Characteristics and Outcomes of Patients Admitted for Acute Heart Failure in a Single Centre Study

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Introduction

- Acute heart failure represents a medical condition with very high mortality rates
- During the acute phase of heart failure decompensation current concepts focus on time-to-treatment management, improved detection of etiologies, precipitating factors and comorbidities
- Risk assessment of acute heart failure patients is a tool for detection of patients in high risk of adverse events or death

Aims

- The aims of this study:
  - to provide a characterisation of hospitalized patients with acute heart failure in a tertiary medical centre
  - to determine risk factors of short- and long-term mortality

- University Hospital in Hradec Králové
  - the only one in-patients centre for 93.000 inhabitants of the city Hradec Králové (2017)
  - the only one tertiary medical centre for 551.000 inhabitants of Hradec Králové region (2017)

Methods

- Retrospective analysis of patients hospitalized for acute heart failure during 12 months (January 2017 – December 2017) in standard or intensive care units of the 1st Department of Internal Medicine-Cardioangiology

- Totally 3413 hospitalization cases, **385 patients with acute heart failure** (diagnosed within 48 hours after or before admission)

- Statistical analysis
  - categorical data – n, %; comparison with the Pearson's chi-square test or Fisher's exact test
  - continuous data – median, IQR; comparison with the non-parametrical Mann-Whitney U test or Kolmogorov-Smirnov test
  - multivariate logistic regression to obtain independent predictors of mortality, odds ratios with corresponding 95% confidence intervals

Results: demographic and clinical characteristics

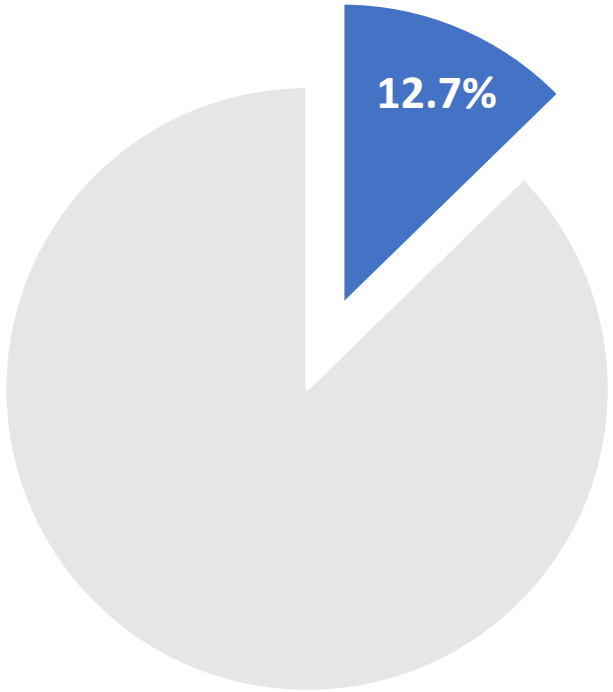
	All (N = 385)
Age, median (IQR)	74 (67.5 - 80)
Female, n (%)	131 (34)
Heart rate, median (IQR)	90 (75 - 110)
Systolic blood pressure, median (IQR)	130 (112 - 150)
Diastolic blood pressure, median (IQR)	75 (64 - 88)
BMI, median (IQR), N = 376	29.3 (26 - 33.8)
BSA, median (IQR), N = 376	2 (1.85 - 2.21)
LV EF, median (IQR), N = 376	37.5 (25 - 50)
Peripheral swelling, n (%)	225 (58.4)
Crackles, n (%)	255 (66.2)
Jugular vein distension, n (%)	135 (35.1)
X-ray pulmonary congestion, n (%)	255 (66.9)
X-ray pleural effusion, n (%)	132 (34.7)
Cardiogenic shock, n (%)	28 (7.3)
Cardiopulmonary resuscitation before admission, n (%)	12 (3.1)

Results: comorbidities

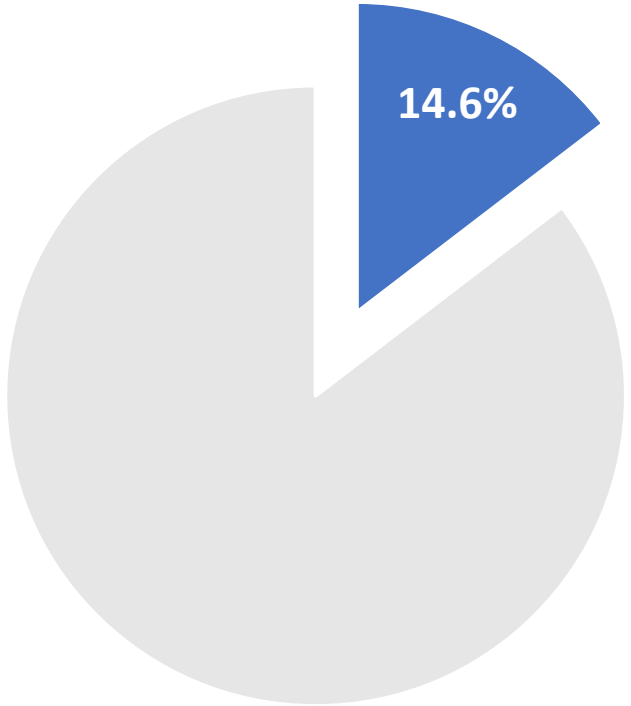
	All (N = 385)
Chronic heart failure, n (%)	163 (42.3)
Coronary artery disease, n (%)	243 (63.1)
Diabetes mellitus, n (%)	181 (47)
Arterial hypertension, n (%)	299 (77.7)
Atrial fibrillation, n (%)	210 (54.6)
Atrial flutter, n (%)	23 (6)
Chronic kidney disease, n (%)	220 (57.1)
Valve disease (at least moderate), n (%)	283 (73.5)
Malignancy, n (%)	59 (15.3)
Peripheral artery disease, n (%)	77 (20)
Chronic obstructive pulmonary disease, n (%)	62 (16.1)
Depression, n (%)	31 (8)
Dyslipidaemia, n (%)	259 (67.3)
Stroke, n (%)	38 (9.9)
ICD, n (%)	34 (8.8)
Pacemaker, n (%)	16 (4.2)
CRT, n (%)	21 (5.5)

