

1 Codes

2

3 Data Cleaning And Manipulation

4 #Loading required packages

5 library(mosaic)

6 library(ggplot2)

7 library(descr)

8 library(haven)

9 library(lubridate)

10 library(dplyr)

11 library(tidyverse)

12 library(pROC)

13 library(ResourceSelection)

14

15 #Cleaning demographic dataset

16 #Importing demographics dataset

17 demo<- Demographics_subsample_v1_20230626

18 #Creating subset with required variables

19 newdemo<- demo %>% select (oGRE_ID, OBF_DOB, SEX, SIMD_2016_QUINTILE, DATE_OF_DEATH)

20 #Remove duplicates in ogre ID

21 newdemo<- newdemo %>% distinct(oGRE_ID,.keep_all=TRUE)

22 # Convert date of birth and date of death to date type

23 newdemo\$OBF_DOB<- as.Date(newdemo\$OBF_DOB, "%Y-%m-%d")

24 newdemo\$DATE_OF_DEATH<- as.Date(newdemo\$DATE_OF_DEATH, "%Y-%m-%d")

25 summary(newdemo\$DATE_OF_DEATH)

```
26  #Removing missing values in deprivation quintile
27  sum (is.na (newdemo$SIMD_2016_QUINTILE))
28  newdemoclean <- newdemo [complete.cases(newdemo$SIMD_2016_QUINTILE),]
29  summary(newdemoclean$SIMD_2016_QUINTILE)
30  head(newdemoclean)
31  #Check for unique values other than 1-5 deprivation quintile
32  newdemoclean2<- newdemoclean%>% filter(SIMD_2016_QUINTILE %in% 1:5)
33  #Check for values other than M and F
34  newdemoclean3<- newdemoclean%>% filter(SEX %in% c("M", "F"))
35  #Cleaning TRAK A and E dataset
36  # Renaming second trak A and E dataset
37  TRAKAANDE <- TRAK_AandE_subsample_v1_20230719
38  #Creating a subsample with required columns
39  NEWTRAK <- TRAKAANDE %>% select(oGRE_ID, DISCHARGE_TYPE_DESCRIPTION, CAUSEOFINJURY_DESCRIPTION, ADMISSION_DATE, DISCHARGE_DATE, ETHNICITY_DESCRIPTION)
40  #Check for missing values
41  sum (is.na (NEWTRAK$DISCHARGE_TYPE_DESCRIPTION))
42  sum (is.na (NEWTRAK$CAUSEOFINJURY_DESCRIPTION))
43  sum (is.na (NEWTRAK$ADMISSION_DATE))
44  sum (is.na (NEWTRAK$DISCHARGE_DATE))
45  sum (is.na (NEWTRAK$ETHNICITY_DESCRIPTION))
46  #Remove missing values from discharge date
47  NEWTRAK2 <- NEWTRAK [complete.cases(NEWTRAK$DISCHARGE_DATE),]
48  #Check if all the date of birth and date of death are in date format
49  NEWTRAK2$ADMISSION_DATE<- as.Date(NEWTRAK2$ADMISSION_DATE, "%Y-%m-%d")
```

```
50 NEWTRAK2$DISCHARGE_DATE<- as.Date(NEWTRAK2$DISCHARGE_DATE, "%Y-%m-%d")
51
52 #Cleaning SMR 01 dataset
53 #Importing and renaming SMR dataset
54 SMR<- SMR01_subsample_v1_20230626
55 #Creating a subsample with required columns
56 NEWSMR <- SMR %>% select(oGRE_ID, ADMDATE)
57 # Check if admission date are in date format
58 NEWSMR$ADMDATE<- as.Date(NEWSMR$ADMDATE, "%Y-%m-%d")
59 sum (is.na (NEWSMR$ADMDATE))
60 summary(NEWSMR$ADMDATE)
61
62 #Cleaning urban or rural dataset
63 #importing and renaming the dataset
64 Urbanandrural<- Urban_Rural_subsample_v1_20230721
65 #Check for missing values
66 sum (is.na (Urbanandrural$Current_UC))
67
68 #Merging all the datasets with required variables
69 MERGEDDATA <- merge(newdemoclean3, NEWTRAK2, by= "oGRE_ID", all = TRUE)
70 MERGEDDATA2<- merge(MERGEDDATA, Urbanandrural, by= "oGRE_ID", all = TRUE)
