9 10  
## 406 10 5  
## 407 10 4  
## 408 8 2  
## 409 10 7  
## 410 10 NA  
## 411 10 3  
## 412 10 3  
## 413 10 6  
## 414 10 8  
## 415 10 9  
## 416 10 7  
## 417 NA 9  
## 418 10 8  
## 419 NA 10  
## 420 NA NA  
## 421 NA 8  
## 422 NA NA  
## 423 NA NA  
## 424 NA NA  
## 425 10 8  
## 426 10 10  
## 427 10 10  
## 428 10 NA  
## 429 10 7  
## 430 10 4  
## 431 10 5  
## 432 10 7  
## 433 NA NA  
## 434 10 10  
## 435 10 1  
## 436 10 7  
## 437 10 NA  
## 438 10 8  
## 439 10 6  
## 440 10 8  
## 441 10 6  
## 442 10 10  
## 443 10 7  
## 444 10 8  
## 445 10 10  
## 446 NA 0  
## 447 10 NA  
## 448 10 NA

plot.default(Graph\_GA\_and\_MN)



library(readxl)  
GA\_Only <- read\_excel("~/GA Only.xlsx", col\_types = c("numeric",   
 "numeric"))

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [36, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [54, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [54, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [63, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [63, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [69, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [69, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [71, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [81, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [81, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [82, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [82, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [87, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [87, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [128, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [237, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [237, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [240, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [274, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [274, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [287, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [297, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [301, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [301, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [313, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [313, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [322, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [323, 1]: expecting numeric: got 'No Score'

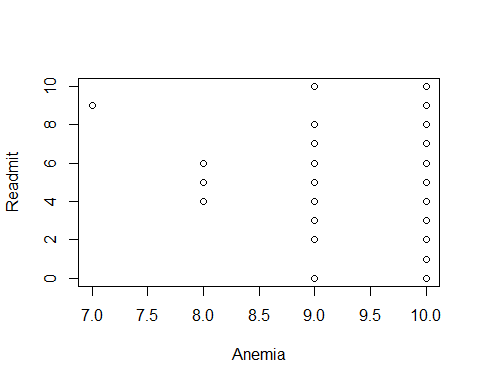
## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [323, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [325, 1]: expecting numeric: got 'No Score'

View(GA\_Only)  
suppressWarnings(GA\_Only)

