Anexo - Código de R

Tesina: Rendimiento pronóstico de subrogados clínicos para estimar la acumulación de tejido adiposo visceral en la predicción de mortalidad por causas cardiovasculares en participantes de la Cohorte de la Ciudad de México

Neftali Eduardo Antonio Villa

2023-05-08

Bibliotecas de Datos

```r
library(dplyr)
library(tidyverse)
library(ggthemes)
library(ggpubr)
library(readr)
library(survival)
library(jtools)
library(gtsummary)
library(data.table)
library(epiR)
library(riskRegression)
library(prodlim)
library(survival)
library(cmprsk)
library(lava)
library(ggplot2)
library(MASS)
library(treemapify)
library("maxstat")
library("survival")
library(survminer)
library("survival")
library(rms)
library(pec)
```

Bibliotecas de Datos

```
base <- read_csv("~/Library/CloudStorage/OneDrive-UNIVERSIDADNACIONALAUTÓNOMADEMÉXICO/PROY
base.mort <- read_csv("/Users/nefoantonio/Library/CloudStorage/OneDrive-UNIVERSIDADNACIONA
base.mrn <- read_csv("/Users/nefoantonio/Library/CloudStorage/OneDrive-UNIVERSIDADNACIONAL
base.rsv <- read_csv("/Users/nefoantonio/Library/CloudStorage/OneDrive-UNIVERSIDADNACIONAL
base.edu <- read_csv("~/Library/CloudStorage/OneDrive-UNIVERSIDADNACIONALAUTÓNOMADEMÉXICO/
base.ids <- read_csv("~/Library/CloudStorage/OneDrive-UNIVERSIDADNACIONALAUTÓNOMADEMÉXICO/

base <- base %>%
  left_join(base.mort, by="PATID") %>%
  left_join(base.mrn, by="PATID") %>%
  left_join(base.rsv, by="PATID") %>%
  left_join(base.edu, by="PATID") %>%
  left_join(base.ids, by="PATID")
```

Recodificación de Variables

```
#Mean SBP
base$PAS_PROM<-rowMeans(as.matrix(base%>%dplyr::select(SBP1,SBP2,SBP3)))

#Mean DBP
base$PAD_PROM<-rowMeans(as.matrix(base%>%dplyr::select(DBP1,DBP2,DBP3)))

#Diabetes
base$DIABETES_FINAL<-NULL
base$DIABETES_FINAL[base$BASE_DIABETES==1 |
                      base$DRUG_D1 == 1 |
                      base$DRUG_D2 == 1 |
                      base$DRUG_D3 == 1 |
                      base$DRUG_D4 == 1 |
                      base$BASE_HBA1C >= 6.5]<-1
base$DIABETES_FINAL<-na.tools::na.replace(base$DIABETES_FINAL,0)

#Cardiovascular Disease
base$CVD_BASAL<-NULL
base$CVD_BASAL[base$BASE_HEARTATTACK==1 |
                 base$BASE_ANGINA==1 |
                 base$BASE_STROKE==1]<-1
base$CVD_BASAL<-na.tools::na.replace(base$CVD_BASAL,0)
```

```r
#Hypertension Definition
base$HAS_FINAL<-NULL
base$HAS_FINAL[base$BASE_HYPERTENSION==1 |
                 base$DRUG_A1 == 1 |
                 base$DRUG_A2 == 1 |
                 base$DRUG_A3 == 1 |
                 base$DRUG_A4 == 1 |
                 base$DRUG_A5 == 1 |
                 base$DRUG_A6 == 1 |
                 base$DRUG_A7 == 1 |
                 base$DRUG_A8 == 1 |
                 base$DRUG_A9 == 1 |
                 base$DRUG_A10 == 1 |
                 base$DRUG_A11 == 1 |
                 base$PAS_PROM >= 140 | base$PAD_PROM >= 90]<-1
base$HAS_FINAL<-na.tools::na.replace(base$HAS_FINAL,0)

#CVD DEATHS
base$VASC_NON_CARD<-NULL
base$VASC_NON_CARD[base$D011==1]<-1
base$VASC_NON_CARD[base$D012==1]<-1
base$VASC_NON_CARD[is.na(base$VASC_NON_CARD)]<-0

## Numeric Variables
base$IMC<-base$WEIGHT/((base$HEIGHT/100)^2)
base$ICE<-base$WAISTC/base$HEIGHT

#Transform Laboratories to mg/dl
base$Glc_mgdl<-base$Glc*18;base$Glc_mgdl[base$Glc_mgdl<=0]<-NA
base$Serum_TG_mgdl<-base$Serum_TG*88.57;base$Serum_TG_mgdl[base$Serum_TG_mgdl<=0]<-NA
base$HDL_C_mgdl<-base$HDL_C*38.67;base$HDL_C_mgdl[base$HDL_C_mgdl<=0]<-NA
base$LDL_C_mgdl<-base$LDL_C*38.67;base$LDL_C_mgdl[base$LDL_C_mgdl<=0]<-NA

## Log Transform Income

base$INCOME_LN<-log(base$INCOME+1)

#Education Recode
base$EDUGP_2<-NULL
base$EDUGP_2[base$EDUGP==1]<-1
base$EDUGP_2[base$EDUGP==2]<-1
```

```r
base$EDUGP_2[base$EDUGP==3]<-1

base$EDUGP_2[base$EDUGP==4]<-2
base$EDUGP_2[base$EDUGP==5]<-2
base$EDUGP_2[base$EDUGP==6]<-2

base$EDUGP_2[base$EDUGP==7]<-3
base$EDUGP_2[base$EDUGP==8]<-3
base$EDUGP_2[base$EDUGP==9]<-3

base$EDUGP_2[base$EDUGP==10]<-4
base$EDUGP_2[base$EDUGP==11]<-4
base$EDUGP_2[base$EDUGP==12]<-4
base$EDUGP_2[base$EDUGP==13]<-4

base$EDAD_CAT<-NULL
base$EDAD_CAT[base$AGE<45]<-1
base$EDAD_CAT[base$AGE>=45 & base$AGE<65]<-2
base$EDAD_CAT[base$AGE>=65]<-3

## Transform selected numeric to factors
base$EDAD_CAT<-factor(base$EDAD_CAT,labels = c("<45","45-65",">65"))
base$COYOACAN<- factor(base$COYOACAN,levels = c(0,1),labels = c("Iztapalapa","Coyoacan"))
base$EDU_LEVEL<- factor(base$EDU_LEVEL,levels = c(1:4),labels = c("University/College","Hi
base$EDUGP<- factor(base$EDUGP,levels = c(1:13),labels = c("Illiterate",
                                                          "Knows how to read",
                                                          "Knows how to read and write",
                                                          "Incomplete elementary",
                                                          "Complete elementary",
                                                          "Tecnical Studies with complete
                                                          "Incomplete high School",
                                                          "Complete high School",
                                                          "Tecnical Studies with complete
                                                          "Collegue",
                                                          "Tecnical Studies with complete
                                                          "Incomplete univesity",
                                                          "Complete univesity"))


base$EDUGP_2<- factor(base$EDUGP_2,labels = c("Illiterate or Non-proper education",
                                             "Elementary",
```

```
                                                    "High School",
                                                    "Collegue"))

## Ocupation Categories
base$OCCUPATION_REC<-NULL

base$OCCUPATION_REC[base$OCCUPATION==10]<-1
base$OCCUPATION_REC[base$OCCUPATION==11]<-1
base$OCCUPATION_REC[base$OCCUPATION==1]<-1
base$OCCUPATION_REC[base$OCCUPATION==13]<-1
base$OCCUPATION_REC[base$OCCUPATION==14]<-1

base$OCCUPATION_REC[base$OCCUPATION==2]<-2
base$OCCUPATION_REC[base$OCCUPATION==3]<-2
base$OCCUPATION_REC[base$OCCUPATION==4]<-2
base$OCCUPATION_REC[base$OCCUPATION==6]<-2
base$OCCUPATION_REC[base$OCCUPATION==16]<-2
base$OCCUPATION_REC[base$OCCUPATION==19]<-2
base$OCCUPATION_REC[base$OCCUPATION==17]<-2
base$OCCUPATION_REC[base$OCCUPATION==18]<-2
base$OCCUPATION_REC[base$OCCUPATION==12]<-2

base$OCCUPATION_REC[base$OCCUPATION==7]<-3
base$OCCUPATION_REC[base$OCCUPATION==8]<-3
base$OCCUPATION_REC[base$OCCUPATION==5]<-3
base$OCCUPATION_REC[base$OCCUPATION==20]<-3

base$OCCUPATION_REC[base$OCCUPATION==15]<-4
base$OCCUPATION_REC[base$OCCUPATION==21]<-4

base$OCCUPATION_REC<-factor(base$OCCUPATION_REC,levels = c(1:4),labels = c("Private Employ
                                                                          "Blue-Collar Wo
                                                                          "Public Sector 
                                                                          "Retired or Une

#Health Provider
base$HEALTH_PROVIDER_2<-NULL
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==1]<-1
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==2]<-1
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==3]<-1
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==4]<-1
```

```
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==5]<-1
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==6]<-1
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==7]<-1
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==8]<-2
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==9]<-2
base$HEALTH_PROVIDER_2[base$HEALTH_PROVIDER==10]<-3
base$HEALTH_PROVIDER_2[is.na(base$HEALTH_PROVIDER)]<-4
base$HEALTH_PROVIDER_2<-factor(base$HEALTH_PROVIDER_2,labels = c("Public HC","Private HC",


#Alcohol Intake
base$ALCGP<-factor(base$ALCGP,labels = c("Never","Former",">3 times a month", ">2 times a

#Physical Activity
base$PHYSGP<-factor(base$PHYSGP,labels = c("None", ">2 times a week",">3 times a week"))

#Visceral Adiposiy Metrics

#METS_IR
base$METS_IR<-((log((2*base$Glc_mgdl)+base$Serum_TG_mgdl)*base$IMC))/(log(base$HDL_C_mgdl)

#METS_VF
base$METSVF<-(4.466+0.011*(log(base$METS_IR)^3)+3.239*(log(base$ICE)^3)+0.319*(base$MALE)
              +0.594*(log(base$AGE)))

#Grasa Visceral
base$VAT_METS<-exp(base$METSVF)

#Indices
base<-base %>%
  mutate(DAAT_index = if_else(MALE >= 1,
                              (-382.9+(1.09*base$WEIGHT)+(6.04*base$WAISTC)+(-2.29*base$IM
                              (-278+(-0.86*base$WEIGHT)+(5.19*base$WAISTC))),
         Depres_index = if_else(MALE >= 1,
                                (-225.39 +(2.125*base$AGE)+(2.843*base$WAISTC)),
                                NA),
         VAI_index = if_else(MALE >= 1,
                             ((base$WAISTC/(39.68+(1.88*base$IMC)))*(base$Serum_TG/1.03)*(
                             ((base$WAISTC/(36.58+(1.89*base$IMC)))*(base$Serum_TG/0.81)*(
         VAI_GEA_index = if_else(MALE >= 1,
                                 ((base$WAISTC/(22.79+(2.68*base$IMC)))*(base$Serum_TG/1.3
```

```
                              ((base$WAISTC/(24.02+(2.37*base$IMC)))*(base$Serum_TG/1.3
           LAAP_index = if_else(MALE >= 1,
                             ((base$WAISTC-65)*base$Serum_TG),
                             ((base$WAISTC-58)*base$Serum_TG)),
           EVA_index = if_else(MALE >= 1,
                            ((1.28*base$AGE)+(4.12*base$WAISTC)-(0.53*base$HDL_C_mgdl)+(0
                            ((1.26*base$AGE)+(1.89*base$IMC)+(2.16*base$WAISTC)-(0.43*bas
```

Etiqueta de Variables

```
setattr(base$AGE, "label", "Edad, (Años)")
setattr(base$MALE, "label", "Sexo, (%)")
setattr(base$COYOACAN, "label", "Municipio, (%)")
setattr(base$EDU_LEVEL, "label", "Educación, (%)")
setattr(base$INCOME, "label", "Ingreso, (pesos/month)")
setattr(base$HEALTH_PROVIDER_2, "label", "Provedor de Servicios de Salud, (%)")
setattr(base$OCCUPATION_REC, "label", "Ocupación, (%)")
setattr(base$EVER_SMOK, "label", "Tabaquismo, (%)")
setattr(base$ALCGP, "label", "Habitos de Consumo de Alcohol, (%)")
setattr(base$PHYSGP, "label", "Actividad Física, (%)")
setattr(base$IMC, "label", "Indice de Masa Corporal, (kg/m2)")
setattr(base$ICE, "label", "Waist-to-Height Ratio, (%)")
setattr(base$HIPC, "label", "Hip Circunference, (cm)")
setattr(base$PAS_PROM, "label", "PAS, (mmHg)")
setattr(base$PAD_PROM, "label", "TAD, (mmHg)")
setattr(base$BASE_HBA1C, "label", "HbA1c, (%)")
setattr(base$Glc_mgdl, "label", "Glucose, (mg/dl)")
setattr(base$Serum_TG_mgdl, "label", "Trigliceridos, (mg/dl)")
setattr(base$HDL_C_mgdl, "label", "HDL-C, (mg/dl)")
setattr(base$LDL_C_mgdl, "label", "LDL-C, (mg/dl)")
```