71 descriptivedata<-MERGEDDATA2 %>% distinct(oGRE_ID, .keep_all = TRUE)
72 summary(descriptivedata$SEX)
73 sum (is.na (descriptivedata$SEX))
```

```
74 summary(MERGEDDATA2)
75 head(MERGEDDATA2)
76 #Cleaning the merged dataset
77 FINALMERGEDDATA<- MERGEDDATA2 %>% drop_na(SIMD_2016_QUINTILE, OBF_DOB, ADMISSION_DATE, DISCHARGE_DATE)
78 summary(FINALMERGEDDATA)
79 summary(FINALMERGEDDATA$DATE_OF_DEATH)
80
81 #Calculating age of the patients
82 FINALMERGEDDATA$AGE <- as.numeric(difftime(FINALMERGEDDATA$ADMISSION_DATE, FINALMERGEDDATA$OBF_DOB, units = "weeks"))/ 52.25
83 FINALMERGEDDATA$AGE <- round (FINALMERGEDDATA$AGE)
84 summary(FINALMERGEDDATA$AGE)
85 #Removing patients below who are below 18 years of old
86 MERGEDSUBSETABOVE18 <- subset(FINALMERGEDDATA, AGE>=18)
87 summary(MERGEDSUBSETABOVE18$AGE)
88 #Categorising age
89 MERGEDSUBSETABOVE18$agegroup<- cut(MERGEDSUBSETABOVE18$AGE,
90                                   breaks= c(17,24,51,65,Inf),
91                                   labels=c('18-24', '25-50', '51-65', 'above65'),
92                                   right= TRUE, include.lowest=TRUE)
93 #Categorising year of admission
94 #Add year column
95 MERGEDSUBSETABOVE18<- MERGEDSUBSETABOVE18 %>% mutate(year= year(as.Date(ADMISSION_DATE)))
96
97 #Categorise year
```

```
98 MERGEDSUBSETABOVE18<- MERGEDSUBSETABOVE18%>% mutate(yearcategorised=case_when(year>=2012& year<=2014~ "2012-2014",
99                                     year>=2015& year<=2017~ "2015-2017",
100                                    year>=2018& year<=2020~ "2018-2020",
101                                    year>=2021& year<=2022~ "2021-2022",
102                                    TRUE~ "OTHER"))
103 #Recoding cause of admission into three categories
104 MERGEDSUBSETABOVE18$CAUSEOFINJURY<- recode(MERGEDSUBSETABOVE18$CAUSEOFINJURY_DESCRIPTION, "Medical Condition"= 1,
105                                     "Injury (Other Mechanism)"= 2,
106                                     "Unspecified"= 4, .default = 3)
107 #Recoding ethnicity into three categories
108 MERGEDSUBSETABOVE18$ETHNICITY<- recode(MERGEDSUBSETABOVE18$ETHNICITY_DESCRIPTION, "White Scottish"= 1, "Not Known"= 3, .default = 2)
109 summary(MERGEDSUBSETABOVE18$ETHNICITY)
110
111 #Calculating mortality within 30 days of A and E visit
112 #Creating a subset after removing duplicates in id column
113 mortality<-MERGEDSUBSETABOVE18%>% distinct(oGRE_ID, .keep_all = TRUE)
114 #Creating a subset of population from A and E for whom admission is only after 2018 since the death dates are only from then
115 mortality<- mortality %>% mutate(year= year(as.Date(ADMISSION_DATE)))
116 mortality<- mortality %>%filter(year>=2018)
117 #Creating a new column in the dataset by subtracting admission date and date of death
118 mortality$mortalitydays<- as.numeric(mortality$DATE_OF_DEATH- mortality$ADMISSION_DATE)
119 mortality$mortalityin30days<- ifelse(mortality$mortalitydays<=30,1,0)
120 mortality$mortalityin30days[is.na(mortality$mortalityin30days)]<-0