## Anemia Readmit  
## 1 10 6  
## 2 9 6  
## 3 10 8  
## 4 10 4  
## 5 10 8  
## 6 10 6  
## 7 8 5  
## 8 10 7  
## 9 10 6  
## 10 10 6  
## 11 10 9  
## 12 10 7  
## 13 10 9  
## 14 10 3  
## 15 10 7  
## 16 10 0  
## 17 10 2  
## 18 9 3  
## 19 10 7  
## 20 10 0  
## 21 10 0  
## 22 10 3  
## 23 10 5  
## 24 10 2  
## 25 7 9  
## 26 10 8  
## 27 10 7  
## 28 10 4  
## 29 10 8  
## 30 10 10  
## 31 10 3  
## 32 10 4  
## 33 10 3  
## 34 10 4  
## 35 10 NA  
## 36 10 2  
## 37 10 8  
## 38 10 6  
## 39 10 8  
## 40 10 9  
## 41 10 10  
## 42 9 4  
## 43 10 7  
## 44 10 1  
## 45 10 2  
## 46 10 5  
## 47 10 3  
## 48 10 2  
## 49 10 5  
## 50 10 0  
## 51 10 3  
## 52 10 8  
## 53 NA NA  
## 54 10 8  
## 55 10 10  
## 56 10 10  
## 57 10 9  
## 58 10 2  
## 59 10 0  
## 60 10 10  
## 61 9 6  
## 62 NA NA  
## 63 10 7  
## 64 10 4  
## 65 9 5  
## 66 8 6  
## 67 10 5  
## 68 NA NA  
## 69 10 6  
## 70 10 NA  
## 71 10 10  
## 72 10 6  
## 73 10 10  
## 74 10 6  
## 75 10 10  
## 76 10 10  
## 77 10 5  
## 78 10 6  
## 79 10 0  
## 80 NA NA  
## 81 NA NA  
## 82 10 0  
## 83 10 8  
## 84 10 10  
## 85 10 1  
## 86 NA NA  
## 87 10 1  
## 88 10 8  
## 89 10 1  
## 90 10 2  
## 91 10 10  
## 92 10 7  
## 93 10 7  
## 94 10 6  
## 95 10 4  
## 96 10 10  
## 97 10 2  
## 98 10 10  
## 99 10 0  
## 100 10 9  
## 101 10 1  
## 102 10 9  
## 103 10 0  
## 104 10 0  
## 105 10 4  
## 106 10 4  
## 107 10 10  
## 108 10 2  
## 109 9 10  
## 110 9 4  
## 111 10 0  
## 112 10 3  
## 113 10 7  
## 114 10 2  
## 115 10 0  
## 116 10 7  
## 117 10 7  
## 118 10 6  
## 119 10 0  
## 120 10 7  
## 121 10 0  
## 122 10 7  
## 123 10 0  
## 124 10 2  
## 125 10 7  
## 126 9 4  
## 127 NA 8  
## 128 10 2  
## 129 9 5  
## 130 10 4  
## 131 10 7  
## 132 10 9  
## 133 10 0  
## 134 10 0  
## 135 10 7  
## 136 9 0  
## 137 10 0  
## 138 10 1  
## 139 10 0  
## 140 10 0  
## 141 10 3  
## 142 10 7  
## 143 10 0  
## 144 10 3  
## 145 10 7  
## 146 10 3  
## 147 10 0  
## 148 10 3  
## 149 10 6  
## 150 10 1  
## 151 10 3  
## 152 10 9  
## 153 10 2  
## 154 9 5  
## 155 10 3  
## 156 10 6  
## 157 9 6  
## 158 10 3  
## 159 10 9  
## 160 10 2  
## 161 10 10  
## 162 10 1  
## 163 10 10  
## 164 10 4  
## 165 10 7  
## 166 10 7  
## 167 10 0  
## 168 10 10  
## 169 10 0  
## 170 10 8  
## 171 9 10  
## 172 10 0  
## 173 9 6  
## 174 10 7  
## 175 10 7  
## 176 10 5  
## 177 10 2  
## 178 10 8  
## 179 10 8  
## 180 10 7  
## 181 10 8  
## 182 10 7  
## 183 10 0  
## 184 10 10  
## 185 10 3  
## 186 10 5  
## 187 10 3  
## 188 10 10  
## 189 10 8  
## 190 10 10  
## 191 10 0  
## 192 10 2  
## 193 10 6  
## 194 10 1  
## 195 10 1  
## 196 10 1  
## 197 10 8  
## 198 10 4  
## 199 10 1  
## 200 10 0  
## 201 10 9  
## 202 10 5  
## 203 10 7  
## 204 10 4  
## 205 10 3  
## 206 10 1  
## 207 9 4  
## 208 10 7  
## 209 10 8  
## 210 10 10  
## 211 10 6  
## 212 10 3  
## 213 10 5  
## 214 10 5  
## 215 10 7  
## 216 10 6  
## 217 10 8  
## 218 10 3  
## 219 10 2  
## 220 10 3  
## 221 9 2  
## 222 10 6  
## 223 10 3  
## 224 10 1  
## 225 10 5  
## 226 10 10  
## 227 10 2  
## 228 10 0  
## 229 10 6  
## 230 10 1  
## 231 10 5  
## 232 10 7  
## 233 10 8  
## 234 10 5  
## 235 10 1  
## 236 NA NA  
## 237 10 6  
## 238 9 7  
## 239 10 NA  
## 240 9 3  
## 241 10 7  
## 242 10 5  
## 243 10 8  
## 244 8 4  
## 245 10 9  
## 246 10 0  
## 247 10 6  
## 248 10 7  
## 249 10 5  
## 250 10 9  
## 251 10 5  
## 252 10 0  
## 253 10 2  
## 254 10 5  
## 255 10 3  
## 256 10 1  
## 257 10 6  
## 258 9 6  
## 259 10 4  
## 260 10 6  
## 261 10 0  
## 262 10 8  
## 263 10 4  
## 264 10 2  
## 265 10 0  
## 266 10 0  
## 267 10 9  
## 268 10 4  
## 269 10 1  
## 270 10 4  
## 271 10 2  
## 272 10 10  
## 273 NA NA  
## 274 10 3  
## 275 10 0  
## 276 10 5  
## 277 10 10  
## 278 10 10  
## 279 10 7  
## 280 10 3  
## 281 9 8  
## 282 10 9  
## 283 10 7  
## 284 10 8  
## 285 10 9  
## 286 10 NA  
## 287 10 5  
## 288 10 8  
## 289 10 3  
## 290 8 6  
## 291 10 1  
## 292 10 8  
## 293 10 2  
## 294 10 9  
## 295 10 2  
## 296 10 NA  
## 297 9 6  
## 298 10 10  
## 299 10 3  
## 300 NA NA  
## 301 10 1  
## 302 10 9  
## 303 10 6  
## 304 10 8  
## 305 10 4  
## 306 10 3  
## 307 10 4  
## 308 10 9  
## 309 10 9  
## 310 10 6  
## 311 10 6  
## 312 NA NA  
## 313 10 7  
## 314 10 6  
## 315 10 1  
## 316 10 3  
## 317 10 6  
## 318 9 2  
## 319 10 9  
## 320 10 5  
## 321 NA 9  
## 322 NA NA  
## 323 10 3  
## 324 NA 10  
## 325 10 10  
## 326 10 3  
## 327 10 6  
## 328 10 9  
## 329 10 0  
## 330 10 6  
## 331 10 4

plot.default(GA\_Only)



library(readxl)  
MN\_Only <- read\_excel("~/MN Only.xlsx", col\_types = c("numeric",   
 "numeric"))