Etiqueta de Variables

```
base.2<-base%>%
  dplyr::filter(DIABETES_FINAL!=1)%>%
  dplyr::filter(CVD_BASAL!=1)%>%
  dplyr::filter(CVD_BASAL!=1)%>%
  dplyr::filter(AGE<80)%>%
```

```
  dplyr::filter(IMC<40)%>%
  dplyr::filter(IMC>=18.5)%>%
  dplyr::mutate(Depres.meanval = mean(Depres_index,na.rm = T), Depres.stdev = sd(Depres_in
                DAAT.meanval = mean(DAAT_index,na.rm = T), DAAT.stdev = sd(DAAT_index,na.r
                LAAP.meanval = mean(LAAP_index,na.rm = T), LAAP.stdev = sd(LAAP_index,na.r
                EVA.meanval = mean(EVA_index,na.rm = T), EVA.stdev = sd(EVA_index,na.rm =
                METS.meanval = mean(METSVF,na.rm = T), METS.stdev = sd(METSVF,na.rm = T),
                DAI.meanval = mean(VAI_GEA_index,na.rm = T), DAI.stdev = sd(VAI_GEA_index,

nrow(base.2)
```

```
[1] 117739
```

```
base.2<-base.2%>%
  dplyr::filter(!is.na(VAI_index))%>%
  dplyr::filter(!is.na(EVA_index))%>%
  dplyr::filter(!is.na(PERSON_YEARS))%>%
  dplyr::filter(STATUS!="U")%>%
  dplyr::filter(abs((DAAT_index-DAAT.meanval)/DAAT.stdev)<3)%>%
  dplyr::filter(abs((LAAP_index-LAAP.meanval)/LAAP.stdev)<3)%>%
  dplyr::filter(abs((EVA_index-EVA.meanval)/EVA.stdev)<3)%>%
  dplyr::filter(abs((METSVF-METS.meanval)/METS.stdev)<3)%>%
  dplyr::filter(abs((VAI_GEA_index-DAI.meanval)/DAI.stdev)<3)

nrow(base.2)
```

```
[1] 29034
```

Resultados: Capitulo 3 - Proceso de selección de participantes integrantes de la muestra de estudio

```
#Se corrobora que no se tengan datos perdidos en los estimadores de adiposidad
#visceral

sum(is.na(base.2$Depres_index))
```

```
[1] 18441
```

```r
sum(is.na(base.2$DAAT_index))
```

```
[1] 0
```

```r
sum(is.na(base.2$LAAP_index))
```

```
[1] 0
```

```r
sum(is.na(base.2$VAI_index))
```

```
[1] 0
```

```r
sum(is.na(base.2$EVA_index))
```

```
[1] 0
```

```r
sum(is.na(base.2$METSVF))
```

```
[1] 0
```

```r
sum(is.na(base.2$VAI_GEA_index))
```

```
[1] 0
```

```r
sum(is.na(base.2$PERSON_YEARS))
```

```
[1] 0
```

Resultados: Capitulo 3 - Características descriptivas de la muestra de estudio

```r
t.0<-base.2 %>%
  dplyr::select(EDAD_CAT,AGE,COYOACAN,EDUGP_2,
                INCOME,OCCUPATION_REC,HEALTH_PROVIDER_2,
                EVER_SMOK,ALCGP,PHYSGP,
                IMC,ICE,HIPC,PAS_PROM,PAD_PROM,BASE_HBA1C,Glc_mgdl,Serum_TG_mgdl,HDL_C_mgd
  tbl_summary(missing = "no")%>%
  bold_labels()%>%
  modify_spanning_header(all_stat_cols() ~ "**Overall Sample**")%>%
  modify_table_body(
    dplyr::mutate,
    label = ifelse(label == "N missing (% missing)",
                   "Unknown",
                   label))


t1.1<-base.2 %>%
  dplyr::filter(MALE==1)%>%
  dplyr::select(EDAD_CAT,AGE,COYOACAN,EDUGP_2,
                INCOME,OCCUPATION_REC,HEALTH_PROVIDER_2,
                EVER_SMOK,ALCGP,PHYSGP,
                IMC,ICE,HIPC,PAS_PROM,PAD_PROM,BASE_HBA1C,Glc_mgdl,Serum_TG_mgdl,HDL_C_mgd
  tbl_summary(by = EDAD_CAT,missing = "no")%>%
  bold_labels()%>%
  modify_spanning_header(all_stat_cols() ~ "**Overall Sample**")%>%
  modify_table_body(
    dplyr::mutate,
    label = ifelse(label == "N missing (% missing)",
                   "Unknown",
                   label))

t1.2<-base.2 %>%
  dplyr::filter(MALE!=1)%>%
  dplyr::select(EDAD_CAT,AGE,COYOACAN,EDUGP_2,
                INCOME,OCCUPATION_REC,HEALTH_PROVIDER_2,
                EVER_SMOK,ALCGP,PHYSGP,
                IMC,ICE,HIPC,PAS_PROM,PAD_PROM,BASE_HBA1C,Glc_mgdl,Serum_TG_mgdl,HDL_C_mgd
  tbl_summary(by = EDAD_CAT,missing = "no")%>%
  bold_labels()%>%
  modify_spanning_header(all_stat_cols() ~ "**Overall Sample**")%>%
  modify_table_body(
    dplyr::mutate,
```

```
    label = ifelse(label == "N missing (% missing)",
                   "Unknown",
                   label))

tbl_merge(
  tbls = list(t.0,t1.1, t1.2),
  tab_spanner = c("Muestra Total (n=29,034)","**Hombres (n=10,593)**", "**Mujeres (n=18,44
```

Characteristic	**N = 29,034**	**<45**, N = 4,314	**45-65**, N = 4,760	**>65**, N = 1,519	**<45**, N = 7,737	**45-65**, N = 8,385	**>65**, N = 2,319
EDAD_CAT							
<45	12,051 (42%)						
45-65	13,145 (45%)						
>65	3,838 (13%)						
Edad, (Años)	47 (40, 57)	39 (37, 41)	53 (48, 58)	70 (67, 74)	39 (37, 42)	52 (48, 57)	70 (67, 74)
Municipio, (%)							
Iztapalapa	2,898 (10.0%)	368 (8.5%)	409 (8.6%)	162 (11%)	829 (11%)	847 (10%)	283 (12%)
Coyoacan	26,136 (90%)	3,946 (91%)	4,351 (91%)	1,357 (89%)	6,908 (89%)	7,538 (90%)	2,036 (88%)
EDUGP_2							
Illiterate or Non-proper education	3,481 (12%)	88 (2.1%)	420 (8.9%)	441 (29%)	317 (4.1%)	1,320 (16%)	895 (39%)
Elementary	13,253 (46%)	1,085 (26%)	2,349 (50%)	794 (53%)	3,039 (40%)	4,818 (58%)	1,168 (51%)
High School	7,339 (25%)	1,559 (37%)	1,047 (22%)	163 (11%)	2,851 (37%)	1,533 (18%)	186 (8.0%)
Collegue	4,735 (16%)	1,516 (36%)	889 (19%)	113 (7.5%)	1,472 (19%)	682 (8.2%)	63 (2.7%)
Ingreso, (pesos/month)	1,000 (0, 2,354)	2,500 (1,500, 4,000)	2,000 (1,200, 3,500)	1,200 (500, 2,000)	0 (0, 1,600)	0 (0, 1,120)	0 (0, 600)
Ocupación, (%)							

Characteristic	**N = 29,034**	**<45**, N = 4,314	**45-65**, N = 4,760	**>65**, N = 1,519	**<45**, N = 7,737	**45-65**, N = 8,385	**>65**, N = 2,319
Private Employers and Professionals	3,998 (14%)	1,242 (29%)	1,007 (21%)	119 (7.8%)	1,022 (13%)	576 (6.9%)	32 (1.4%)
Blue-Collar Workers	18,874 (65%)	2,004 (47%)	2,151 (45%)	417 (27%)	5,541 (72%)	6,771 (81%)	1,990 (86%)
Public Sector Workers	3,738 (13%)	925 (21%)	922 (19%)	111 (7.3%)	1,089 (14%)	661 (7.9%)	30 (1.3%)
Retired or Unemployed	2,390 (8.2%)	137 (3.2%)	677 (14%)	871 (57%)	72 (0.9%)	368 (4.4%)	265 (11%)
Provedor de Servicios de Salud, (%)							
Public HC	1,350 (4.6%)	178 (4.1%)	186 (3.9%)	73 (4.8%)	393 (5.1%)	404 (4.8%)	116 (5.0%)
Private HC	407 (1.4%)	70 (1.6%)	75 (1.6%)	11 (0.7%)	127 (1.6%)	86 (1.0%)	38 (1.6%)
Non-Specified	58 (0.2%)	11 (0.3%)	8 (0.2%)	2 (0.1%)	15 (0.2%)	20 (0.2%)	2 (<0.1%)
Missing	27,219 (94%)	4,055 (94%)	4,491 (94%)	1,433 (94%)	7,202 (93%)	7,875 (94%)	2,163 (93%)
Tabaquismo, (%)	15,353 (53%)	3,412 (79%)	3,836 (81%)	1,220 (80%)	3,431 (44%)	2,850 (34%)	604 (26%)
Habitos de Consumo de Alcohol, (%)							
Never	4,679 (16%)	204 (4.7%)	157 (3.3%)	78 (5.1%)	1,643 (21%)	1,890 (23%)	707 (31%)
Former	1,639 (5.6%)	375 (8.7%)	398 (8.4%)	105 (6.9%)	346 (4.5%)	339 (4.0%)	76 (3.3%)
>3 times a month	7,483 (26%)	1,729 (40%)	1,964 (41%)	644 (42%)	1,241 (16%)	1,463 (17%)	442 (19%)
>2 times a week	13,195 (45%)	1,358 (31%)	1,587 (33%)	500 (33%)	4,247 (55%)	4,475 (53%)	1,028 (44%)
>3 times a week	2,026 (7.0%)	647 (15%)	651 (14%)	190 (13%)	259 (3.3%)	215 (2.6%)	64 (2.8%)
Actividad Física, (%)							
None	22,120 (76%)	2,730 (63%)	3,360 (71%)	1,123 (74%)	6,329 (82%)	6,758 (81%)	1,820 (78%)

Characteristic	**N = 29,034**	**<45**, N = 4,314	**45-65**, N = 4,760	**>65**, N = 1,519	**<45**, N = 7,737	**45-65**, N = 8,385	**>65**, N = 2,319
>2 times a week	2,509 (8.6%)	909 (21%)	570 (12%)	85 (5.6%)	383 (5.0%)	409 (4.9%)	153 (6.6%)
>3 times a week	4,398 (15%)	675 (16%)	829 (17%)	309 (20%)	1,023 (13%)	1,216 (15%)	346 (15%)
Indice de Masa Corporal, (kg/m2)	27.9 (25.3, 30.9)	27.0 (24.8, 29.6)	27.4 (25.2, 30.0)	26.7 (24.4, 29.1)	27.8 (25.2, 30.9)	29.0 (26.3, 32.1)	28.2 (25.5, 31.6)
Waist-to-Height Ratio, (%)	0.58 (0.54, 0.63)	0.56 (0.52, 0.59)	0.58 (0.55, 0.62)	0.59 (0.56, 0.63)	0.57 (0.53, 0.62)	0.61 (0.56, 0.66)	0.64 (0.59, 0.69)
Hip Circunference, (cm)	102 (97, 108)	100 (96, 104)	100 (96, 105)	99 (95, 104)	102 (97, 108)	105 (99, 111)	104 (98, 112)
PAS, (mmHg)	125 (117, 135)	123 (117, 130)	128 (120, 137)	135 (126, 146)	120 (111, 127)	127 (119, 137)	137 (127, 149)
TAD, (mmHg)	83 (77, 90)	83 (78, 89)	85 (80, 91)	85 (80, 91)	80 (73, 85)	83 (79, 90)	86 (80, 92)
HbA1c, (%)	5.35 (5.08, 5.54)	5.26 (4.99, 5.45)	5.35 (5.17, 5.63)	5.45 (5.17, 5.63)	5.17 (4.99, 5.35)	5.35 (5.17, 5.63)	5.54 (5.26, 5.72)
Glucose, (mg/dl)	55 (45, 65)	51 (41, 61)	55 (46, 67)	58 (49, 71)	52 (43, 61)	56 (47, 67)	61 (50, 73)
Trigliceridos, (mg/dl)	128 (104, 156)	134 (110, 164)	138 (112, 166)	125 (102, 151)	117 (95, 143)	130 (107, 157)	127 (105, 154)
HDL-C, (mg/dl)	40 (35, 45)	37 (33, 41)	37 (33, 41)	37 (33, 42)	41 (37, 46)	42 (37, 47)	43 (37, 48)
LDL-C, (mg/dl)	50 (40, 60)	50 (39, 60)	50 (39, 60)	48 (39, 58)	48 (39, 57)	52 (41, 62)	52 (41, 62)