121 sum(mortality$mortalityin30days==1)
```

```
122
123  #Creating a variable for people Discharged on the same day
124  MERGEDSUBSETABOVE18$dischargedays<- as.numeric(MERGEDSUBSETABOVE18$DISCHARGE_DATE- MERGEDSUBSETABOVE18$ADMISSION_DATE)
125  sum(MERGEDSUBSETABOVE18$dischargedays==0)
126  summary(MERGEDSUBSETABOVE18$dischargedays)
127  MERGEDSUBSETABOVE18$dischargedaysameday<- ifelse(MERGEDSUBSETABOVE18$dischargedays<=0,1,0)
128  dischargebyID<-MERGEDSUBSETABOVE18%>% distinct(oGRE_ID, .keep_all = TRUE)
129  sum(dischargebyID$dischargedaysameday==1)
130
131  #Creating a variable to see repeat presentation to A and E within 30 days of previous visit
132  repeatpresentationwithin30days<- MERGEDSUBSETABOVE18 %>%
133  arrange(oGRE_ID, ADMISSION_DATE) %>%
134  group_by(oGRE_ID) %>%
135  mutate(repeatvisitdays= as.numeric(ADMISSION_DATE-lag(ADMISSION_DATE)))
136  repeatpresentationwithin30days$ repeatvisitin30days <- ifelse(repeatpresentationwithin30days$repeatvisitdays <=30, 1, 0)
137  repeatpresentationwithin30days$repeatvisitin30days[is.na(repeatpresentationwithin30days$repeatvisitin30days)]<-0
138
139  #Removing multiple enteries of patients to calculate the number of patients
140  patientidnoduplicate4<-repeatpresentationwithin30days %>%
141  arrange(oGRE_ID, desc(repeatvisitin30days))%>%
142  group_by(oGRE_ID) %>%
143  mutate(repeatvisitin30days1 = ifelse(any(repeatvisitin30days==1),
144                                     1,0)) %>% distinct(oGRE_ID, .keep_all = TRUE)
145  sum(patientidnoduplicate4$repeatvisitin30days==1)
```

```
146
147 #To check for immediate hospital admission
148 MERGEDSUBSETABOVE18<- MERGEDSUBSETABOVE18 %>% mutate(year= year(as.Date(ADMISSION_DATE)))
149 MERGEDDATA8 <- merge(MERGEDSUBSETABOVE18, NEWSMR, by= "oGRE_ID")
150 MERGEDDATA8$datematch<- ifelse (MERGEDDATA8$DISCHARGE_DATE==MERGEDDATA8$ADMDATE,1,0)
151 HOSPADM<-MERGEDDATA8 %>% group_by(oGRE_ID)%>%
152           summarise(HOSADM= ifelse(any(datematch==1), 1, 0),)
153 patientidnoduplicateforhospitalisationFINAL<-dischargebyID %>% left_join(HOSPADM, by="oGRE_ID")
154 patientidnoduplicateforhospitalisationFINAL$HOSADM[is.na(patientidnoduplicateforhospitalisationFINAL$HOSADM)]<-0
155 sum(patientidnoduplicateforhospitalisationFINAL$HOSADM==1, na.rm=TRUE)
156
157 #Loading comorbidity dataset
158 comorbDATA<-Comorbidities_subsample_v1_20230728
159 #Adding Comorbidity to all merged datasets
160 df<- comorbtrial%>% rowwise() %>% mutate (comcount= sum(!is.na(c_across(-oGRE_ID))))%>% ungroup()
161 df<- df%>% mutate( comgroup= case_when(comcount==0~ 0,
162           comcount==1~1,
163           comcount==2~2,
164           comcount>=3~3))
165 newcomorb2 <- df%>% select(oGRE_ID, comgroup)
166 comorbfinaldis<- dischargebyIDfinal %>% left_join(newcomorb2, by="oGRE_ID")
167 comorbfinalmor<-mortalityfinal%>% left_join(newcomorb2, by="oGRE_ID")
168 comorbfinalhosp<-patientidnoduplicateforhospitalisationFINAL%>% left_join(newcomorb2, by="oGRE_ID")
169 comorbfinalrepeat<-patientidnoduplicate4%>% left_join(newcomorb2, by="oGRE_ID")
```