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [3, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [3, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [37, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [80, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [87, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [89, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [90, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [90, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [91, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [92, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [92, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [93, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [93, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [94, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [94, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [98, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [103, 1]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [103, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [107, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [116, 1]: expecting numeric: got 'No Score'

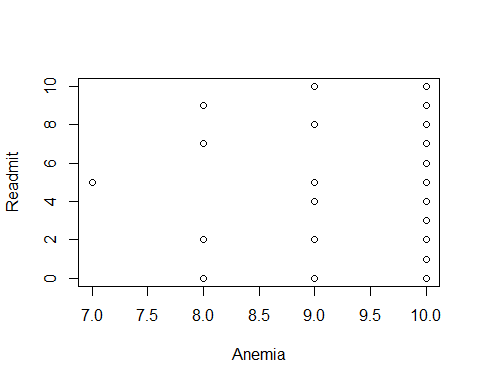
## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [117, 2]: expecting numeric: got 'No Score'

## Warning in read\_xlsx\_(path, sheet, col\_names = col\_names, col\_types =  
## col\_types, : [118, 2]: expecting numeric: got 'No Score'

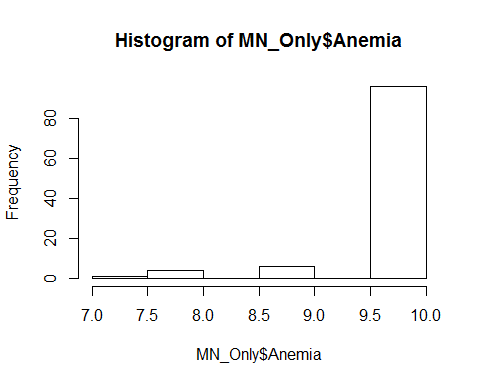
View(MN\_Only)  
suppressWarnings(MN\_Only)

## Anemia Readmit  
## 1 10 4  
## 2 NA NA  
## 3 10 8  
## 4 10 6  
## 5 9 5  
## 6 10 10  
## 7 10 6  
## 8 10 2  
## 9 10 9  
## 10 10 1  
## 11 10 4  
## 12 10 6  
## 13 10 9  
## 14 9 2  
## 15 10 10  
## 16 10 3  
## 17 10 6  
## 18 10 0  
## 19 10 7  
## 20 10 6  
## 21 10 0  
## 22 10 10  
## 23 10 10  
## 24 10 6  
## 25 9 0  
## 26 10 4  
## 27 10 7  
## 28 10 4  
## 29 8 9  
## 30 10 8  
## 31 8 7  
## 32 10 6  
## 33 10 10  
## 34 9 4  
## 35 10 3  
## 36 10 NA  
## 37 10 5  
## 38 10 4  
## 39 10 0  
## 40 10 7  
## 41 9 8  
## 42 10 10  
## 43 10 7  
## 44 10 5  
## 45 10 7  
## 46 8 0  
## 47 10 0  
## 48 10 1  
## 49 10 0  
## 50 10 8  
## 51 10 5  
## 52 10 6  
## 53 10 2  
## 54 10 10  
## 55 10 4  
## 56 10 6  
## 57 10 4  
## 58 7 5  
## 59 10 8  
## 60 10 10  
## 61 10 1  
## 62 10 4  
## 63 10 0  
## 64 10 9  
## 65 10 2  
## 66 10 7  
## 67 10 1  
## 68 10 3  
## 69 10 10  
## 70 10 3  
## 71 10 5  
## 72 10 8  
## 73 10 0  
## 74 9 10  
## 75 10 5  
## 76 10 4  
## 77 8 2  
## 78 10 7  
## 79 10 NA  
## 80 10 3  
## 81 10 3  
## 82 10 6  
## 83 10 8  
## 84 10 9  
## 85 10 7  
## 86 NA 9  
## 87 10 8  
## 88 NA 10  
## 89 NA NA  
## 90 NA 8  
## 91 NA NA  
## 92 NA NA  
## 93 NA NA  
## 94 10 8  
## 95 10 10  
## 96 10 10  
## 97 10 NA  
## 98 10 7  
## 99 10 4  
## 100 10 5  
## 101 10 7  
## 102 NA NA  
## 103 10 10  
## 104 10 1  
## 105 10 7  
## 106 10 NA  
## 107 10 8  
## 108 10 6  
## 109 10 8  
## 110 10 6  
## 111 10 10  
## 112 10 7  
## 113 10 8  
## 114 10 10  
## 115 NA 0  
## 116 10 NA  
## 117 10 NA

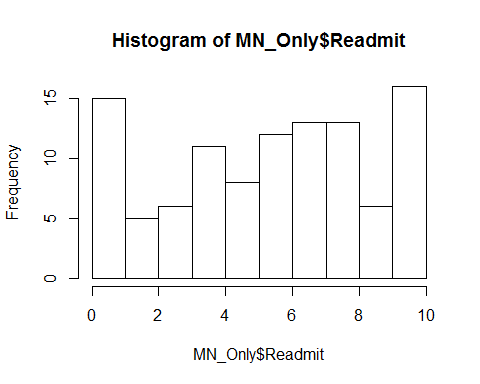
plot.default(MN\_Only)