Resultados: Capitulo 3 - Estimación de subrogados clínicos de adiposidad viscera

```
#METS-VF
Sup.Fig.1A<-base.2 %>%
  ggplot(aes(x = METSVF)) +
  geom_histogram(aes(y=..density..),fill="#e79b33",col="white", binwidth = 0.05) +
```

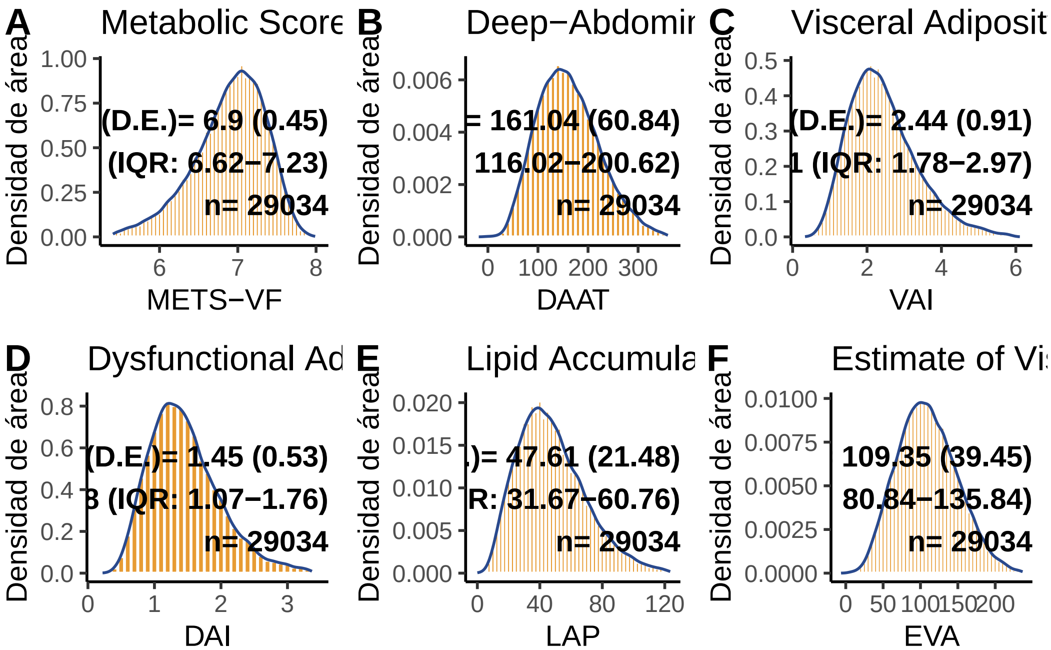
```r
  geom_density(col="#29498d")+
  labs(title = "Metabolic Score for Visceral Fat")+
  xlab ("METS-VF") +
  ylab ("Densidad de área") +
  theme_classic()

Sup.Fig.1A<-egg::tag_facet(Sup.Fig.1A, x = Inf, y = Inf,
               hjust = 1, open = "", close = "",
               tag_pool = c(paste0("Media (D.E.)= ", paste0(round(mean(base.2$METSVF),2),"
                                   "\nMediana (R.I.Q.)= ",  paste0(round(median(base.2$MET
                                   "\nn= ",nrow(base.2))))
```

```
Warning: The dot-dot notation (`..density..`) was deprecated in ggplot2 3.4.0.
i Please use `after_stat(density)` instead.
```

```r
#DAAT
Sup.Fig.1B<-base.2 %>%
  ggplot(aes(x = DAAT_index)) +
  geom_histogram(aes(y=..density..),fill="#e79b33",col="white", binwidth = 10) +
  geom_density(col="#29498d")+
  labs(title = "Deep-Abdominal-Adipose-Tissue")+
  xlab ("DAAT") +
  ylab ("Densidad de área") +
  theme_classic()


Sup.Fig.1B<-egg::tag_facet(Sup.Fig.1B, x = Inf, y = Inf,
                           hjust = 1, open = "", close = "",
                           tag_pool = c(paste0("Media (D.E.)= ", paste0(round(mean(base.2$
                                               "\nMediana (R.I.Q.)= ",  paste0(round(media
                                               "\nn= ",nrow(base.2))))

#VAI
Sup.Fig.1C<-base.2 %>%
  ggplot(aes(x = VAI_index)) +
  geom_histogram(aes(y=..density..),fill="#e79b33",col="white", binwidth = 0.1) +
  geom_density(col="#29498d")+
  labs(title = "Visceral Adiposity Index ")+
  xlab ("VAI") +
  ylab ("Densidad de área") +
  theme_classic()
```

```
Sup.Fig.1C<-egg::tag_facet(Sup.Fig.1C, x = Inf, y = Inf,
                           hjust = 1, open = "", close = "",
                           tag_pool = c(paste0("Media (D.E.)= ", paste0(round(mean(base.2$
                                                "\nMediana (R.I.Q.)= ",  paste0(round(media
                                                "\nn= ",nrow(base.2))))

#VAI-GEA
Sup.Fig.1D<-base.2 %>%
  ggplot(aes(x = VAI_GEA_index)) +
  geom_histogram(aes(y=..density..),fill="#e79b33",col="white", binwidth = 0.1) +
  geom_density(col="#29498d")+
  labs(title = "Dysfunctional Adiposity Index ")+
  xlab ("DAI") +
  ylab ("Densidad de área") +
  theme_classic()


Sup.Fig.1D<-egg::tag_facet(Sup.Fig.1D, x = Inf, y = Inf,
                           hjust = 1, open = "", close = "",
                           tag_pool = c(paste0("Media (D.E.)= ", paste0(round(mean(base.2$
                                                "\nMediana (R.I.Q.)= ",  paste0(round(media
                                                "\nn= ",nrow(base.2))))



#LAAP
Sup.Fig.1E<-base.2 %>%
  ggplot(aes(x = LAAP_index)) +
  geom_histogram(aes(y=..density..),fill="#e79b33",col="white", binwidth = 2.5) +
  geom_density(col="#29498d")+
  labs(title = "Lipid Accumulation Product")+
  xlab ("LAP") +
  ylab ("Densidad de área") +
  theme_classic()


Sup.Fig.1E<-egg::tag_facet(Sup.Fig.1E, x = Inf, y = Inf,
                           hjust = 1, open = "", close = "",
                           tag_pool = c(paste0("Media (D.E.)= ", paste0(round(mean(base.2$
                                                "\nMediana (R.I.Q.)= ",  paste0(round(media
                                                "\nn= ",nrow(base.2))))
```

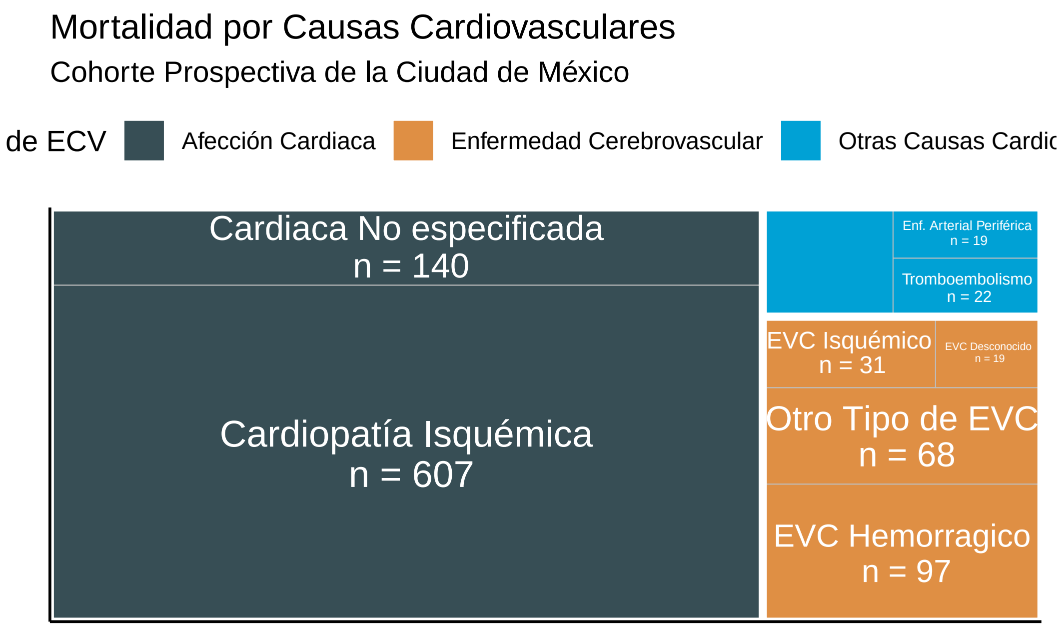
```
#EVA
Sup.Fig.1F<-base.2 %>%
  ggplot(aes(x = EVA_index)) +
  geom_histogram(aes(y=..density..),fill="#e79b33",col="white", binwidth = 5) +
  geom_density(col="#29498d")+
  labs(title = "Estimate of Visceral Adipose Tissue Area ")+
  xlab ("EVA") +
  ylab ("Densidad de área") +
  theme_classic()


Sup.Fig.1F<-egg::tag_facet(Sup.Fig.1F, x = Inf, y = Inf,
                           hjust = 1, open = "", close = "",
                           tag_pool = c(paste0("Media (D.E.)= ", paste0(round(mean(base.2$
                                               "\nMediana (R.I.Q.)= ",  paste0(round(media
                                               "\nn= ",nrow(base.2))))

ggarrange(Sup.Fig.1A,Sup.Fig.1B,Sup.Fig.1C,Sup.Fig.1D,Sup.Fig.1E,Sup.Fig.1F,ncol = 3,nrow
```



Resultados: Capitulo 3 - Evaluación de causas de muerte cardiovascular

```
df<- data.frame(CLUSTERS=c("Afección Cardiaca",
                           "Afección Cardiaca",
                           "Enfermedad Cerebrovascular",
                           "Enfermedad Cerebrovascular",
                           "Enfermedad Cerebrovascular",
                           "Enfermedad Cerebrovascular",
                           "Otras Causas Cardiovasculares",
                           "Otras Causas Cardiovasculares",
                           "Otras Causas Cardiovasculares"),
                prevalence=c(table(base.2$D001)[2],
                             table(base.2$D002)[2],
                             table(base.2$D004)[2],
                             table(base.2$D005)[2],
                             table(base.2$D006)[2],
                             table(base.2$D007)[2],
                             table(base.2$D009)[2],
                             table(base.2$D010)[2],
                             table(base.2$D011)[2]),
                hemisphere=c("Afección Cardiaca",
                             "Afección Cardiaca",
                             "Enfermedad Cerebrovascular",
                             "Enfermedad Cerebrovascular",
                             "Enfermedad Cerebrovascular",
                             "Enfermedad Cerebrovascular",
                             "Otras Causas Cardiovasculares",
                             "Otras Causas Cardiovasculares",
                             "Otras Causas Cardiovasculares"),
                labels=c(paste0("Cardiopatía Isquémica\n n = ",table(base.2$D001)[2]),
                         paste0("Cardiaca No especificada\n n = ",table(base.2$D002)[2]),
                         paste0("EVC Isquémico\n n = ",table(base.2$D004)[2]),
                         paste0("EVC Hemorragico\n n = ",table(base.2$D005)[2]),
                         paste0("EVC Desconocido\n n = ",table(base.2$D006)[2]),
                         paste0("Otro Tipo de EVC\n n = ",table(base.2$D007)[2]),
                         paste0("Tromboembolismo\n n = ",table(base.2$D009)[2]),
                         paste0("Enf. Arterial Periférica\n n = ",table(base.2$D010)[2]),
                         paste0("Otras Muertes No Especificadas\n n = ",table(base.2$D011)


ggplot2::ggplot(df,aes(area=prevalence,
```

```
                        fill=CLUSTERS,
                        label=labels,
                        subgroup = hemisphere))+
    treemapify::geom_treemap(layout="squarified")+
    geom_treemap_subgroup_border(colour = "white")+
    geom_treemap_text(place = "centre",size = 14,colour = "white")+
    labs(fill="Grupo de ECV",title = "Mortalidad por Causas Cardiovasculares",subtitle = "Co
    ggsci::scale_fill_jama()+
    theme_classic()+
    xlab("")+
    ylab("")+
    theme(legend.position = "top")
```