170

171 **Descriptive Statistics**

```
172 table(descriptivedata$SEX)
173 table(descriptivedata$ETHNICITY_DESCRIPTION)
174 table(descriptivedata$Current_UC)
175 table(dischargebyID$agegroup)
176 table(descriptivedata$SIMD_2016_QUINTILE)
177 table(dischargebyID$CAUSEOFINJURY_DESCRIPTION)
178 table(TRAKAANDE$HOSPITAL_DESCRIPTION)
179 table(dischargebyIDfinal$yearcategorised)
180 table(dischargebyIDfinal$CAUSEOFINJURY)
181 table(comorbfinalhosp$comgroup)
182 table(comorbfinalhosp$ETHNICITY)
```

183 **#Mortalitywithin 30 days**

184 **#SIMD**

```
185 crosstabmortality<- crosstab(mortalityfinal$mortalityin30days, mortalityfinal$SIMD_2016_QUINTILE,chisq = FALSE)
186 print(crosstabmortality)
```

187 **#Age**

```
188 crosstabage<- crosstab(mortalityfinal$mortalityin30days, mortalityfinal$agegroup)
189 print(crosstabage)
```

190 **#Sex**

```
191 crosstabsex<- crosstab(mortalityfinal$mortalityin30days, mortalityfinal$SEX)
192 print(crosstabsex)
```

193 **#Ethnicity**

```
194 crosstabmortality<- crosstab(mortalityfinal$mortalityin30days, mortalityfinal$ETHNICITY)
```



```
195  print(crosstabmortality)
196  #Cause
197  crosstabmortality<- crosstab(mortalityfinal$mortalityin30days, mortalityfinal$CAUSEOFINJURY)
198  print(crosstabmortality)
199  #Year categorised
200  crosstabmortality<- crosstab(mortalityfinal$mortalityin30days, mortalityfinal$yearcategorised)
201  print(crosstabmortality)
202  #Comorbidity
203  crosstabmortality<- crosstab(comorbfinalmor$mortalityin30days, comorbfinalmor$comgroup)
204  print(crosstabmortality)
205
206  #Discharged on same day of A and E visit
207  # SIMD
208  crosstabdischarge<- crosstab(dischargebyIDfinal$dischargedssameday, dischargebyIDfinal$SIMD_2016_QUINTILE)
209  print(crosstabdischarge)
210  #Age
211  crosstabdischargeage<- crosstab(dischargebyID$dischargedssameday, dischargebyID$agegroup)
212  print(crosstabdischargeage)
213  #Sex
214  crosstabdischargesex<- crosstab(dischargebyID$dischargedssameday, dischargebyID$SEX)
215  print(crosstabdischargesex)
216  #year
217  crosstabyear<- crosstab(dischargebyIDfinal$dischargedssameday, dischargebyIDfinal$yearcategorised)
218  print(crosstabyear)
```

```
219  # Ethnicity
220  crosstabdischarge<- crosstab(dischargebyID$dischargedssameday, dischargebyID$ETHNICITY)
221  print(crosstabdischarge)
222  # Cause
223  crosstabdischargecause<- table(dischargebyID$dischargedssameday, dischargebyID$CAUSEOFINJURY)
224  print(crosstabdischargecause)
225  #Comorbidity
226  crosstabdischarge<- crosstab(comorbfinaldis$dischargedssameday, comorbfinaldis$comgroup)
227  print(crosstabdischarge)
228
229  #Immediate hospital admission
230  #SIMD
231  crosstabadmsimd<- crosstab(patientidnoduplicateforhospitalisationFINAL$HOSADM, patientidnoduplicateforhospitalisationFINAL$SIMD_2016_QUINTILE)
232  print(crosstabadmsimd)
233  #Age
234  crosstabadmage<- crosstab(patientidnoduplicateforhospitalisation4$datematch, patientidnoduplicateforhospitalisation4$agegroup)
235  print(crosstabadmage)
236  #Comorbidity
237  crosstabadmcom<- crosstab(comorbfinalhosp$HOSADM, comorbfinalhosp$comgroup)
238  print(crosstabadmcom)
239  #Sex
240  crosstabadmsex<- crosstab(patientidnoduplicateforhospitalisationFINAL$HOSADM, patientidnoduplicateforhospitalisationFINAL$SEX)print(crosstabadmsex)
241  #Ethnicity
242  crosstabadmETHN<- crosstab(patientidnoduplicateforhospitalisationFINAL$HOSADM, patientidnoduplicateforhospitalisationFINAL$ETHNICITY)
```

```
243 print(crosstabadmETHN)
244 #Year
245 crosstabadmyear<- crosstab(patientidnoduplicateforhospitalisationFINAL$HOSADM, patientidnoduplicateforhospitalisationFINAL$yearcategorised)print(crosstabadmyear)
246 #Cause
247 crosstabadmcause<- crosstab(patientidnoduplicateforhospitalisation4$datematch, patientidnoduplicateforhospitalisation4$CAUSEOFINJURY)
248 print(crosstabadmcause)
249
250 #Repeat presentation to A&E
251 #SIMD
252 crosstabRPSIMD<- crosstab(patientidnoduplicate4$repeatvisitin30days, patientidnoduplicate4$SIMD_2016_QUINTILE)print(crosstabRPSIMD)
253 #Age
254 crosstabRPage<- crosstab(patientidnoduplicate4$repeatvisitin30days, patientidnoduplicate4$agegroup)print(crosstabRPage)
255 #Sex
256 crosstabRPsex<- crosstab(patientidnoduplicate4$repeatvisitin30days, patientidnoduplicate4$SEX)print(crosstabRPsex)
257 #Ethnicity
258 crosstabRPethn<- crosstab(patientidnoduplicate4$repeatvisitin30days, patientidnoduplicate4$ETHNICITY)print(crosstabRPethn)
259 #Year
260 crosstabRPyear<- crosstab(patientidnoduplicate4$repeatvisitin30days, patientidnoduplicate4$yearcategorised)
261 print(crosstabRPyear)
262 #Cause
263 summary(patientidnoduplicate4$CAUSEOFINJURY)crosstabRPcause<- crosstab(patientidnoduplicate4$repeatvisitin30days, patientidnoduplicate4$CAUSEOFINJURY)print(crosstabRPcause)
264 #Comorbidity
265 crosstabRPcause<- crosstab(comorbfinalrepeat$repeatvisitin30days, comorbfinalrepeat$comgroup)print(crosstabRPcause)
266
```