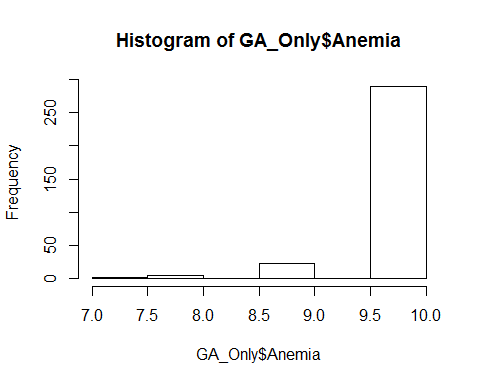
hist(MN\_Only$Anemia)



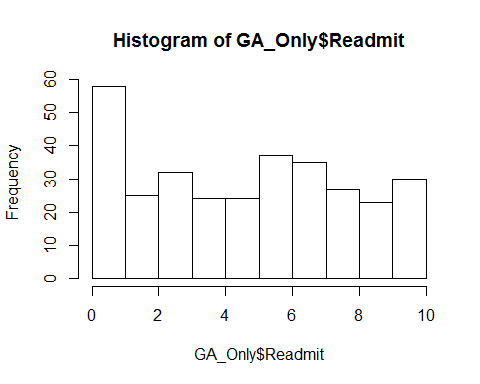
hist(MN\_Only$Readmit)



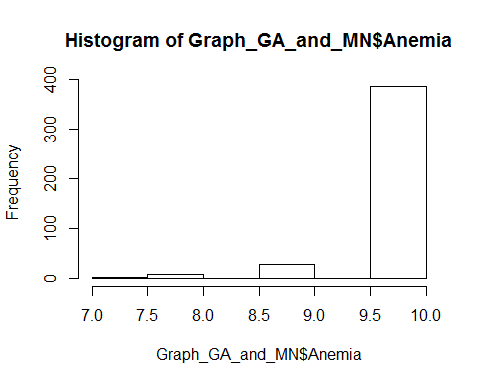
hist(GA\_Only$Anemia)



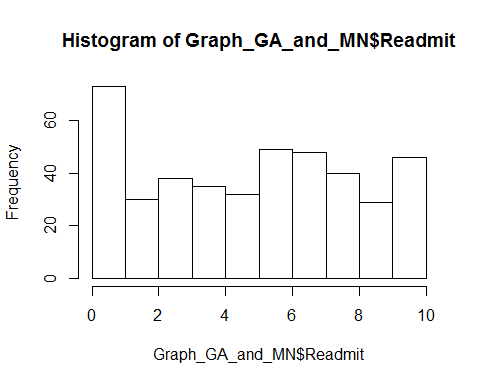
hist(GA\_Only$Readmit)



hist(Graph\_GA\_and\_MN$Anemia)



hist(Graph\_GA\_and\_MN$Readmit)



summary(Anemia)

## Facility Name CMS Certification Number (CCN) Alternate CCN 1   
## Length:453 Min. :112312 Length:453   
## Class :character 1st Qu.:112659 Class :character   
## Mode :character Median :112795 Mode :character   
## Mean :154467   
## 3rd Qu.:242502   
## Max. :852504   
##   
## Address1 Address2 City   
## Length:453 Length:453 Length:453   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
##   
## State Zip Code Network Measure Name   
## Length:453 Min. :30004 Min. : 6.000 Length:453   
## Class :character 1st Qu.:30269 1st Qu.: 6.000 Class :character   
## Mode :character Median :30906 Median : 6.000 Mode :character   
## Mean :37224 Mean : 7.291   
## 3rd Qu.:55021 3rd Qu.:11.000   
## Max. :56751 Max. :11.000   
##   
## Anemia Management Reporting Score  
## Min. : 7.000   
## 1st Qu.:10.000   
## Median :10.000   
## Mean : 9.882   
## 3rd Qu.:10.000   
## Max. :10.000   
## NA's :29   
## State Avg Anemia Management Reporting Score  
## Min. :10   
## 1st Qu.:10   
## Median :10   
## Mean :10   
## 3rd Qu.:10   
## Max. :10   
##   
## National Avg Anemia Management Reporting Score  
## Min. :10   
## 1st Qu.:10   
## Median :10   
## Mean :10   
## 3rd Qu.:10   
## Max. :10   
##

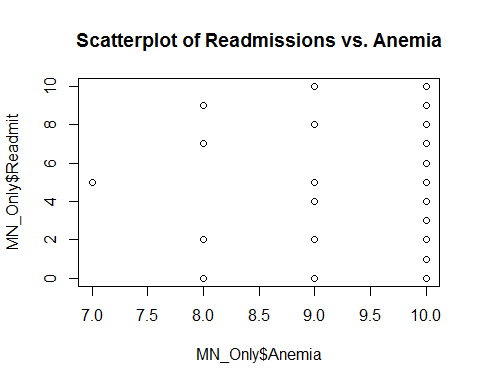
summary(Readmissions)