Resultados: Capitulo 3 - Resultados del modelaje de riesgos competitivos

```
#Muerte All Vascular
base.2$MUERTE_VASCULAR
```

```
Warning: Unknown or uninitialised column: `MUERTE_VASCULAR`.
```

```
NULL
```

```r
base.2$MUERTE_VASCULAR[base.2$STATUS=="A" & base.2$D015==0]<-0
```

```
Warning: Unknown or uninitialised column: `MUERTE_VASCULAR`.
```

```r
base.2$MUERTE_VASCULAR[base.2$STATUS=="D" & base.2$D015==1]<-1
base.2$MUERTE_VASCULAR[base.2$STATUS=="D" & base.2$D015==0]<-2

event<- base.2$MUERTE_VASCULAR
event<- factor(event, 0:2, labels=c("censor","Vascular","death_other"))

#METS-VF
fgfit1<-FGR(Hist(PERSON_YEARS,MUERTE_VASCULAR)~scale(METSVF),data=base.2,cause = 1)
summary(fgfit1)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_VASCULAR) ~ scale(METSVF),
    data = base.2, cause = 1)

              coef exp(coef) se(coef)    z p-value
scale(METSVF) 0.95      2.59   0.0446 21.3       0

              exp(coef) exp(-coef) 2.5% 97.5%
scale(METSVF)      2.59      0.387 2.37  2.82

Num. cases = 29034
Pseudo Log-likelihood = -10255
Pseudo likelihood ratio test = 636  on 1 df,
```

```r
#Deep-Abdominal Adipose Tissue index
fgfit2<-FGR(Hist(PERSON_YEARS,MUERTE_VASCULAR)~scale(DAAT_index),data=base.2,cause = 1)
summary(fgfit2)
```

```
Competing Risks Regression
```

```
Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_VASCULAR) ~ scale(DAAT_index),
    data = base.2, cause = 1)

                    coef exp(coef) se(coef)    z p-value
scale(DAAT_index) 0.383      1.47   0.0264 14.5       0

                  exp(coef) exp(-coef) 2.5% 97.5%
scale(DAAT_index)      1.47      0.682 1.39  1.54

Num. cases = 29034
Pseudo Log-likelihood = -10490
Pseudo likelihood ratio test = 167  on 1 df,
```

```r
#Visceral Adiposity Index
fgfit3<-FGR(Hist(PERSON_YEARS,MUERTE_VASCULAR)~scale(VAI_index),data=base.2,cause = 1)
summary(fgfit3)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_VASCULAR) ~ scale(VAI_index),
    data = base.2, cause = 1)

                   coef exp(coef) se(coef)     z p-value
scale(VAI_index) 0.0273      1.03   0.0302 0.903    0.37

                 exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_index)      1.03      0.973 0.969  1.09

Num. cases = 29034
Pseudo Log-likelihood = -10573
Pseudo likelihood ratio test = 0.78  on 1 df,
```

```r
#GEA-VAI
fgfit4<-FGR(Hist(PERSON_YEARS,MUERTE_VASCULAR)~scale(VAI_GEA_index),data=base.2,cause = 1)
summary(fgfit4)
```

```
Competing Risks Regression
```

```
Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_VASCULAR) ~ scale(VAI_GEA_index),
    data = base.2, cause = 1)

                       coef exp(coef) se(coef)    z p-value
scale(VAI_GEA_index) 0.0443      1.05   0.0298 1.49    0.14

                     exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_GEA_index)      1.05      0.957 0.986  1.11

Num. cases = 29034
Pseudo Log-likelihood = -10572
Pseudo likelihood ratio test = 2.07  on 1 df,
```

```
#Lipid Accumulation Product
fgfit5<-FGR(Hist(PERSON_YEARS,MUERTE_VASCULAR)~scale(LAAP_index),data=base.2,cause = 1)
summary(fgfit5)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_VASCULAR) ~ scale(LAAP_index),
    data = base.2, cause = 1)

                   coef exp(coef) se(coef)   z p-value
scale(LAAP_index) 0.179       1.2   0.0267 6.7 2.1e-11

                  exp(coef) exp(-coef) 2.5% 97.5%
scale(LAAP_index)       1.2      0.836 1.14  1.26

Num. cases = 29034
Pseudo Log-likelihood = -10555
Pseudo likelihood ratio test = 35.9  on 1 df,
```

```
#Eva Index
fgfit6<-FGR(Hist(PERSON_YEARS,MUERTE_VASCULAR)~scale(EVA_index),data=base.2,cause = 1)
summary(fgfit6)
```

```
Competing Risks Regression
```

```
Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_VASCULAR) ~ scale(EVA_index),
    data = base.2, cause = 1)

                  coef exp(coef) se(coef)    z p-value
scale(EVA_index) 0.735      2.09   0.0273 26.9       0

                 exp(coef) exp(-coef) 2.5% 97.5%
scale(EVA_index)      2.09       0.48 1.98   2.2

Num. cases = 29034
Pseudo Log-likelihood = -10272
Pseudo likelihood ratio test = 602  on 1 df,
```

```
#Depress
fgfit7<-FGR(Hist(PERSON_YEARS,MUERTE_VASCULAR)~scale(Depres_index),data=base.2,cause = 1)
summary(fgfit7)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_VASCULAR) ~ scale(Depres_index),
    data = base.2, cause = 1)

                     coef exp(coef) se(coef)    z p-value
scale(Depres_index) 0.907      2.48    0.046 19.7       0

                    exp(coef) exp(-coef) 2.5% 97.5%
scale(Depres_index)      2.48      0.404 2.26  2.71

Num. cases = 10593
Pseudo Log-likelihood = -3965
Pseudo likelihood ratio test = 378  on 1 df,
```

```
#Any Cardiac Death
base.2$MUERTE_CARDIO
```

```
Warning: Unknown or uninitialised column: `MUERTE_CARDIO`.

NULL
```

```r
base.2$MUERTE_CARDIO[base.2$STATUS=="A" & base.2$D003==0]<-0
```

```
Warning: Unknown or uninitialised column: `MUERTE_CARDIO`.
```

```r
base.2$MUERTE_CARDIO[base.2$STATUS=="D" & base.2$D003==1]<-1
base.2$MUERTE_CARDIO[base.2$STATUS=="D" & base.2$D003==0]<-2

#METS-VF
fg.fit.1.cardio<-FGR(Hist(PERSON_YEARS,MUERTE_CARDIO)~scale(METSVF),data=base.2,cause = 1)
summary(fg.fit.1.cardio)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_CARDIO) ~ scale(METSVF),
    data = base.2, cause = 1)

              coef exp(coef) se(coef)    z p-value
scale(METSVF) 0.94      2.56   0.0524 17.9       0

              exp(coef) exp(-coef) 2.5% 97.5%
scale(METSVF)      2.56      0.391 2.31  2.84

Num. cases = 29034
Pseudo Log-likelihood = -7370
Pseudo likelihood ratio test = 450  on 1 df,
```

```r
#Deep-Abdominal Adipose Tissue index
fg.fit.2.cardio<-FGR(Hist(PERSON_YEARS,MUERTE_CARDIO)~scale(DAAT_index),data=base.2,cause
summary(fg.fit.2.cardio)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_CARDIO) ~ scale(DAAT_index),
    data = base.2, cause = 1)

                   coef exp(coef) se(coef)    z p-value
scale(DAAT_index) 0.393      1.48   0.0311 12.6       0
```

```
                 exp(coef) exp(-coef) 2.5% 97.5%
scale(DAAT_index)      1.48      0.675 1.39  1.57

Num. cases = 29034
Pseudo Log-likelihood = -7532
Pseudo likelihood ratio test = 126  on 1 df,
```

```
#Visceral Adiposity Index
fg.fit.3.cardio<-FGR(Hist(PERSON_YEARS,MUERTE_CARDIO)~scale(VAI_index),data=base.2,cause =
summary(fg.fit.3.cardio)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_CARDIO) ~ scale(VAI_index),
    data = base.2, cause = 1)

                     coef exp(coef) se(coef)      z p-value
scale(VAI_index) -0.00692     0.993   0.0363 -0.191    0.85

                 exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_index)     0.993       1.01 0.925  1.07

Num. cases = 29034
Pseudo Log-likelihood = -7595
Pseudo likelihood ratio test = 0.04  on 1 df,
```

```
#GEA-VAI
fg.fit.4.cardio<-FGR(Hist(PERSON_YEARS,MUERTE_CARDIO)~scale(VAI_GEA_index),data=base.2,cau
summary(fg.fit.4.cardio)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_CARDIO) ~ scale(VAI_GEA_index),
    data = base.2, cause = 1)

                       coef exp(coef) se(coef)     z p-value
scale(VAI_GEA_index) 0.0116      1.01   0.0357 0.325    0.74
```

```
                     exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_GEA_index)      1.01      0.988 0.943  1.09

Num. cases = 29034
Pseudo Log-likelihood = -7595
Pseudo likelihood ratio test = 0.1  on 1 df,
```

```
#Lipid Accumulation Product
fg.fit.5.cardio<-FGR(Hist(PERSON_YEARS,MUERTE_CARDIO)~scale(LAAP_index),data=base.2,cause
summary(fg.fit.5.cardio)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_CARDIO) ~ scale(LAAP_index),
    data = base.2, cause = 1)

                   coef exp(coef) se(coef)    z p-value
scale(LAAP_index) 0.162      1.18   0.0313 5.18 2.3e-07

                  exp(coef) exp(-coef) 2.5% 97.5%
scale(LAAP_index)      1.18       0.85 1.11  1.25

Num. cases = 29034
Pseudo Log-likelihood = -7584
Pseudo likelihood ratio test = 20.9  on 1 df,
```

```
#Eva Index
fg.fit.6.cardio<-FGR(Hist(PERSON_YEARS,MUERTE_CARDIO)~scale(EVA_index),data=base.2,cause =
summary(fg.fit.6.cardio)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_CARDIO) ~ scale(EVA_index),
    data = base.2, cause = 1)

                  coef exp(coef) se(coef)    z p-value
scale(EVA_index) 0.737      2.09   0.0319 23.1       0
```

```
                 exp(coef) exp(-coef) 2.5% 97.5%
scale(EVA_index)      2.09      0.479 1.96  2.22

Num. cases = 29034
Pseudo Log-likelihood = -7377
Pseudo likelihood ratio test = 436  on 1 df,
```

```
#Depress
fg.fit.7.cardio<-FGR(Hist(PERSON_YEARS,MUERTE_CARDIO)~scale(Depres_index),data=base.2,caus
summary(fg.fit.7.cardio)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_CARDIO) ~ scale(Depres_index),
    data = base.2, cause = 1)

                     coef exp(coef) se(coef)    z p-value
scale(Depres_index) 0.869      2.39   0.0534 16.3       0

                    exp(coef) exp(-coef) 2.5% 97.5%
scale(Depres_index)      2.39      0.419 2.15  2.65

Num. cases = 10593
Pseudo Log-likelihood = -2894
Pseudo likelihood ratio test = 255  on 1 df,
```

```
#Any Cerebrovascular Death
base.2$MUERTE_STROKE
```

```
Warning: Unknown or uninitialised column: `MUERTE_STROKE`.

NULL
```

```
base.2$MUERTE_STROKE[base.2$STATUS=="A" & base.2$D008==0]<-0
```

```
Warning: Unknown or uninitialised column: `MUERTE_STROKE`.
```

```r
base.2$MUERTE_STROKE[base.2$STATUS=="D" & base.2$D008==1]<-1
base.2$MUERTE_STROKE[base.2$STATUS=="D" & base.2$D008==0]<-2

#METS-VF
fg.fit.1.stroke<-FGR(Hist(PERSON_YEARS,MUERTE_STROKE)~scale(METSVF),data=base.2,cause = 1)
summary(fg.fit.1.stroke)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_STROKE) ~ scale(METSVF),
    data = base.2, cause = 1)

              coef exp(coef) se(coef)    z p-value
scale(METSVF) 1.01      2.74   0.0976 10.3       0

              exp(coef) exp(-coef) 2.5% 97.5%
scale(METSVF)      2.74      0.364 2.27  3.32

Num. cases = 29034
Pseudo Log-likelihood = -2127
Pseudo likelihood ratio test = 146  on 1 df,
```

```r
#Deep-Abdominal Adipose Tissue index
fg.fit.2.stroke<-FGR(Hist(PERSON_YEARS,MUERTE_STROKE)~scale(DAAT_index),data=base.2,cause
summary(fg.fit.2.stroke)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_STROKE) ~ scale(DAAT_index),
    data = base.2, cause = 1)

                   coef exp(coef) se(coef)    z p-value
scale(DAAT_index) 0.331      1.39   0.0564 5.87 4.3e-09

                  exp(coef) exp(-coef) 2.5% 97.5%
scale(DAAT_index)      1.39      0.718 1.25  1.56

Num. cases = 29034
```

```
Pseudo Log-likelihood = -2187
Pseudo likelihood ratio test = 25.6  on 1 df,
```

```
#Visceral Adiposity Index
fg.fit.3.stroke<-FGR(Hist(PERSON_YEARS,MUERTE_STROKE)~scale(VAI_index),data=base.2,cause =
summary(fg.fit.3.stroke)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_STROKE) ~ scale(VAI_index),
    data = base.2, cause = 1)

                  coef exp(coef) se(coef)    z p-value
scale(VAI_index) 0.121      1.13    0.064 1.89   0.059

                 exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_index)      1.13      0.886 0.995  1.28

Num. cases = 29034
Pseudo Log-likelihood = -2198
Pseudo likelihood ratio test = 3.33  on 1 df,
```

```
#GEA-VAI
fg.fit.4.stroke<-FGR(Hist(PERSON_YEARS,MUERTE_STROKE)~scale(VAI_GEA_index),data=base.2,cau
summary(fg.fit.4.stroke)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_STROKE) ~ scale(VAI_GEA_index),
    data = base.2, cause = 1)

                      coef exp(coef) se(coef)    z p-value
scale(VAI_GEA_index) 0.114      1.12   0.0639 1.78   0.075

                     exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_GEA_index)      1.12      0.892 0.989  1.27

Num. cases = 29034
```

```
Pseudo Log-likelihood = -2198
Pseudo likelihood ratio test = 2.94  on 1 df,
```

```
#Lipid Accumulation Product
fg.fit.5.stroke<-FGR(Hist(PERSON_YEARS,MUERTE_STROKE)~scale(LAAP_index),data=base.2,cause
summary(fg.fit.5.stroke)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_STROKE) ~ scale(LAAP_index),
    data = base.2, cause = 1)

                   coef exp(coef) se(coef)    z p-value
scale(LAAP_index) 0.271      1.31   0.0584 4.64 3.6e-06

                  exp(coef) exp(-coef) 2.5% 97.5%
scale(LAAP_index)      1.31      0.763 1.17  1.47

Num. cases = 29034
Pseudo Log-likelihood = -2191
Pseudo likelihood ratio test = 17.6  on 1 df,
```

```
#Eva Index
fg.fit.6.stroke<-FGR(Hist(PERSON_YEARS,MUERTE_STROKE)~scale(EVA_index),data=base.2,cause =
summary(fg.fit.6.stroke)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_STROKE) ~ scale(EVA_index),
    data = base.2, cause = 1)

                  coef exp(coef) se(coef)    z p-value
scale(EVA_index) 0.718      2.05   0.0591 12.1       0

                 exp(coef) exp(-coef) 2.5% 97.5%
scale(EVA_index)      2.05      0.488 1.83   2.3

Num. cases = 29034
```

```
Pseudo Log-likelihood = -2140
Pseudo likelihood ratio test = 120  on 1 df,
```

```r
#Depress
fg.fit.7.stroke<-FGR(Hist(PERSON_YEARS,MUERTE_STROKE)~scale(Depres_index),data=base.2,caus
summary(fg.fit.7.stroke)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_STROKE) ~ scale(Depres_index),
    data = base.2, cause = 1)

                    coef exp(coef) se(coef)    z p-value
scale(Depres_index) 1.05      2.85     0.11 9.49       0

                    exp(coef) exp(-coef) 2.5% 97.5%
scale(Depres_index)      2.85      0.351 2.29  3.54

Num. cases = 10593
Pseudo Log-likelihood = -695
Pseudo likelihood ratio test = 88.6  on 1 df,
```

```r
#Other CVD
base.2$MUERTE_OTRAS
```

```
Warning: Unknown or uninitialised column: `MUERTE_OTRAS`.

NULL
```

```r
base.2$MUERTE_OTRAS[base.2$D009==1]<-1
```

```
Warning: Unknown or uninitialised column: `MUERTE_OTRAS`.
```

```r
base.2$MUERTE_OTRAS[base.2$D010==1]<-1
base.2$MUERTE_OTRAS[base.2$D011==1]<-1
base.2$MUERTE_OTRAS[base.2$D012==1]<-1
```

```r
base.2$MUERTE_OTRAS<-na.tools::na.replace(base.2$MUERTE_OTRAS,0)

base.2$MUERTE_OTRAS_2[base.2$STATUS=="A" & base.2$MUERTE_OTRAS==0]<-0
```

```
Warning: Unknown or uninitialised column: `MUERTE_OTRAS_2`.
```

```r
base.2$MUERTE_OTRAS_2[base.2$STATUS=="D" & base.2$MUERTE_OTRAS==1]<-1
base.2$MUERTE_OTRAS_2[base.2$STATUS=="D" & base.2$MUERTE_OTRAS==0]<-2

#METS-VF
fg.fit.1.others<-FGR(Hist(PERSON_YEARS,MUERTE_OTRAS_2)~scale(METSVF),data=base.2,cause = 1
summary(fg.fit.1.others)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_OTRAS_2) ~ scale(METSVF),
    data = base.2, cause = 1)

               coef exp(coef) se(coef)    z p-value
scale(METSVF) 0.734      2.08    0.151 4.85 1.2e-06

              exp(coef) exp(-coef) 2.5% 97.5%
scale(METSVF)      2.08       0.48 1.55   2.8

Num. cases = 29034
Pseudo Log-likelihood = -771
Pseudo likelihood ratio test = 30.7  on 1 df,
```

```r
#Deep-Abdominal Adipose Tissue index
fg.fit.2.others<-FGR(Hist(PERSON_YEARS,MUERTE_OTRAS_2)~scale(DAAT_index),data=base.2,cause
summary(fg.fit.2.others)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_OTRAS_2) ~ scale(DAAT_index),
    data = base.2, cause = 1)
```

```
                     coef exp(coef) se(coef)    z p-value
scale(DAAT_index) 0.392      1.48    0.102 3.83 0.00013

                  exp(coef) exp(-coef) 2.5% 97.5%
scale(DAAT_index)      1.48      0.676 1.21  1.81

Num. cases = 29034
Pseudo Log-likelihood = -780
Pseudo likelihood ratio test = 12.9  on 1 df,
```

```
#Visceral Adiposity Index
fg.fit.3.others<-FGR(Hist(PERSON_YEARS,MUERTE_OTRAS_2)~scale(VAI_index),data=base.2,cause
summary(fg.fit.3.others)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_OTRAS_2) ~ scale(VAI_index),
    data = base.2, cause = 1)

                     coef exp(coef) se(coef)   z p-value
scale(VAI_index) 0.0813      1.08    0.102 0.8    0.42

                 exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_index)      1.08      0.922 0.889  1.32

Num. cases = 29034
Pseudo Log-likelihood = -786
Pseudo likelihood ratio test = 0.53  on 1 df,
```

```
#GEA-VAI
fg.fit.4.others<-FGR(Hist(PERSON_YEARS,MUERTE_OTRAS_2)~scale(VAI_GEA_index),data=base.2,ca
summary(fg.fit.4.others)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_OTRAS_2) ~ scale(VAI_GEA_index),
    data = base.2, cause = 1)
```

```
                     coef exp(coef) se(coef)    z p-value
scale(VAI_GEA_index) 0.15      1.16   0.0979 1.53    0.13

                     exp(coef) exp(-coef)  2.5% 97.5%
scale(VAI_GEA_index)      1.16      0.861 0.959  1.41

Num. cases = 29034
Pseudo Log-likelihood = -786
Pseudo likelihood ratio test = 1.85  on 1 df,
```

```
#Lipid Accumulation Product
fg.fit.5.others<-FGR(Hist(PERSON_YEARS,MUERTE_OTRAS_2)~scale(LAAP_index),data=base.2,cause
summary(fg.fit.5.others)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_OTRAS_2) ~ scale(LAAP_index),
    data = base.2, cause = 1)

                    coef exp(coef) se(coef)     z p-value
scale(LAAP_index) 0.0641      1.07    0.103 0.619    0.54

                  exp(coef) exp(-coef) 2.5% 97.5%
scale(LAAP_index)      1.07      0.938 0.87  1.31

Num. cases = 29034
Pseudo Log-likelihood = -787
Pseudo likelihood ratio test = 0.32  on 1 df,
```

```
#Eva Index
fg.fit.6.others<-FGR(Hist(PERSON_YEARS,MUERTE_OTRAS_2)~scale(EVA_index),data=base.2,cause
summary(fg.fit.6.others)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_OTRAS_2) ~ scale(EVA_index),
    data = base.2, cause = 1)
```

```
                 coef exp(coef) se(coef)    z p-value
scale(EVA_index) 0.642       1.9    0.101 6.38 1.8e-10

                 exp(coef) exp(-coef) 2.5% 97.5%
scale(EVA_index)       1.9      0.526 1.56  2.32

Num. cases = 29034
Pseudo Log-likelihood = -770
Pseudo likelihood ratio test = 34.3  on 1 df,
```

```
#Depress
fg.fit.7.others<-FGR(Hist(PERSON_YEARS,MUERTE_OTRAS_2)~scale(Depres_index),data=base.2,cau
summary(fg.fit.7.others)
```

```
Competing Risks Regression

Call:
FGR(formula = Hist(PERSON_YEARS, MUERTE_OTRAS_2) ~ scale(Depres_index),
    data = base.2, cause = 1)

                     coef exp(coef) se(coef)    z p-value
scale(Depres_index) 0.757      2.13    0.128 5.91 3.4e-09

                    exp(coef) exp(-coef) 2.5% 97.5%
scale(Depres_index)      2.13      0.469 1.66  2.74

Num. cases = 10593
Pseudo Log-likelihood = -384
Pseudo likelihood ratio test = 25.7  on 1 df,
```

