

Presentation

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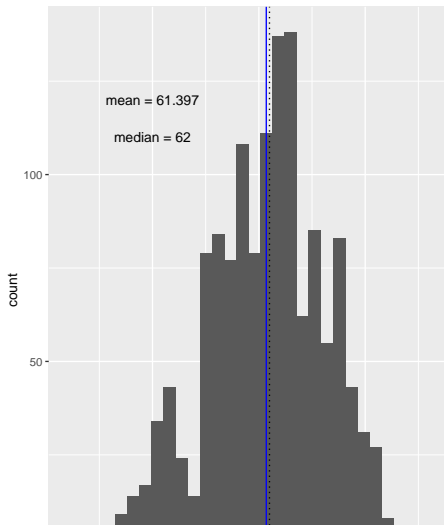
Introduction

Introduction text here

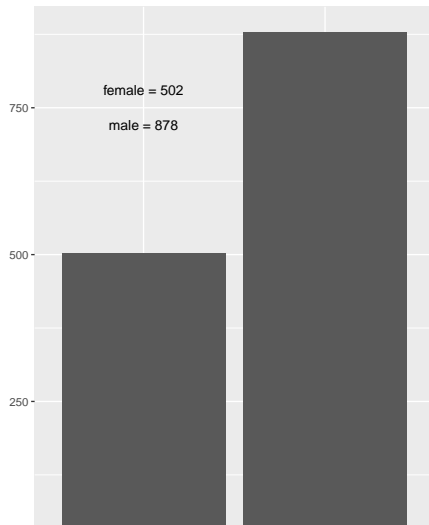
Descriptive statistics

- Demographic information

age distribution



distribution of sex

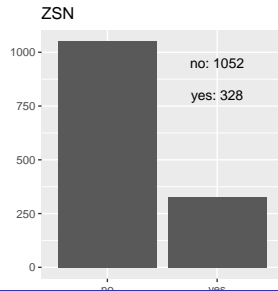
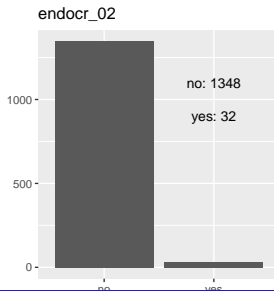
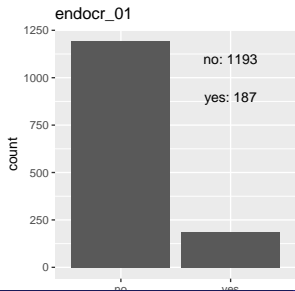
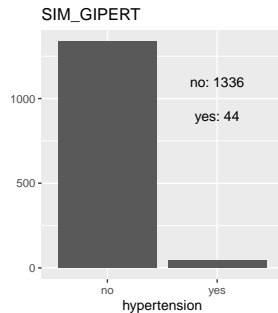
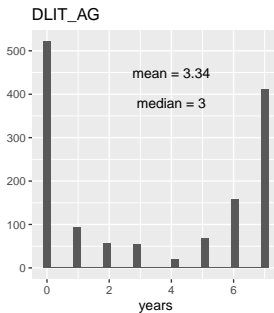
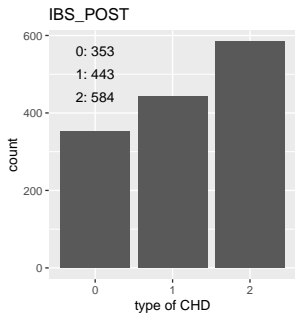


Descriptive statistics

- Patient physiological attributes
- IBS_POST: coronary heart disease in recent weeks before admission to hospital
 - 0: there was no CHD
 - 1: exertional angina pectoris
 - 2: unstable angina pectoris
- DLIT_AG: duration of arterial hypertension
 - 0: there was no arterial hypertension
 - 1: one year
 - 2: two years
 - 3: three years
 - 4: four years
 - 5: five years
 - 6: 6-10 years
 - 7: more than 10 years

- SIM_GIPERT: systematic hypertension; 0 - no, 1 - yes
- endocr_01: diabetes mellitus in the anamnesis; 0 - no, 1 - yes
- endocr_02: obesity in the anamnesis; 0 - no, 1 - yes
- ZSN: chronic heart failure; 0 - no, 1 - yes

Descriptive statistics



Ariane: Analysis of Sex and Chronic Heart Failure: Overview

Question: Is there an association between sex and chronic heart failure?