## Facility Name CMS Certification Number (CCN) Alternate CCN 1   
## Length:453 Min. :112312 Length:453   
## Class :character 1st Qu.:112659 Class :character   
## Mode :character Median :112795 Mode :character   
## Mean :154467   
## 3rd Qu.:242502   
## Max. :852504   
##   
## Address 1 Address 2 City   
## Length:453 Length:453 Length:453   
## Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character   
##   
##   
##   
##   
## State Zip Code Network Measure Name   
## Length:453 Min. :30004 Min. : 6.000 Length:453   
## Class :character 1st Qu.:30269 1st Qu.: 6.000 Class :character   
## Mode :character Median :30906 Median : 6.000 Mode :character   
## Mean :37224 Mean : 7.291   
## 3rd Qu.:55021 3rd Qu.:11.000   
## Max. :56751 Max. :11.000   
##   
## Achievement Measure Rate Achievement Measure Ratio SRR Measure Score  
## Length:453 Min. :0.0000 Min. : 0.000   
## Class :character 1st Qu.:0.7600 1st Qu.: 3.000   
## Mode :character Median :0.9300 Median : 6.000   
## Mean :0.9431 Mean : 5.169   
## 3rd Qu.:1.1425 3rd Qu.: 8.000   
## Max. :1.8300 Max. :10.000   
## NA's :33 NA's :33   
## State Avg SRR Measure Score National Avg SRR Measure Score  
## Min. :5.000 Min. :5   
## 1st Qu.:5.000 1st Qu.:5   
## Median :5.000 Median :5   
## Mean :5.258 Mean :5   
## 3rd Qu.:6.000 3rd Qu.:5   
## Max. :6.000 Max. :5   
##

attach(MN\_Only)

## The following object is masked \_by\_ .GlobalEnv:  
##   
## Anemia

plot(MN\_Only$Anemia,MN\_Only$Readmit, main="Scatterplot of Readmissions vs. Anemia")

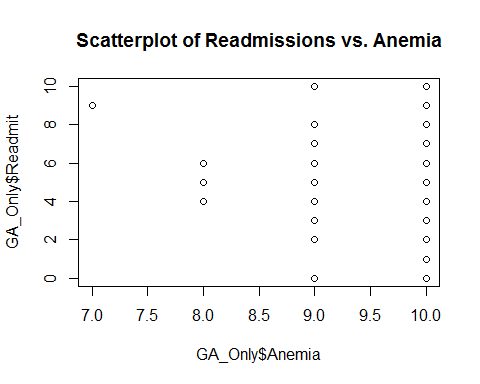


attach(GA\_Only)

## The following object is masked \_by\_ .GlobalEnv:  
##   
## Anemia

## The following objects are masked from MN\_Only:  
##   
## Anemia, Readmit

plot(GA\_Only$Anemia,GA\_Only$Readmit, main="Scatterplot of Readmissions vs. Anemia")



The results show that, for both Georgia and Minnesota, anemia scores are mostly at a 10 with a few exceptions lower going all the way to 1 center per state reporting a score of 7. When using SSR or the Adjusted Readmission Value, the results indicate that there are several dialysis centers reporting readmission rates higher than expected or predicted. In the SSR histogram, the distribution is fairly normal with a slight positive skew indicating that the mean is slightly above the peak. The histogram of the adjusted Readmission value shows a clear picture of the distribution containing several values above the expected value of 5.0, indicating that readmission rates for those centers are higher than anticipated. The same is true when the graphs are divided by state, with Minnesota showing even more values between 5.0 and 10.0. Plotting the anemia scores vs. Readmission scores in overall format, as well as by each individual state, produced interesting results if somewhat difficult to interpret since the vast majority of anemia scores fall at the value of 10.0. Tables of the data better display the fact that the majority of centers in both states have anemia management reporting scores of 10.0. In Georgia, 290/331 have this value and Minnesota has 97/117 reporting this value. The anemia values in each state also have a few missing values that Medicare has coded N/A. There were 14 missing values in Georgia and 9 in Minnesota. For the adjusted Readmission value, in both Georgia and Minnesota, there is no value that received a vast majority in the frequency tables. 59/117 centers in Minnesota have a readmission value between 6.0 and 10.0, indicating higher than expected readmission rates. 152/331 centers in Georgia have readmission rates in the same range between 6.0 and 10.0. These values for both states are higher than I would have anticipated.

The results indicate several things. The first is that anemia management reporting scores are not all where they should be considering that dialysis centers are equipped, and function, to treat anemia in ESRD patients. Second, there is a fairly high frequency of centers in these two states with readmission rates that are higher than expected. While there is only 1 center in each state with an anemia score of 7, it is an interesting result that their SSR values are at 1.0 and 0.6 which indicates that readmission rates at these centers are better than anticipated. The results also show more Readmission values at higher than expected levels being reported from centers who have an anemia management score of 10.0.