Resultados: Capitulo 3 - Métricas de calibración

```
Figure4A<-ggplotify::as.ggplot(~calPlot(list("METS-VF"=fgfit1,
                                   "DAAT"=fgfit2,
                                   "LAP"=fgfit5,
                                   "EVA"=fgfit6),
                              time=c(20),cores = 3,col = c(ggsci::pal_jama("default")(6))[
                              showPseudo=FALSE,
                              type="risk",
                              data=base.2,
```

```r
                                xlim=c(0,0.20),
                                ylim=c(0,0.20),
                                xlab = c("Probabilidad del Evento Predicho"),
                                ylab = c("Frecuencia de Eventos Observados")))+
    ggtitle("Todas las Causas Cardiovasculares")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```r
  Figure4B<-ggplotify::as.ggplot(~calPlot(list("METS-VF"=fg.fit.1.cardio,
               "DAAT"=fg.fit.2.cardio,
               "LAP"=fg.fit.5.cardio,
               "EVA"=fg.fit.6.cardio),
          time=c(20),cores = 3,col = c(ggsci::pal_jama("default")(6))[c(1:2,5:6)],
          showPseudo=FALSE,
          type="risk",
          data=base.2,
          xlim=c(0,0.20),
          ylim=c(0,0.20),
          xlab = c("Probabilidad del Evento Predicho"),
          ylab = c("Frecuencia de Eventos Observados")))+
    ggtitle("Afecciones Cardíacas")
```