267

268 Regression Models

269

270 #Mortality model building

271 #SIMD

272 mortalityfinal\$SIMD_2016_QUINTILE <-factor(mortalityfinal\$SIMD_2016_QUINTILE)

273 MortalitymodelSIMD <- glm(mortalityin30days ~ SIMD_2016_QUINTILE , data=mortalityfinal, family="binomial")

274 summary(MortalitymodelSIMD)

275 confint.default(MortalitymodelSIMD)

276 exp(cbind(OR=coef(MortalitymodelSIMD), confint.default(MortalitymodelSIMD)))

277 #Age

278 Mortalitymodelage <- glm(mortalityin30days ~ AGE , data=mortalityfinal, family="binomial")

279 summary(Mortalitymodelage)

280 confint.default(Mortalitymodelage)

281 exp(cbind(OR=coef(Mortalitymodelage), confint.default(Mortalitymodelage)))

282 #Sex

283 Mortalitymodelsex <- glm(mortalityin30days ~ SEX, data=mortalityfinal, family="binomial")

284 summary(Mortalitymodelsex)

285 confint.default(Mortalitymodelsex)

286 exp(cbind(OR=coef(Mortalitymodelsex), confint.default(Mortalitymodelsex)))

287 #Ethnicity

288 mortalityfinal\$ETHNICITY <-factor(mortalityfinal\$ETHNICITY)

289 Mortalitymodelethn <- glm(mortalityin30days ~ ETHNICITY , data=mortalityfinal, family="binomial")

290 summary(Mortalitymodelethn)