## Interpretation

Based on the results from Georgia and Minnesota, there appears to be some relation between anemia management reporting scores and readmission rates, but no definiteive association, causation, or correlation can be determined from the data. Indeed, as mentioned in the results section, the 2 centers with the lowest reported anemia value of 7.0 had a readmission score that was at or below the expected value. Adjusting the SSR into a readmission value that was scaled from 1 to 10 made those results easier to see and analyze. For better analysis of this data, the same needs to coccur for the anemia values. Since the majority of anemia values are at a 10.0, a better way to truly stratify those results would be to change the measurement where a 10.0 would have to be the value reported only if truly optimal results are obtained.

## Data Dictionary

The memisc package was installed so that a data dictionary could be produced on the datasets. Below is the information provided by the data dictionary in R chunks.

Hmisc::describe(Anemia)

## Anemia   
##   
## 13 Variables 453 Observations  
## ---------------------------------------------------------------------------  
## Facility Name   
## n missing distinct   
## 453 0 439   
##   
## lowest : ABERCORN DIALYSIS ALTRU HEALTH SYSTEM RENAL DIALYSIS AT LIFECARE ALTRU HEALTH SYSTEM RENAL DIALYSIS CROOKSTON AMERICUS DIALYSIS ARA AUGUSTA LLC   
## highest: WILLIAMS STREET DIALYSIS WINONA HEALTH SERVICES WOODBURY DIALYSIS OF DAVITA WRIGHTSVILLE DIALYSIS WYLDS ROAD DIALYSIS   
## ---------------------------------------------------------------------------  
## CMS Certification Number (CCN)   
## n missing distinct Info Mean Gmd .05 .10   
## 453 0 453 1 154467 64733 112525 112562   
## .25 .50 .75 .90 .95   
## 112659 112795 242502 242584 243522   
##   
## Value 110000 240000 850000  
## Frequency 331 117 5  
## Proportion 0.731 0.258 0.011  
## ---------------------------------------------------------------------------  
## Alternate CCN 1   
## n missing distinct   
## 453 0 20   
##   
## - (434, 0.958), 110038 (1, 0.002), 110095 (1, 0.002), 110104 (1, 0.002),  
## 110105 (1, 0.002), 240010 (1, 0.002), 240022 (1, 0.002), 240030 (1,  
## 0.002), 240044 (1, 0.002), 240049 (1, 0.002), 240061 (1, 0.002), 240088  
## (1, 0.002), 240093 (1, 0.002), 240101 (1, 0.002), 241320 (1, 0.002),  
## 241342 (1, 0.002), 241347 (1, 0.002), 241370 (1, 0.002), 242316 (1,  
## 0.002), 245470 (1, 0.002)  
## ---------------------------------------------------------------------------  
## Address1   
## n missing distinct   
## 453 0 452   
##   
## lowest : 1000 COWLES CLINIC WAY, SUITE S-100 1000 TELFAIR ST 1002 BOULDER DRIVE 1002 WILLIAMS ST 1009 PROFESSIONAL BLVD   
## highest: BUSINESS HIGHWAY 371 D/B/A PERRY DIALYSIS CENTER DIALYSIS UNIT HEALTH PLAZA DIALYSIS RED LAKE HOSPITAL   
## ---------------------------------------------------------------------------  
## Address2   
## n missing distinct   
## 453 0 68   
##   
## lowest : - 1027 KEITH DR 1279 HWY 54 WEST #110 1ST FLOOR 2024 SOUTH 6TH ST   
## highest: SUITE B - 100 SUITE C SUITE E SUITE F SUITE X126   
## ---------------------------------------------------------------------------  
## City   
## n missing distinct   
## 453 0 224   
##   
## lowest : ACWORTH ADEL ALBANY ALBERT LEA ALEXANDRIA   
## highest: WOODBURY WOODSTOCK WORTHINGTON WRIGHTSVILLE WYOMING   
## ---------------------------------------------------------------------------  
## State   
## n missing distinct   
## 453 0 2   
##   
## Value GA MN  
## Frequency 336 117  
## Proportion 0.742 0.258  
## ---------------------------------------------------------------------------  
## Zip Code   
## n missing distinct Info Mean Gmd .05 .10   
## 453 0 296 1 37224 10088 30035 30078   
## .25 .50 .75 .90 .95   
## 30269 30906 55021 55453 56266   
##   
## lowest : 30004 30012 30013 30014 30016, highest: 56633 56671 56701 56716 56751  
## ---------------------------------------------------------------------------  
## Network   
## n missing distinct Info Mean Gmd   
## 453 0 2 0.575 7.291 1.92   
##   
## Value 6 11  
## Frequency 336 117  
## Proportion 0.742 0.258  
## ---------------------------------------------------------------------------  
## Measure Name   
## n missing distinct value   
## 453 0 1 ANEMIA MANAGEMENT   
##   
## Value ANEMIA MANAGEMENT  
## Frequency 453  
## Proportion 1  
## ---------------------------------------------------------------------------  
## Anemia Management Reporting Score   
## n missing distinct Info Mean Gmd   
## 424 29 4 0.245 9.882 0.2191   
##   
## Value 7 8 9 10  
## Frequency 2 8 28 386  
## Proportion 0.005 0.019 0.066 0.910  
## ---------------------------------------------------------------------------  
## State Avg Anemia Management Reporting Score   
## n missing distinct Info Mean Gmd   
## 453 0 1 0 10 0   
##   
## Value 10  
## Frequency 453  
## Proportion 1  
## ---------------------------------------------------------------------------  
## National Avg Anemia Management Reporting Score   
## n missing distinct Info Mean Gmd   
## 453 0 1 0 10 0   
##   
## Value 10  
## Frequency 453  
## Proportion 1  
## ---------------------------------------------------------------------------