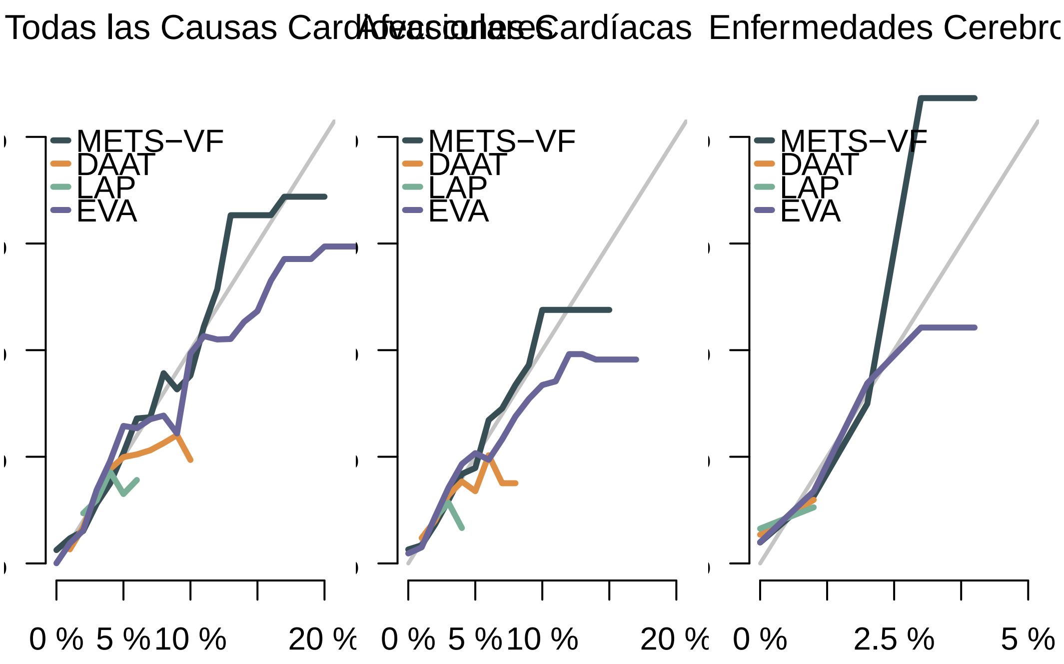
```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```r
  Figure4C<-ggplotify::as.ggplot(~calPlot(list("METS-VF"=fg.fit.1.stroke,
               "DAAT"=fg.fit.2.stroke,
               "LAP"=fg.fit.5.stroke,
               "EVA"=fg.fit.6.stroke),
          time=c(15),cores = 3,col = c(ggsci::pal_jama("default")(6))[c(1:2,5:6)],
          showPseudo=FALSE,
          type="risk",
          data=base.2,
          xlim=c(0,0.05),
```

```
        ylim=c(0,0.05),
        xlab = c("Probabilidad del Evento Predicho"),
        ylab = c("Frecuencia de Eventos Observados")))+
  ggtitle("Enfermedades Cerebrovasculares")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```
ggarrange(Figure4A,Figure4B,Figure4C,ncol = 3,nrow = 1)
```



Resultados: Capitulo 3 - Metricas de rendimiento general

```
#ROC Metrics (Overall CVD Mortality)
ROC.df.1<-Score(list("METS-VF"=fgfit1,
                "DAAT"=fgfit2,
                "VAI"=fgfit3,
                "DAI"=fgfit4,
```

```r
                    "LAP"=fgfit5,
                    "EVA"=fgfit6),
               formula=Hist(PERSON_YEARS,MUERTE_VASCULAR)~1,
               data=base.2,
               conf.int=TRUE,
               summary="risks",
               metrics="auc",
               plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```r
#ROC Metrics (Ischemic Heart Disease)
ROC.df.2<-Score(list("METS-VF"=fg.fit.1.cardio,
                     "DAAT"=fg.fit.2.cardio,
                     "VAI"=fg.fit.3.cardio,
                     "DAI"=fg.fit.4.cardio,
                     "LAP"=fg.fit.5.cardio,
                     "EVA"=fg.fit.6.cardio),
                formula=Hist(PERSON_YEARS,MUERTE_CARDIO)~1,
                data=base.2,
                conf.int=TRUE,
                summary="risks",
                metrics="auc",
                plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```r
#ROC Metrics (Stroke)
ROC.df.3<-Score(list("METS-VF"=fg.fit.1.stroke,
```

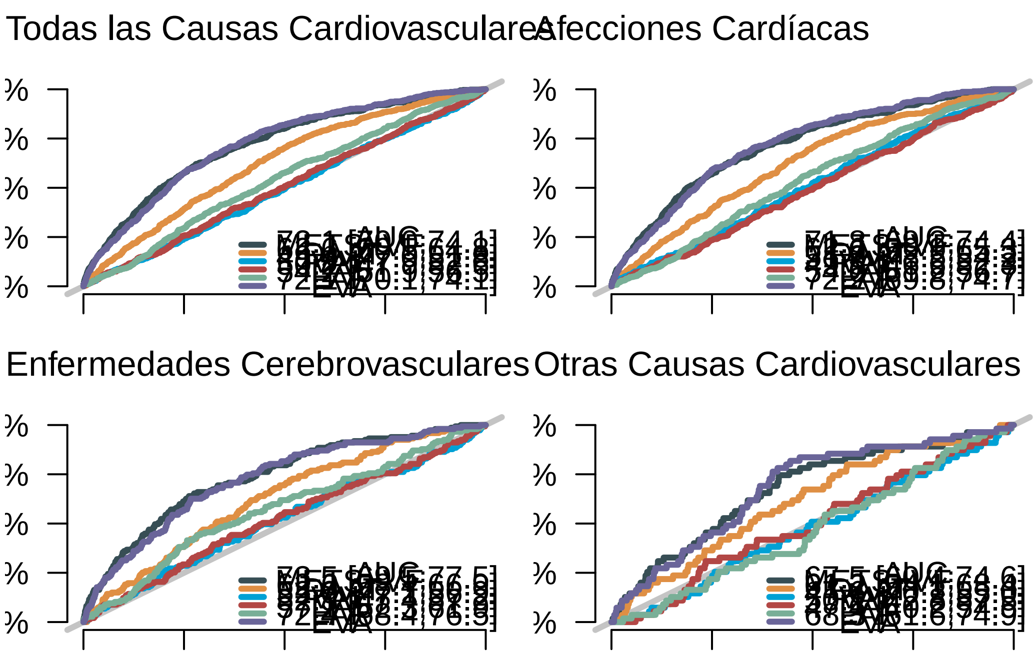
```r
                     "DAAT"=fg.fit.2.stroke,
                     "VAI"=fg.fit.3.stroke,
                     "DAI"=fg.fit.4.stroke,
                     "LAP"=fg.fit.5.stroke,
                     "EVA"=fg.fit.6.stroke),
                formula=Hist(PERSON_YEARS,MUERTE_STROKE)~1,
                data=base.2,
                conf.int=TRUE,
                summary="risks",
                metrics="auc",
                plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```r
#ROC Metrics (Others)
ROC.df.4<-Score(list("METS-VF"=fg.fit.1.others,
                     "DAAT"=fg.fit.2.others,
                     "VAI"=fg.fit.3.others,
                     "DAI"=fg.fit.4.others,
                     "LAP"=fg.fit.5.others,
                     "EVA"=fg.fit.6.others),
                formula=Hist(PERSON_YEARS,MUERTE_OTRAS_2)~1,
                data=base.2,
                conf.int=TRUE,
                summary="risks",
                metrics="auc",
                plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```
#ROC CURVE

Figure2A<-ggplotify::as.ggplot(~plotROC(ROC.df.1,col = c(ggsci::pal_jama("default")(6)),
                              xlab = "Tasa de Falsos Positivos (1-Especificidad)",
                              ylab = "Tasa de Verdaderos Positivos (Sensibilidad)"))+
  ggtitle("Todas las Causas Cardiovasculares")



Figure2B<-ggplotify::as.ggplot(~plotROC(ROC.df.2,col = c(ggsci::pal_jama("default")(6)),
                                        xlab = "Tasa de Falsos Positivos (1-Especificidad)
                                        ylab = "Tasa de Verdaderos Positivos (Sensibilidad
  ggtitle("Afecciones Cardíacas")

Figure2C<-ggplotify::as.ggplot(~plotROC(ROC.df.3,col = c(ggsci::pal_jama("default")(6)),
                                        xlab = "Tasa de Falsos Positivos (1-Especificidad)
                                        ylab = "Tasa de Verdaderos Positivos (Sensibilidad
  ggtitle("Enfermedades Cerebrovasculares")

Figure2D<-ggplotify::as.ggplot(~plotROC(ROC.df.4,col = c(ggsci::pal_jama("default")(6)),
                                        xlab = "Tasa de Falsos Positivos (1-Especificidad)
                                        ylab = "Tasa de Verdaderos Positivos (Sensibilidad
  ggtitle("Otras Causas Cardiovasculares")

ggarrange(Figure2A,Figure2B,Figure2C,Figure2D,ncol = 2,nrow = 2)
```



Resultados: Capitulo 3 - Estimación del rendimiento pronóstico durante el tiempo de seguimiento

```
#ROC Metrics (Overall CVD Mortality)
ROC.time.df.1<-Score(list("METS-VF"=fgfit1,
                       "DAAT"=fgfit2,
                       "VAI"=fgfit3,
                       "DAI"=fgfit4,
                       "LAP"=fgfit5,
                       "EVA"=fgfit6),
                  formula=Hist(PERSON_YEARS,MUERTE_VASCULAR)~1,
                  data=base.2,
                  times = seq(1,20,1),
                  conf.int=TRUE,
                  summary="risks",
                  metrics="auc",
                  plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
```

```
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```r
#ROC Metrics (Cardiac Causes)
ROC.time.df.2<-Score(list("METS-VF"=fg.fit.1.cardio,
                         "DAAT"=fg.fit.2.cardio,
                         "VAI"=fg.fit.3.cardio,
                         "DAI"=fg.fit.4.cardio,
                         "LAP"=fg.fit.5.cardio,
                         "EVA"=fg.fit.6.cardio),
                    formula=Hist(PERSON_YEARS,MUERTE_CARDIO)~1,
                    data=base.2,
                    times = seq(1,20,1),
                    conf.int=TRUE,
                    summary="risks",
                    metrics="auc",
                    plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```r
#ROC Metrics (Cerebrovascular Causes)
ROC.time.df.3<-Score(list("METS-VF"=fg.fit.1.stroke,
                           "DAAT"=fg.fit.2.stroke,
                           "VAI"=fg.fit.3.stroke,
                           "DAI"=fg.fit.4.stroke,
                           "LAP"=fg.fit.5.stroke,
                           "EVA"=fg.fit.6.stroke),
                      formula=Hist(PERSON_YEARS,MUERTE_STROKE)~1,
                      data=base.2,
                      times = seq(1,20,1),
                      conf.int=TRUE,
                      summary="risks",
                      metrics="auc",
                      plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

```
#ROC Metrics (Other Causes)
ROC.time.df.4<-Score(list("METS-VF"=fg.fit.1.others,
                          "DAAT"=fg.fit.2.others,
                          "VAI"=fg.fit.3.others,
                          "DAI"=fg.fit.4.others,
                          "LAP"=fg.fit.5.others,
                          "EVA"=fg.fit.6.others),
                     formula=Hist(PERSON_YEARS,MUERTE_OTRAS_2)~1,
                     data=base.2,
                     times = seq(1,20,1),
                     conf.int=TRUE,
                     summary="risks",
                     metrics="auc",
                     plots="roc")
```