Sex	Chronic Heart Failure	
	No	Yes
Female	353	149
Male	699	179

Analysis of Sex and Chronic Heart Failure: Tests

Pearson χ^2 Test of Independence:

X-squared
14.71773

p-value = 0.00012

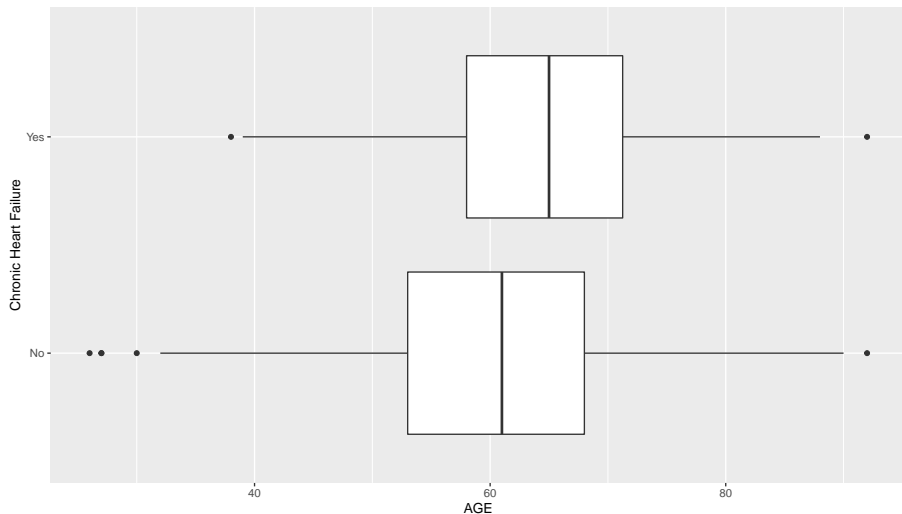
Likelihood Ratio Test of Independence:

G
14.93905

p-value = 0.00011

Analysis of Age(Continuous) and Chronic Heart Failure: Overview

Question: Is there an association between age and chronic heart failure?



Analysis of Age(Continuous) and Chronic Heart Failure: Summary Statistics

	Chronic Heart Failure	
	No	Yes
Min.	26	38
1st Qu.	53	58
Median	61	65
Mean	60.42586	64.51220
3rd Qu.	68.00	71.25
Max	92	92

Analysis of Age(Continuous) and Chronic Heart Failure: Test

Analysis was done using a two sided Wilcoxon Rank Sum Test to test if there is a difference in Chronic Heart Failure outcome across age.

W

136546.5

p-value = 1e-08

Analysis of Age(Categorical) and Chronic Heart Failure: Overview

Question: Is there an association between age(decade) and chronic heart failure?

Age	Chronic Heart Failure	
	No	Yes
20s	3	0
30s	44	2
40s	114	24
50s	294	67
60s	365	126
70s	197	86
80s	32	22
90s	3	1

Analysis of Age(Categorical) and Chronic Heart Failure: Test

Pearson χ^2 Test of Independence:

X-squared

35.41942

p-value = 1e-05

Likelihood Ratio Test of Independence:

G

38.86163

p-value = 2.08e-06

Alona

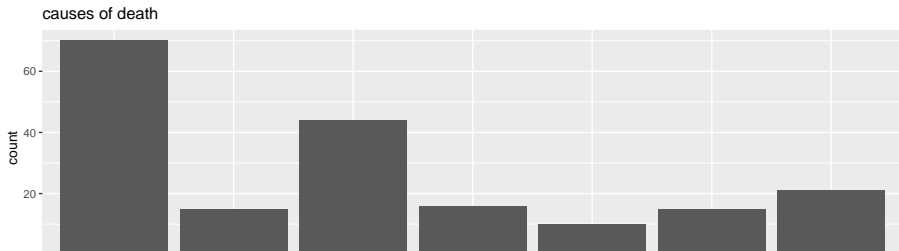
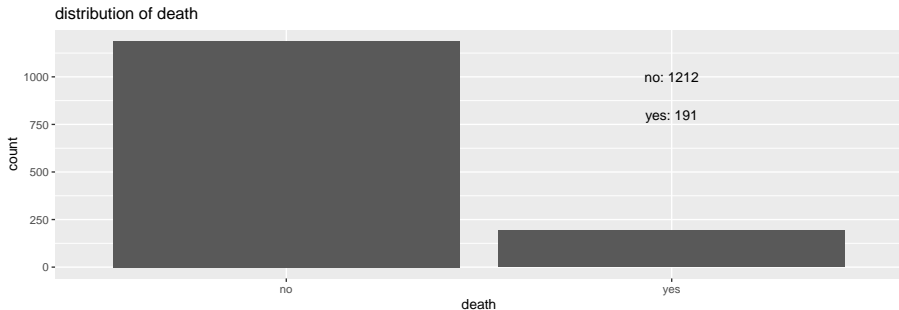
Alona

Minsu

Secondary analysis - modeling the relationship between death outcome and selected variables

- The dataset includes one variable indicating the causes of lethal outcome for the patients
 - LET_IS: causes of lethal outcome
 - 0: survive
 - 1: cardiogenic edema
 - 2: pulmonary edema
 - 3: myocardial rupture
 - 4: progress of congestive heart failure
 - 5: thromboembolism
 - 6: asystole
 - 7: ventricular fibrillation
- Build a logistic regression model to predict death of the patients by turning LET_IS to a binary variable “death”
- Build model with multinomial response to investigate the cause of death

Secondary analysis - modeling the relationship between death outcome and selected variables