291 confint.default(Mortalitymodelethn)

```
292 exp(cbind(OR=coef(Mortalitymodelethn), confint.default(Mortalitymodelethn)))
293 # Cause
294 mortalityfinal$CAUSEOFINJURY <-factor(mortalityfinal$CAUSEOFINJURY)
295 Mortalitymodelcause <- glm(mortalityin30days ~ CAUSEOFINJURY , data=mortalityfinal, family="binomial")
296 summary(Mortalitymodelcause)
297 confint.default(Mortalitymodelcause)
298 exp(cbind(OR=coef(Mortalitymodelcause), confint.default(Mortalitymodelcause)))
299 #Year
300 mortalityfinal$yearcategorised <-factor(mortalityfinal$yearcategorised)
301 Mortalitymodelyear <- glm(mortalityin30days ~ yearcategorised , data=mortalityfinal, family="binomial")
302 summary(Mortalitymodelyear)
303 confint.default(Mortalitymodelyear)
304 exp(cbind(OR=coef(Mortalitymodelyear), confint.default(Mortalitymodelyear)))
305 #Comorb
306 comorbfinalmor$comgroup <-factor(comorbfinalmor$comgroup)
307 Mortalitymodelcomorb <- glm(mortalityin30days ~ comgroup , data=comorbfinalmor, family="binomial")
308 summary(Mortalitymodelcomorb)
309 confint.default(Mortalitymodelcomorb)
310 exp(cbind(OR=coef(Mortalitymodelcomorb), confint.default(Mortalitymodelcomorb)))
311 #Adjusted model
312 mortalityfinal$SIMD_2016_QUINTILE <-factor(mortalityfinal$SIMD_2016_QUINTILE)
313 mortalityfinal$ETHNICITY<-factor(mortalityfinal$ETHNICITY)
314 mortalityfinal$yearcategorised <-factor(mortalityfinal$yearcategorised)
315 mortalityfinal$CAUSEOFINJURY <-factor(mortalityfinal$CAUSEOFINJURY)
```

```
316 mortalityfinal$comorbidity <-factor(mortalityfinal$comorbidity)
317 MortalitymodelADJ <- glm(mortalityin30days ~ SIMD_2016_QUINTILE+ SEX+ yearcategorised+ AGE+ CAUSEOFINJURY+ ETHNICITY+ comgroup, data=comorbfinalmor, family="binomial")
318 summary(MortalitymodelADJ)
319 confint.default(MortalitymodelADJ)
320 exp(cbind(OR=coef(MortalitymodelADJ), confint.default(MortalitymodelADJ)))
321 #Fit check
322 Predict1<- MortalitymodelADJ, newdata= comorbfinalmor, type="response")
323 Roc1<- roc(comorbfinalmor$mortalityin30days, Predict1 , ci= TRUE)
324 print(Roc1)
325 plot(Roc1)
326
327 #Discharge model
328 #SIMD
329 dischargemodelSIMD <- glm(dischargedssameday ~ SIMD_2016_QUINTILE , data=dischargebyID, family="binomial")
330 summary(dischargemodelSIMD)
331 confint.default(dischargemodelSIMD)
332 exp(cbind(OR=coef(dischargemodelSIMD), confint.default(dischargemodelSIMD)))
333 #Age
334 dischargemodelAGE <- glm(dischargedssameday ~ AGE , data=dischargebyID, family="binomial")
335 summary(dischargemodelAGE)
336 confint.default(dischargemodelAGE)
337 exp(cbind(OR=coef(dischargemodelAGE), confint.default(dischargemodelAGE)))
338 #Sex
339 dischargemodelsex <- glm(dischargedssameday ~ SEX , data=dischargebyID, family="binomial")
```

```
340 summary(dischargemodelsex)
341 confint.default(dischargemodelsex)
342 exp(cbind(OR=coef(dischargemodelsex), confint.default(dischargemodelsex)))
343 #Cause
344 dischargemodelcause <- glm(dischargedssameday ~ CAUSEOFINJURY , data=dischargebyID, family="binomial")
345 summary(dischargemodelcause)
346 confint.default(dischargemodelcause)
347 exp(cbind(OR=coef(dischargemodelcause), confint.default(dischargemodelcause)))
348 #Ethnicity
349 dischargemodellethn <- glm(dischargedssameday ~ ETHNICITY , data=dischargebyID, family="binomial")
350 summary(dischargemodellethn)
351 confint.default(dischargemodellethn)
352 exp(cbind(OR=coef(dischargemodellethn), confint.default(dischargemodellethn)))
353 #Year
354 dischargemodelyear <- glm(dischargedssameday ~ yearcategorised , data=dischargebyID, family="binomial")
355 summary(dischargemodelyear)
356 confint.default(dischargemodelyear)
357 exp(cbind(OR=coef(dischargemodelyear), confint.default(dischargemodelyear)))
358 #Comorbidity
359 comorbfinaldis$comgroup <- factor(comorbfinaldis$comgroup)
360 dischargemodelcom <- glm(dischargedssameday ~ comgroup , data=comorbfinaldis, family="binomial")
361 summary(dischargemodelcom)
362 confint.default(dischargemodelcom)
363 exp(cbind(OR=coef(dischargemodelcom), confint.default(dischargemodelcom)))
```

```
364  #Adjusted Model