```
[1] "scale(METSVF)"
[1] "scale(DAAT_index)"
[1] "scale(VAI_index)"
[1] "scale(VAI_GEA_index)"
[1] "scale(LAAP_index)"
[1] "scale(EVA_index)"
```

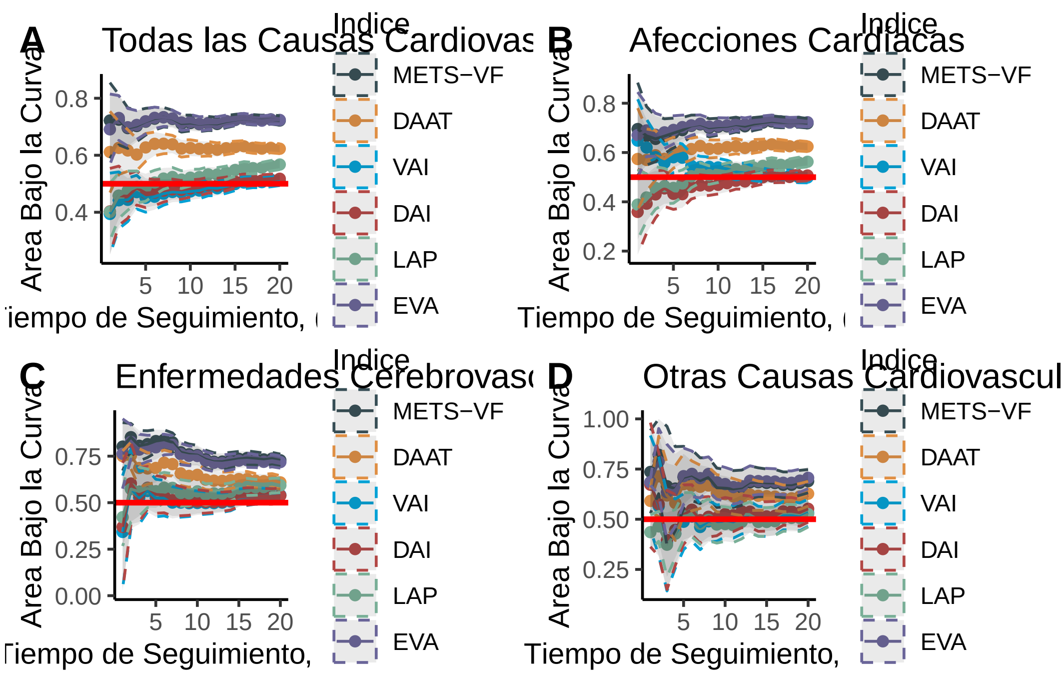
```
Figure3A<-ggplot(ROC.time.df.1$AUC$score,
       aes(times,AUC,colour=model))+
  geom_point()+
  geom_line()+
  geom_ribbon(aes(ymin=lower,
                  ymax=upper,
                  colour=model),
              alpha=0.1,linetype=2)+
  ggsci::scale_colour_jama()+
  labs(colour="Indice")+
  theme_classic()+
```

```
  ylab("Area Bajo la Curva")+
  xlab("Tiempo de Seguimiento, (Años)")+
  ggtitle("Todas las Causas Cardiovasculares")+
  geom_hline(yintercept = 0.5, linetype=1,
             color = "red", size=1)
```

```
Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
i Please use `linewidth` instead.
```

```
Figure3B<-ggplot(ROC.time.df.2$AUC$score,
                 aes(times,AUC,colour=model))+
  geom_point()+
  geom_line()+
  geom_ribbon(aes(ymin=lower,
                  ymax=upper,
                  colour=model),
              alpha=0.1,linetype=2)+
  ggsci::scale_colour_jama()+
  labs(colour="Indice")+
  theme_classic()+
  ylab("Area Bajo la Curva")+
  xlab("Tiempo de Seguimiento, (Años)")+
  ggtitle("Afecciones Cardíacas")+
  geom_hline(yintercept = 0.5, linetype=1,
             color = "red", size=1)

Figure3C<-ggplot(ROC.time.df.3$AUC$score,
                 aes(times,AUC,colour=model))+
  geom_point()+
  geom_line()+
  geom_ribbon(aes(ymin=lower,
                  ymax=upper,
                  colour=model),
              alpha=0.1,linetype=2)+
  ggsci::scale_colour_jama()+
  labs(colour="Indice")+
  theme_classic()+
  ylab("Area Bajo la Curva")+
  xlab("Tiempo de Seguimiento, (Años)")+
  ggtitle("Enfermedades Cerebrovasculares")+
  geom_hline(yintercept = 0.5, linetype=1,
```

```
            color = "red", size=1)

Figure3D<-ggplot(ROC.time.df.4$AUC$score,
                 aes(times,AUC,colour=model))+
  geom_point()+
  geom_line()+
  geom_ribbon(aes(ymin=lower,
                  ymax=upper,
                  colour=model),
              alpha=0.1,linetype=2)+
  ggsci::scale_colour_jama()+
  labs(colour="Indice")+
  theme_classic()+
  ylab("Area Bajo la Curva")+
  xlab("Tiempo de Seguimiento, (Años)")+
  ggtitle("Otras Causas Cardiovasculares")+
  geom_hline(yintercept = 0.5, linetype=1,
            color = "red", size=1)

ggarrange(Figure3A,Figure3B,Figure3C,Figure3D,ncol = 2,nrow = 2,labels = LETTERS[1:4])
```



Resultados: Capitulo 3 - Evaluación de puntos de corte específicos

```r
#Muerte All Vascular
#METS-VF
res.cut.all.1 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D015",va
summary(res.cut.all.1)
```

```
       cutpoint statistic
METSVF 7.211766  24.29035
```

```r
#Deep-Abdominal Adipose Tissue index
res.cut.all.2 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D015",va
summary(res.cut.all.2)
```

```
           cutpoint statistic
DAAT_index  145.206  13.38629
```

```r
#Visceral Adiposity Index
res.cut.all.3 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D015",va
summary(res.cut.all.3)
```

```
          cutpoint statistic
VAI_index 2.012154  1.991938
```

```r
#GEA-VAI
res.cut.all.4 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D015",va
summary(res.cut.all.4)
```

```
              cutpoint statistic
VAI_GEA_index 1.237504   2.61297
```

```r
#Lipid Accumulation Product
res.cut.all.5 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D015",va
summary(res.cut.all.5)
```

```
           cutpoint statistic
LAAP_index   45.253  7.466332
```

```r
#Eva Index
res.cut.all.6 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D015",va
summary(res.cut.all.6)
```

```
          cutpoint statistic
EVA_index 133.2737  23.48369
```

```r
#Depress
res.cut.all.7 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D015",va
summary(res.cut.all.7)
```

```
             cutpoint statistic
Depres_index 174.9466   19.0239
```

```r
###Cardiac Deaths
#METS-VF
res.cut.cardiac.1 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D003
summary(res.cut.cardiac.1)
```

```
       cutpoint statistic
METSVF 7.300217  20.86636
```

```r
#Deep-Abdominal Adipose Tissue index
res.cut.cardiac.2 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D003
summary(res.cut.cardiac.2)
```

```
           cutpoint statistic
DAAT_index 150.8149  11.95281
```

```r
#Visceral Adiposity Index
res.cut.cardiac.3 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D003
summary(res.cut.cardiac.3)
```

```
          cutpoint statistic
VAI_index 3.436877  1.631837
```

```r
#GEA-VAI
res.cut.cardiac.4 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D003
summary(res.cut.cardiac.4)
```

```
              cutpoint statistic
VAI_GEA_index 0.9975464  2.342943
```

```r
#Lipid Accumulation Product
res.cut.cardiac.5 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D003
summary(res.cut.cardiac.5)
```

```
           cutpoint statistic
LAAP_index   45.078  6.363569
```

```r
#Eva Index
res.cut.cardiac.6 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D003
summary(res.cut.cardiac.6)
```

```
          cutpoint statistic
EVA_index 135.2184  20.89256
```

```r
#Depress
res.cut.cardiac.7 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D003
summary(res.cut.cardiac.7)
```

```
             cutpoint statistic
Depres_index 179.2111  16.55898
```

```r
##Any Cerebrovascular Deaths
#METS-VF
res.cut.cerebrovasc.1 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "
summary(res.cut.cerebrovasc.1)
```

```
       cutpoint statistic
METSVF 7.231185  12.21993
```

```r
#Deep-Abdominal Adipose Tissue index
res.cut.cerebrovasc.2 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "
summary(res.cut.cerebrovasc.2)
```

```
           cutpoint statistic
DAAT_index 153.9097  5.540596
```

```r
#Visceral Adiposity Index
res.cut.cerebrovasc.3 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "
summary(res.cut.cerebrovasc.3)
```

```
          cutpoint statistic
VAI_index 3.090636  2.674579
```

```r
#GEA-VAI
res.cut.cerebrovasc.4 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "
summary(res.cut.cerebrovasc.4)
```

```
              cutpoint statistic
VAI_GEA_index 1.383923  2.489902
```

```r
#Lipid Accumulation Product
res.cut.cerebrovasc.5 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "
summary(res.cut.cerebrovasc.5)
```

```
           cutpoint statistic
LAAP_index     57.4  5.370069
```

```r
#Eva Index
res.cut.cerebrovasc.6 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "
summary(res.cut.cerebrovasc.6)
```

```
          cutpoint statistic
EVA_index 133.1655   11.0112
```

```
#Depress
res.cut.cerebrovasc.7 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "
summary(res.cut.cerebrovasc.7)
```

```
             cutpoint statistic
Depres_index  200.509  8.930644
```

```
#Other CVD
#METS-VF
res.cut.other.1 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D009",
summary(res.cut.other.1)
```

```
       cutpoint statistic
METSVF 6.963835  3.596831
```

```
#Deep-Abdominal Adipose Tissue index
res.cut.other.2 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D009",
summary(res.cut.other.2)
```

```
           cutpoint statistic
DAAT_index 122.0835  2.566053
```

```
#Visceral Adiposity Index
res.cut.other.3 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D009",
summary(res.cut.other.3)
```

```
          cutpoint statistic
VAI_index 3.697909  1.287855
```

```
#GEA-VAI
res.cut.other.4 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D009",
summary(res.cut.other.4)
```

```
              cutpoint statistic
VAI_GEA_index 1.798452  1.976538
```

```r
#Lipid Accumulation Product
res.cut.other.5 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D009",
summary(res.cut.other.5)
```

```
           cutpoint statistic
LAAP_index  32.8032  1.456717
```

```r
#Eva Index
res.cut.other.6 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D009",
summary(res.cut.other.6)
```

```
          cutpoint statistic
EVA_index 117.4862  4.116698
```

```r
#Depress
res.cut.other.7 <- survminer::surv_cutpoint(base.2, time = "PERSON_YEARS", event = "D009",
summary(res.cut.other.7)
```

```
             cutpoint statistic
Depres_index  171.593  3.501927
```

```r
##Muerte All Vascular
res.cat.all.1 <- surv_categorize(res.cut.all.1)
res.cat.all.2 <- surv_categorize(res.cut.all.2)
res.cat.all.3 <- surv_categorize(res.cut.all.3)
res.cat.all.4 <- surv_categorize(res.cut.all.4)
res.cat.all.5 <- surv_categorize(res.cut.all.5)
res.cat.all.6 <- surv_categorize(res.cut.all.6)

cox.cat.all.1<-coxph(Surv(PERSON_YEARS, D015)~METSVF, data=res.cat.all.1)
cox.cat.all.2<-coxph(Surv(PERSON_YEARS, D015)~DAAT_index, data=res.cat.all.2)
cox.cat.all.3<-coxph(Surv(PERSON_YEARS, D015)~VAI_index, data=res.cat.all.3)
cox.cat.all.4<-coxph(Surv(PERSON_YEARS, D015)~VAI_GEA_index, data=res.cat.all.4)
cox.cat.all.5<-coxph(Surv(PERSON_YEARS, D015)~LAAP_index, data=res.cat.all.5)
cox.cat.all.6<-coxph(Surv(PERSON_YEARS, D015)~EVA_index, data=res.cat.all.6)

c.stat.all.1<-paste0(round(cox.cat.all.1$concordance[6],2)," (",round(cox.cat.all.1$concor
c.stat.all.2<-paste0(round(cox.cat.all.2$concordance[6],2)," (",round(cox.cat.all.2$concor
```

```
c.stat.all.3<-paste0(round(cox.cat.all.3$concordance[6],2)," (",round(cox.cat.all.3$concor
c.stat.all.4<-paste0(round(cox.cat.all.4$concordance[6],2)," (",round(cox.cat.all.4$concor
c.stat.all.5<-paste0(round(cox.cat.all.5$concordance[6],2)," (",round(cox.cat.all.5$concor
c.stat.all.6<-paste0(round(cox.cat.all.6$concordance[6],2)," (",round(cox.cat.all.6$concor