Hmisc::describe(Readmissions)

## Readmissions   
##   
## 15 Variables 453 Observations  
## ---------------------------------------------------------------------------  
## Facility Name   
## n missing distinct   
## 453 0 439   
##   
## lowest : ABERCORN DIALYSIS ALTRU HEALTH SYSTEM RENAL DIALYSIS AT LIFECARE ALTRU HEALTH SYSTEM RENAL DIALYSIS CROOKSTON AMERICUS DIALYSIS ARA AUGUSTA LLC   
## highest: WILLIAMS STREET DIALYSIS WINONA HEALTH SERVICES WOODBURY DIALYSIS OF DAVITA WRIGHTSVILLE DIALYSIS WYLDS ROAD DIALYSIS   
## ---------------------------------------------------------------------------  
## CMS Certification Number (CCN)   
## n missing distinct Info Mean Gmd .05 .10   
## 453 0 453 1 154467 64733 112525 112562   
## .25 .50 .75 .90 .95   
## 112659 112795 242502 242584 243522   
##   
## Value 110000 240000 850000  
## Frequency 331 117 5  
## Proportion 0.731 0.258 0.011  
## ---------------------------------------------------------------------------  
## Alternate CCN 1   
## n missing distinct   
## 453 0 20   
##   
## - (434, 0.958), 110038 (1, 0.002), 110095 (1, 0.002), 110104 (1, 0.002),  
## 110105 (1, 0.002), 240010 (1, 0.002), 240022 (1, 0.002), 240030 (1,  
## 0.002), 240044 (1, 0.002), 240049 (1, 0.002), 240061 (1, 0.002), 240088  
## (1, 0.002), 240093 (1, 0.002), 240101 (1, 0.002), 241320 (1, 0.002),  
## 241342 (1, 0.002), 241347 (1, 0.002), 241370 (1, 0.002), 242316 (1,  
## 0.002), 245470 (1, 0.002)  
## ---------------------------------------------------------------------------  
## Address 1   
## n missing distinct   
## 453 0 452   
##   
## lowest : 1000 COWLES CLINIC WAY, SUITE S-100 1000 TELFAIR ST 1002 BOULDER DRIVE 1002 WILLIAMS ST 1009 PROFESSIONAL BLVD   
## highest: BUSINESS HIGHWAY 371 D/B/A PERRY DIALYSIS CENTER DIALYSIS UNIT HEALTH PLAZA DIALYSIS RED LAKE HOSPITAL   
## ---------------------------------------------------------------------------  
## Address 2   
## n missing distinct   
## 453 0 68   
##   
## lowest : - 1027 KEITH DR 1279 HWY 54 WEST #110 1ST FLOOR 2024 SOUTH 6TH ST   
## highest: SUITE B - 100 SUITE C SUITE E SUITE F SUITE X126   
## ---------------------------------------------------------------------------  
## City   
## n missing distinct   
## 453 0 224   
##   
## lowest : ACWORTH ADEL ALBANY ALBERT LEA ALEXANDRIA   
## highest: WOODBURY WOODSTOCK WORTHINGTON WRIGHTSVILLE WYOMING   
## ---------------------------------------------------------------------------  
## State   
## n missing distinct   
## 453 0 2   
##   
## Value GA MN  
## Frequency 336 117  
## Proportion 0.742 0.258  
## ---------------------------------------------------------------------------  
## Zip Code   
## n missing distinct Info Mean Gmd .05 .10   
## 453 0 296 1 37224 10088 30035 30078   
## .25 .50 .75 .90 .95   
## 30269 30906 55021 55453 56266   
##   
## lowest : 30004 30012 30013 30014 30016, highest: 56633 56671 56701 56716 56751  
## ---------------------------------------------------------------------------  
## Network   
## n missing distinct Info Mean Gmd   
## 453 0 2 0.575 7.291 1.92   
##   
## Value 6 11  
## Frequency 336 117  
## Proportion 0.742 0.258  
## ---------------------------------------------------------------------------  
## Measure Name   
## n missing distinct value   
## 453 0 1 SRR   
##   
## Value SRR  
## Frequency 453  
## Proportion 1  
## ---------------------------------------------------------------------------  
## Achievement Measure Rate   
## n missing distinct value   
## 453 0 1 -   
##   
## Value -  
## Frequency 453  
## Proportion 1  
## ---------------------------------------------------------------------------  
## Achievement Measure Ratio   
## n missing distinct Info Mean Gmd .05 .10   
## 420 33 113 1 0.943 0.3105 0.4795 0.6290   
## .25 .50 .75 .90 .95   
## 0.7600 0.9300 1.1425 1.2900 1.3700   
##   
## lowest : 0.00 0.17 0.21 0.23 0.28, highest: 1.56 1.59 1.67 1.68 1.83  
## ---------------------------------------------------------------------------  
## SRR Measure Score   
## n missing distinct Info Mean Gmd .05 .10   
## 420 33 11 0.991 5.169 3.659 0 0   
## .25 .50 .75 .90 .95   
## 3 6 8 10 10   
##   
## Value 0 1 2 3 4 5 6 7 8 9  
## Frequency 47 26 30 38 35 32 49 48 40 29  
## Proportion 0.112 0.062 0.071 0.090 0.083 0.076 0.117 0.114 0.095 0.069  
##   
## Value 10  
## Frequency 46  
## Proportion 0.110  
## ---------------------------------------------------------------------------  
## State Avg SRR Measure Score   
## n missing distinct Info Mean Gmd   
## 453 0 2 0.575 5.258 0.384   
##   
## Value 5 6  
## Frequency 336 117  
## Proportion 0.742 0.258  
## ---------------------------------------------------------------------------  
## National Avg SRR Measure Score   
## n missing distinct Info Mean Gmd   
## 453 0 1 0 5 0   
##   
## Value 5  
## Frequency 453  
## Proportion 1  
## ---------------------------------------------------------------------------