365  comorbfinaldis$SIMD_2016_QUINTILE <-factor(comorbfinaldis$SIMD_2016_QUINTILE)
366  comorbfinaldis$ETHNICITY<-factor(comorbfinaldis$ETHNICITY)
367  comorbfinaldis$yearcategorised <-factor(comorbfinaldis$yearcategorised)
368  comorbfinaldis$CAUSEOFINJURY <-factor(comorbfinaldis$CAUSEOFINJURY)
369  dischargemodel <- glm(dischargedsame day ~ SIMD_2016_QUINTILE + AGE+ SEX + yearcategorised+ ETHNICITY+ CAUSEOFINJURY+ comgroup, data=comorbfinaldis, family="binomial")
370  summary(dischargemodel)
371  confint.default(dischargemodel)
372  exp(cbind(OR=coef(dischargemodel), confint.default(dischargemodel)))
373  #Fit check
374  Predict2<- dischargemodel, newdata= comorbfinaldis, type="response")
375  Roc2<- roc(comorbfinaldis $ dischargedsame day, Predict2 , ci= TRUE)
376  print(Roc2)
377  plot(Roc2)
378
379  #Repeat Presentation Model
380  #SIMD
381  repeatpresentationmodelsimd <- glm(repeatvisitin30days ~ SIMD_2016_QUINTILE , data=patientidnoduplicate4, family="binomial")
382  summary(repeatpresentationmodelsimd)
383  confint.default(repeatpresentationmodelsimd)
384  exp(cbind(OR=coef(repeatpresentationmodelsimd), confint.default(repeatpresentationmodelsimd)))
385  #Sex
386  repeatpresentationmodelsex <- glm(repeatvisitin30days ~ SEX , data=patientidnoduplicate4, family="binomial")
387  summary(repeatpresentationmodelsex)
```



```
388   confint.default(repeatpresentationmodelsex)
389   exp(cbind(OR=coef(repeatpresentationmodelsex), confint.default(repeatpresentationmodelsex)))
390   #Age
391   repeatpresentationmodelage <- glm(repeatvisitin30days ~ AGE , data=patientidnoduplicate4, family="binomial")
392   summary(repeatpresentationmodelage)
393   confint.default(repeatpresentationmodelage)
394   exp(cbind(OR=coef(repeatpresentationmodelage), confint.default(repeatpresentationmodelage)))
395   #Ethnicity
396   patientidnoduplicate4$ETHNICITY<-factor(patientidnoduplicate4$ETHNICITY)
397   repeatpresentationmodelethn <- glm(repeatvisitin30days ~ ETHNICITY , data=patientidnoduplicate4, family="binomial")
398   summary(repeatpresentationmodelethn)
399   confint.default(repeatpresentationmodelethn)
400   exp(cbind(OR=coef(repeatpresentationmodelethn), confint.default(repeatpresentationmodelethn)))
401   #Year
402   patientidnoduplicate4$yearcategorised<-factor(patientidnoduplicate4$yearcategorised)
403   repeatpresentationmodelyear <- glm(repeatvisitin30days ~ yearcategorised , data=patientidnoduplicate4, family="binomial")
404   summary(repeatpresentationmodelyear)
405   confint.default(repeatpresentationmodelyear)
406   exp(cbind(OR=coef(repeatpresentationmodelyear), confint.default(repeatpresentationmodelyear)))
407   #Cause
408   patientidnoduplicate4$CAUSEOFINJURY<-factor(patientidnoduplicate4$CAUSEOFINJURY)
409   repeatpresentationmodelcause <- glm(repeatvisitin30days ~ CAUSEOFINJURY , data=patientidnoduplicate4, family="binomial")
410   summary(repeatpresentationmodelcause)
411   confint.default(repeatpresentationmodelcause)
```

```
412 exp(cbind(OR=coef(repeatpresentationmodelcause), confint.default(repeatpresentationmodelcause)))
413 #Comorbidity
414 repeatpresentationmodelcom <- glm(repeatvisitin30days ~ comgroup , data=comorbfinalrepeat, family="binomial")
415 summary(repeatpresentationmodelcom)
416 confint.default(repeatpresentationmodelcom)
417 exp(cbind(OR=coef(repeatpresentationmodelcom), confint.default(repeatpresentationmodelcom)))
418 #Adjusted Model
419 patientidnoduplicate4$SIMD_2016_QUINTILE <-factor(patientidnoduplicate4$SIMD_2016_QUINTILE)
420 patientidnoduplicate4$ETHNICITY<-factor(patientidnoduplicate4$ETHNICITY)
421 patientidnoduplicate4$yearcategorised <-factor(patientidnoduplicate4$yearcategorised)
422 patientidnoduplicate4$CAUSEOFINJURY <-factor(patientidnoduplicate4$CAUSEOFINJURY)
423 comorbfinalrepeat$comgroup <-factor(comorbfinalrepeat$comgroup)
424 repeatpresentationmodel <- glm(repeatvisitin30days ~ SIMD_2016_QUINTILE + AGE+ SEX+ yearcategorised+ CAUSEOFINJURY+ ETHNICITY+ comgroup, data=comorbfinalrepeat,
425 family="binomial")
426 summary(repeatpresentationmodel)
427 confint.default(repeatpresentationmodel)