##Any Cardiac Death
res.cat.cardiac.1 <- surv_categorize(res.cut.cardiac.1)
res.cat.cardiac.2 <- surv_categorize(res.cut.cardiac.2)
res.cat.cardiac.3 <- surv_categorize(res.cut.cardiac.3)
res.cat.cardiac.4 <- surv_categorize(res.cut.cardiac.4)
res.cat.cardiac.5 <- surv_categorize(res.cut.cardiac.5)
res.cat.cardiac.6 <- surv_categorize(res.cut.cardiac.6)

cox.cat.cardiac.1<-coxph(Surv(PERSON_YEARS, D003)~METSVF, data=res.cat.cardiac.1)
cox.cat.cardiac.2<-coxph(Surv(PERSON_YEARS, D003)~DAAT_index, data=res.cat.cardiac.2)
cox.cat.cardiac.3<-coxph(Surv(PERSON_YEARS, D003)~VAI_index, data=res.cat.cardiac.3)
cox.cat.cardiac.4<-coxph(Surv(PERSON_YEARS, D003)~VAI_GEA_index, data=res.cat.cardiac.4)
cox.cat.cardiac.5<-coxph(Surv(PERSON_YEARS, D003)~LAAP_index, data=res.cat.cardiac.5)
cox.cat.cardiac.6<-coxph(Surv(PERSON_YEARS, D003)~EVA_index, data=res.cat.cardiac.6)

c.stat.cardiac.1<-paste0(round(cox.cat.cardiac.1$concordance[6],2)," (",round(cox.cat.card
c.stat.cardiac.2<-paste0(round(cox.cat.cardiac.2$concordance[6],2)," (",round(cox.cat.card
c.stat.cardiac.3<-paste0(round(cox.cat.cardiac.3$concordance[6],2)," (",round(cox.cat.card
c.stat.cardiac.4<-paste0(round(cox.cat.cardiac.4$concordance[6],2)," (",round(cox.cat.card
c.stat.cardiac.5<-paste0(round(cox.cat.cardiac.5$concordance[6],2)," (",round(cox.cat.card
c.stat.cardiac.6<-paste0(round(cox.cat.cardiac.6$concordance[6],2)," (",round(cox.cat.card

#Cerebrovascular
res.cat.cerebrovasc.1 <- surv_categorize(res.cut.cerebrovasc.1)
res.cat.cerebrovasc.2 <- surv_categorize(res.cut.cerebrovasc.2)
res.cat.cerebrovasc.3 <- surv_categorize(res.cut.cerebrovasc.3)
res.cat.cerebrovasc.4 <- surv_categorize(res.cut.cerebrovasc.4)
res.cat.cerebrovasc.5 <- surv_categorize(res.cut.cerebrovasc.5)
res.cat.cerebrovasc.6 <- surv_categorize(res.cut.cerebrovasc.6)

cox.cat.cerebrovasc.1<-coxph(Surv(PERSON_YEARS, D008)~METSVF, data=res.cat.cerebrovasc.1)
cox.cat.cerebrovasc.2<-coxph(Surv(PERSON_YEARS, D008)~DAAT_index, data=res.cat.cerebrovasc
cox.cat.cerebrovasc.3<-coxph(Surv(PERSON_YEARS, D008)~VAI_index, data=res.cat.cerebrovasc.
cox.cat.cerebrovasc.4<-coxph(Surv(PERSON_YEARS, D008)~VAI_GEA_index, data=res.cat.cerebrov
cox.cat.cerebrovasc.5<-coxph(Surv(PERSON_YEARS, D008)~LAAP_index, data=res.cat.cerebrovasc
cox.cat.cerebrovasc.6<-coxph(Surv(PERSON_YEARS, D008)~EVA_index, data=res.cat.cerebrovasc.
```

```r
c.stat.cerebrovasc.1<-paste0(round(cox.cat.cerebrovasc.1$concordance[6],2)," (",round(cox.
c.stat.cerebrovasc.2<-paste0(round(cox.cat.cerebrovasc.2$concordance[6],2)," (",round(cox.
c.stat.cerebrovasc.3<-paste0(round(cox.cat.cerebrovasc.3$concordance[6],2)," (",round(cox.
c.stat.cerebrovasc.4<-paste0(round(cox.cat.cerebrovasc.4$concordance[6],2)," (",round(cox.
c.stat.cerebrovasc.5<-paste0(round(cox.cat.cerebrovasc.5$concordance[6],2)," (",round(cox.
c.stat.cerebrovasc.6<-paste0(round(cox.cat.cerebrovasc.6$concordance[6],2)," (",round(cox.

#Other
res.cat.other.1 <- surv_categorize(res.cut.other.1)
res.cat.other.2 <- surv_categorize(res.cut.other.2)
res.cat.other.3 <- surv_categorize(res.cut.other.3)
res.cat.other.4 <- surv_categorize(res.cut.other.4)
res.cat.other.5 <- surv_categorize(res.cut.other.5)
res.cat.other.6 <- surv_categorize(res.cut.other.6)

cox.cat.other.1<-coxph(Surv(PERSON_YEARS, D009)~METSVF, data=res.cat.other.1)
cox.cat.other.2<-coxph(Surv(PERSON_YEARS, D009)~DAAT_index, data=res.cat.other.2)
cox.cat.other.3<-coxph(Surv(PERSON_YEARS, D009)~VAI_index, data=res.cat.other.3)
cox.cat.other.4<-coxph(Surv(PERSON_YEARS, D009)~VAI_GEA_index, data=res.cat.other.4)
cox.cat.other.5<-coxph(Surv(PERSON_YEARS, D009)~LAAP_index, data=res.cat.other.5)
cox.cat.other.6<-coxph(Surv(PERSON_YEARS, D009)~EVA_index, data=res.cat.other.6)

c.stat.other.1<-paste0(round(cox.cat.other.1$concordance[6],2)," (",round(cox.cat.other.1$
c.stat.other.2<-paste0(round(cox.cat.other.2$concordance[6],2)," (",round(cox.cat.other.2$
c.stat.other.3<-paste0(round(cox.cat.other.3$concordance[6],2)," (",round(cox.cat.other.3$
c.stat.other.4<-paste0(round(cox.cat.other.4$concordance[6],2)," (",round(cox.cat.other.4$
c.stat.other.5<-paste0(round(cox.cat.other.5$concordance[6],2)," (",round(cox.cat.other.5$
c.stat.other.6<-paste0(round(cox.cat.other.6$concordance[6],2)," (",round(cox.cat.other.6$

##Table of CutOffs

df.cut.1<-data.frame(index_1=c("METS-VF","DAAT","VAI","DAI","LAAP","EVA"),
                     cutoff_1=c(round(as.numeric(res.cut.all.1$cutpoint[1]),2),
                                round(as.numeric(res.cut.all.2$cutpoint[1]),2),
                                round(as.numeric(res.cut.all.3$cutpoint[1]),2),
                                round(as.numeric(res.cut.all.4$cutpoint[1]),2),
                                round(as.numeric(res.cut.all.5$cutpoint[1]),2),
                                round(as.numeric(res.cut.all.6$cutpoint[1]),2)),
                     statistic_1=c(round(as.numeric(res.cut.all.1$cutpoint[2]),2),
                                   round(as.numeric(res.cut.all.2$cutpoint[2]),2),
                                   round(as.numeric(res.cut.all.3$cutpoint[2]),2),
```

```
                                   round(as.numeric(res.cut.all.4$cutpoint[2]),2),
                                   round(as.numeric(res.cut.all.5$cutpoint[2]),2),
                                   round(as.numeric(res.cut.all.6$cutpoint[2]),2)),
                     CI_95_1=c(rbind(c.stat.all.1,
                                   c.stat.all.2,
                                   c.stat.all.3,
                                   c.stat.all.4,
                                   c.stat.all.5,
                                   c.stat.all.6)))

df.cut.2<-data.frame(index_2=c("METS-VF","DAAT","VAI","DAI","LAAP","EVA"),
                     cutoff_2=c(round(as.numeric(res.cut.cardiac.1$cutpoint[1]),2),
                                round(as.numeric(res.cut.cardiac.2$cutpoint[1]),2),
                                round(as.numeric(res.cut.cardiac.3$cutpoint[1]),2),
                                round(as.numeric(res.cut.cardiac.4$cutpoint[1]),2),
                                round(as.numeric(res.cut.cardiac.5$cutpoint[1]),2),
                                round(as.numeric(res.cut.cardiac.6$cutpoint[1]),2)),
                     statistic_2=c(round(as.numeric(res.cut.cardiac.1$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cardiac.2$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cardiac.3$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cardiac.4$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cardiac.5$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cardiac.6$cutpoint[2]),2)),
                     CI_95_2=c(rbind(c.stat.cardiac.1,
                                   c.stat.cardiac.2,
                                   c.stat.cardiac.3,
                                   c.stat.cardiac.4,
                                   c.stat.cardiac.5,
                                   c.stat.cardiac.6)))

df.cut.3<-data.frame(index_3=c("METS-VF","DAAT","VAI","DAI","LAAP","EVA"),
                     cutoff_3=c(round(as.numeric(res.cut.cerebrovasc.1$cutpoint[1]),2),
                                round(as.numeric(res.cut.cerebrovasc.2$cutpoint[1]),2),
                                round(as.numeric(res.cut.cerebrovasc.3$cutpoint[1]),2),
                                round(as.numeric(res.cut.cerebrovasc.4$cutpoint[1]),2),
                                round(as.numeric(res.cut.cerebrovasc.5$cutpoint[1]),2),
                                round(as.numeric(res.cut.cerebrovasc.6$cutpoint[1]),2)),
                     statistic_3=c(round(as.numeric(res.cut.cerebrovasc.1$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cerebrovasc.2$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cerebrovasc.3$cutpoint[2]),2),
                                   round(as.numeric(res.cut.cerebrovasc.4$cutpoint[2]),2),
```

```
                                    round(as.numeric(res.cut.cerebrovasc.5$cutpoint[2]),2),
                                    round(as.numeric(res.cut.cerebrovasc.6$cutpoint[2]),2))
                     CI_95_3=c(rbind(c.stat.cerebrovasc.1,
                                    c.stat.cerebrovasc.2,
                                    c.stat.cerebrovasc.3,
                                    c.stat.cerebrovasc.4,
                                    c.stat.cerebrovasc.5,
                                    c.stat.cerebrovasc.6)))

df.cut.4<-data.frame(index_4=c("METS-VF","DAAT","VAI","DAI","LAAP","EVA"),
                     cutoff_4=c(round(as.numeric(res.cut.other.1$cutpoint[1]),2),
                                 round(as.numeric(res.cut.other.2$cutpoint[1]),2),
                                 round(as.numeric(res.cut.other.3$cutpoint[1]),2),
                                 round(as.numeric(res.cut.other.4$cutpoint[1]),2),
                                 round(as.numeric(res.cut.other.5$cutpoint[1]),2),
                                 round(as.numeric(res.cut.other.6$cutpoint[1]),2)),
                     statistic_4=c(round(as.numeric(res.cut.other.1$cutpoint[2]),2),
                                    round(as.numeric(res.cut.other.2$cutpoint[2]),2),
                                    round(as.numeric(res.cut.other.3$cutpoint[2]),2),
                                    round(as.numeric(res.cut.other.4$cutpoint[2]),2),
                                    round(as.numeric(res.cut.other.5$cutpoint[2]),2),
                                    round(as.numeric(res.cut.other.6$cutpoint[2]),2)),
                     CI_95_4=c(rbind(c.stat.other.1,
                                    c.stat.other.2,
                                    c.stat.other.3,
                                    c.stat.other.4,
                                    c.stat.other.5,
                                    c.stat.other.6)))


df.cut<-cbind(df.cut.1,df.cut.2[,-1],df.cut.3[,-1],df.cut.4[,-1])
df.cut<-df.cut %>%
  rename("Indice de Grasa Visceral" = "index_1",
         "Punto de Corte\n(Cualquier Causa Cardiovasculares)" = "cutoff_1",
         "Estadístico-Log-Rank\n(Cualquier Causa Cardiovasculares)" = "statistic_1",
         "Estadístico-C\n(Cualquier Causa Cardiovasculares)" = "CI_95_1",
         "Punto de Corte\n(Afecciones Cardiacas)" = "cutoff_2",
         "Estadístico-Log-Rank\n(Afecciones Cardiacas)" = "statistic_2",
         "Estadístico-C\n(Afecciones Cardiacas)" = "CI_95_2",
         "Punto de Corte\n(Enfermedades Cerebrovasculares)" = "cutoff_3",
         "Estadístico-Log-Rank\n(Enfermedades Cerebrovasculares)" = "statistic_3",
```

```
        "Estadístico-C\n(Enfermedades Cerebrovasculares)" = "CI_95_3",
        "Punto de Corte\n(Otras Causas Cardiovasculares)" = "cutoff_4",
        "Estadístico-Log-Rank\n(Otras Causas Cardiovasculares)" = "statistic_4",
        "Estadístico-C\n(Otras Causas Cardiovasculares)" = "CI_95_4")

flextable::align(flextable::flextable(df.cut,cwidth=7),align="center",part="all")%>%flexta
```

Indice de Grasa Visceral	Punto de Corte (Cualquier Causa Cardiovasculares)	Estadístico-Log-Rank (Cualquier Causa Cardiovasculares)
METS-VF	7.21	24.29
DAAT	145.21	13.39
VAI	2.01	1.99
DAI	1.24	2.61
LAAP	45.25	7.47
EVA	133.27	23.48