Hmisc::describe(GA\_Only)

## GA\_Only   
##   
## 2 Variables 331 Observations  
## ---------------------------------------------------------------------------  
## Anemia   
## n missing distinct Info Mean Gmd   
## 317 14 4 0.234 9.896 0.1938   
##   
## Value 7 8 9 10  
## Frequency 1 4 22 290  
## Proportion 0.003 0.013 0.069 0.915  
## ---------------------------------------------------------------------------  
## Readmit   
## n missing distinct Info Mean Gmd .05 .10   
## 315 16 11 0.991 4.994 3.658 0 0   
## .25 .50 .75 .90 .95   
## 2 5 8 9 10   
##   
## Value 0 1 2 3 4 5 6 7 8 9  
## Frequency 37 21 25 32 24 24 37 35 27 23  
## Proportion 0.117 0.067 0.079 0.102 0.076 0.076 0.117 0.111 0.086 0.073  
##   
## Value 10  
## Frequency 30  
## Proportion 0.095  
## ---------------------------------------------------------------------------

Hmisc::describe(MN\_Only)

## MN\_Only   
##   
## 2 Variables 117 Observations  
## ---------------------------------------------------------------------------  
## Anemia   
## n missing distinct Info Mean Gmd   
## 107 10 4 0.278 9.841 0.2948   
##   
## Value 7 8 9 10  
## Frequency 1 4 6 96  
## Proportion 0.009 0.037 0.056 0.897  
## ---------------------------------------------------------------------------  
## Readmit   
## n missing distinct Info Mean Gmd .05 .10   
## 105 12 11 0.988 5.695 3.609 0 1   
## .25 .50 .75 .90 .95   
## 4 6 8 10 10   
##   
## Value 0 1 2 3 4 5 6 7 8 9  
## Frequency 10 5 5 6 11 8 12 13 13 6  
## Proportion 0.095 0.048 0.048 0.057 0.105 0.076 0.114 0.124 0.124 0.057  
##   
## Value 10  
## Frequency 16  
## Proportion 0.152  
## ---------------------------------------------------------------------------

## Limitations

The majority of anemia scores made reading the plots, graphs, etc. somewhat difficult to interpret. In future studies, better data may be obtained by examining all states within a network, or even all states if that data analysis is possible. Confounder variables were not factored in to the hypothesis or outcome results.

## Conclusions

Although there appears to be some possible association with anemia scores and readmission rates, the data available from Georgia and Minnesota does not give conclusive evidence to this statement. It is possible that better conclusions can be made with an anemia score system that is more specific in performance, which would hopefully delineate the results beyond the overwhelming majority reporting a 10.0 score. Regression models that account for variables contributing to either confounding and/or effect size may be useful in further determining a cause for higher than expected readmission rates. This step seems possible in future research because there are many other Medicare datasets available with other variables that are measured and reported from dialysis centers. It was an interesting conclusion that was observed showing that, although the majority of centers have an anemia score of 10.0, the SRR and Readmission values varied widely from well above the expected number to well below the expected number. I assert that a more detailed analysis is needed on multiple states from the various USRDS networks as well on the other variables available for analysis from Medicare to further explore association between anemia and readmission. I also assert that a modified anemia management scale is necessary to clarify results.

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