Secondary analysis

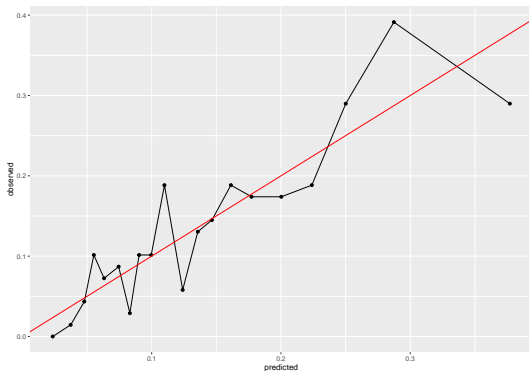
- Full model contains continuous variables AGE, DLIT_AG, categorical variables SEX, IBS_POST, SIM_GIPERT, endocr_01, endocr_02, and the interaction terms between AGE and all the other variables.
- Used stepwise step() to select the best model.
- The best model selected:

$$\log \frac{\pi_i}{1-\pi_i} = -6.018 + 0.058 \times AGE + 0.073 \times I(IBM = 1) + 0.696 \times I(IBM = 2) + 0.726 \times I(SIM = 1) + 0.476 \times I(endocr01 = 1) + 1.081 \times I(endocr02 = 1)$$

- All selected predictors increase the probability of death.
 - $\exp(\text{beta_age}) = 1.06$
 - $OR(IBM_POST = 1 \text{ vs. } IBM_POST = 0) = 1.08$ ($p = 0.77 > 0.5$)
 - $OR(IBM_POST = 2 \text{ vs. } IBM_POST = 0) = 2.01$
 - $OR(\text{hypertension vs. non hypertension}) = 2.07$ ($p = 0.065 > 0.5$)
 - $OR(\text{diabetes vs. non diabetes}) = 1.61$
 - $OR(\text{obese vs. not obese}) = 2.95$

Secondary analysis

- Goodness of fit check with Hosmer-Lemeshow test by grouping the observations into 20 groups. The test statistic is 0.4291, indicating an adequate fit of the model to the dataset.
- Plotted the predicted value against the observed value of the 20 groups. Overall the dots follow the diagonal.



Secondary analysis

- Fit baseline category logit model on cause of death. Used predictors selected in the previous analysis.

$$\log \frac{\pi_j(x)}{\pi_J(x)} = \beta_{0j} + \beta_{1j} \times AGE + \beta_{2j} \times I(IBM = 1) + \beta_{3j} \times I(IBM = 2) + \beta_{4j} \times I(SIM = 1) + \beta_{5j} \times I(endocr01 = 1) + \beta_{6j} \times I(endocr02 = 1), j = 1, \dots, 6$$

where J = cardiogenic shock, j = 1 pulmonary edema, 2 myocardial rupture, 3 progress of congestive heart failure, 4 thromboembolism, 5 asystole, 6 ventricular fibrillation

```
multi.mod <- multinom(LET_IS ~ AGE + as.factor(IBM_POST) + as
```

```
## # weights:  56 (42 variable)
## initial  value 371.668838
## iter   10 value 312.126386
## iter   20 value 300.807784
## iter   30 value 300.010607
## iter   40 value 299.933289
## iter   50 value 299.931699
```

Secondary analysis

```
##      intercept          AGE IBS_POST = 1 IBS_POST = 2 SIM_GIPEP
## 2 -5.208477  0.05003237    0.4172287   -0.2605801   -14.8802
## 3 -2.662446  0.04515371   -0.8725386   -1.3250667    -0.0125
## 4 -3.189649  0.02970654   -0.3969242   -0.7216065    0.0040
## 5  1.046965 -0.03766681   -0.2262002   -1.5074724   -16.1651
## 6 -2.551705  0.03088585   -2.0391936   -1.3081214   -16.8835
## 7  2.872844 -0.05676433   -0.5333366   -0.2875964    0.2570
##      endocr_02 = 1
## 2    -14.0286129
## 3      0.6681173
## 4   -15.2277093
## 5   -16.3110403
## 6      0.7648381
## 7   -15.7083009
```

Secondary analysis

Estimated $\exp(\beta_{ij})$:

##		intercept	AGE	IBS_POST = 1	IBS_POST = 2	SIM_GIPF
## 2		0.005469998	1.0513051	1.5177496	0.7706045	3.4482
## 3		0.069777345	1.0461887	0.4178893	0.2657852	9.8748
## 4		0.041186340	1.0301522	0.6723850	0.4859709	1.0040
## 5		2.848990047	0.9630338	0.7975584	0.2214691	9.5399
## 6		0.077948656	1.0313678	0.1301336	0.2703274	4.6510
## 7		17.687253718	0.9448167	0.5866443	0.7500642	1.2930
##	endocr_02 = 1					
## 2		8.080734e-07				
## 3		1.950562e+00				
## 4		2.436071e-07				
## 5		8.245276e-08				
## 6		2.148646e+00				
## 7		1.506509e-07				