428 exp(cbind(OR=coef(repeatpresentationmodel), confint.default(repeatpresentationmodel)))
429 #Fit check
430 Predict3<- repeatpresentationmodel, newdata= comorbfinalrepeat, type="response")
431 Roc3<- roc(comorbfinalrepeat$repeatvisitin30days, Predict3 , ci= TRUE)
432 print(Roc3)
433 plot(Roc3)
434
435 #Immediate hospital admission model
436 #Age
```

```
437 immediatehospitalisationmodelage<- glm( HOSADM ~ AGE , data=patientidnoduplicateforhospitalisationFINAL, family="binomial")
438 summary(immediatehospitalisationmodelage)
439 confint.default(immediatehospitalisationmodelage)
440 exp(cbind(OR=coef(immediatehospitalisationmodelage), confint.default(immediatehospitalisationmodelage)))
441 #Sex
442 immediatehospitalisationmodelsex<- glm(HOSADM ~ SEX , data=patientidnoduplicateforhospitalisationFINAL, family="binomial")
443 summary(immediatehospitalisationmodelsex)
444 confint.default(immediatehospitalisationmodelsex)
445 exp(cbind(OR=coef(immediatehospitalisationmodelsex), confint.default(immediatehospitalisationmodelsex)))
446 #SIMD
447 immediatehospitalisationmodelsimd<- glm( HOSADM ~ SIMD_2016_QUINTILE , data=patientidnoduplicateforhospitalisationFINAL, family="binomial")
448 summary(immediatehospitalisationmodelsimd)
449 confint.default(immediatehospitalisationmodelsimd)
450 exp(cbind(OR=coef(immediatehospitalisationmodelsimd), confint.default(immediatehospitalisationmodelsimd)))
451 #Ethnicity
452 immediatehospitalisationmodelethn<- glm( HOSADM ~ ETHNICITY , data=patientidnoduplicateforhospitalisationFINAL, family="binomial")
453 summary(immediatehospitalisationmodelethn)
454 confint.default(immediatehospitalisationmodelethn)
455 exp(cbind(OR=coef(immediatehospitalisationmodelethn), confint.default(immediatehospitalisationmodelethn)))
456 #Cause
457 immediatehospitalisationmodelcause<- glm( HOSADM~ CAUSEOFINJURY , data=patientidnoduplicateforhospitalisationFINAL, family="binomial")
458 summary(immediatehospitalisationmodelcause)
459 confint.default(immediatehospitalisationmodelcause)
460 exp(cbind(OR=coef(immediatehospitalisationmodelcause), confint.default(immediatehospitalisationmodelcause)))
```

```
461  #Year
462  immediatehospitalisationmodelyear<- glm( HOSADM ~ yearcategorised , data=patientidnoduplicateforhospitalisationFINAL, family="binomial")
463  summary(immediatehospitalisationmodelyear)
464  confint.default(immediatehospitalisationmodelyear)
465  exp(cbind(OR=coef(immediatehospitalisationmodelyear), confint.default(immediatehospitalisationmodelyear)))
466  #Comorbidity
467  immediatehospitalisationmodelcom<- glm( HOSADM ~ comgroup , data=comorbfinalhosp, family="binomial")
468  summary(immediatehospitalisationmodelcom)
469  confint.default(immediatehospitalisationmodelcom)
470  exp(cbind(OR=coef(immediatehospitalisationmodelcom), confint.default(immediatehospitalisationmodelcom)))
471  #Adjusted model
472  patientidnoduplicateforhospitalisationFINAL$SIMD_2016_QUINTILE <-factor(patientidnoduplicateforhospitalisationFINAL$SIMD_2016_QUINTILE)
473  patientidnoduplicateforhospitalisationFINAL$ETHNICITY <-factor(patientidnoduplicateforhospitalisationFINAL$ETHNICITY)
474  patientidnoduplicateforhospitalisationFINAL$yearcategorised <-factor(patientidnoduplicateforhospitalisationFINAL$yearcategorised)
475  patientidnoduplicateforhospitalisationFINAL$CAUSEOFINJURY <-factor(patientidnoduplicateforhospitalisationFINAL$CAUSEOFINJURY)
476  comorbfinalhosp$comgroup <-factor(comorbfinalhosp$comgroup)
477  immediatehospitalisationmodel<- glm( HOSADM ~ SIMD_2016_QUINTILE + AGE + SEX + yearcategorised+ ETHNICITY+ CAUSEOFINJURY+ comgroup, data=comorbfinalhosp,
478  family="binomial")
479  summary(immediatehospitalisationmodel)
480  confint.default(immediatehospitalisationmodel)
481  exp(cbind(OR=coef(immediatehospitalisationmodel), confint.default(immediatehospitalisationmodel)))
482  #Fit check
483  Predict4<- immediatehospitalisationmodel, newdata= comorbfinalhosp, type="response")
484  Roc4<- roc(comorbfinalhosp$HOSADM, Predict4 , ci= TRUE)
485  print(Roc4)
```

486 plot(Roc4)