Results: mortality rates

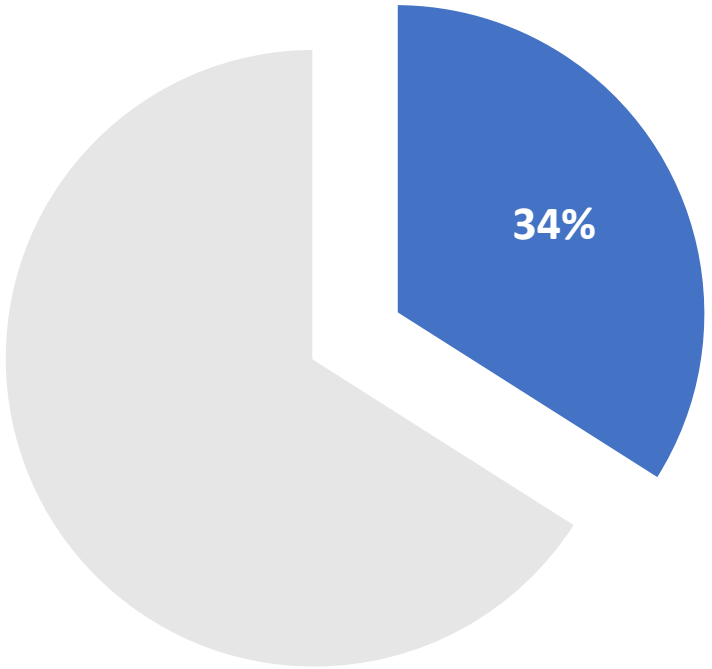
In-hospital mortality



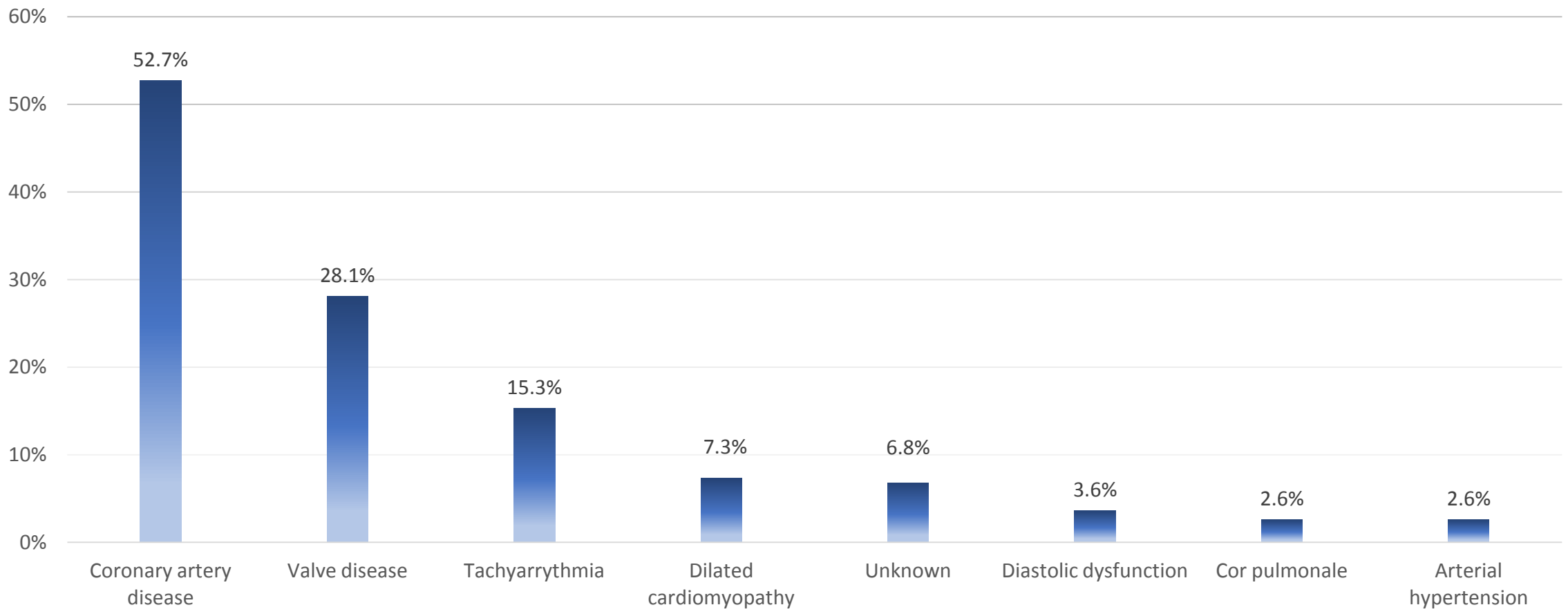
30-day mortality



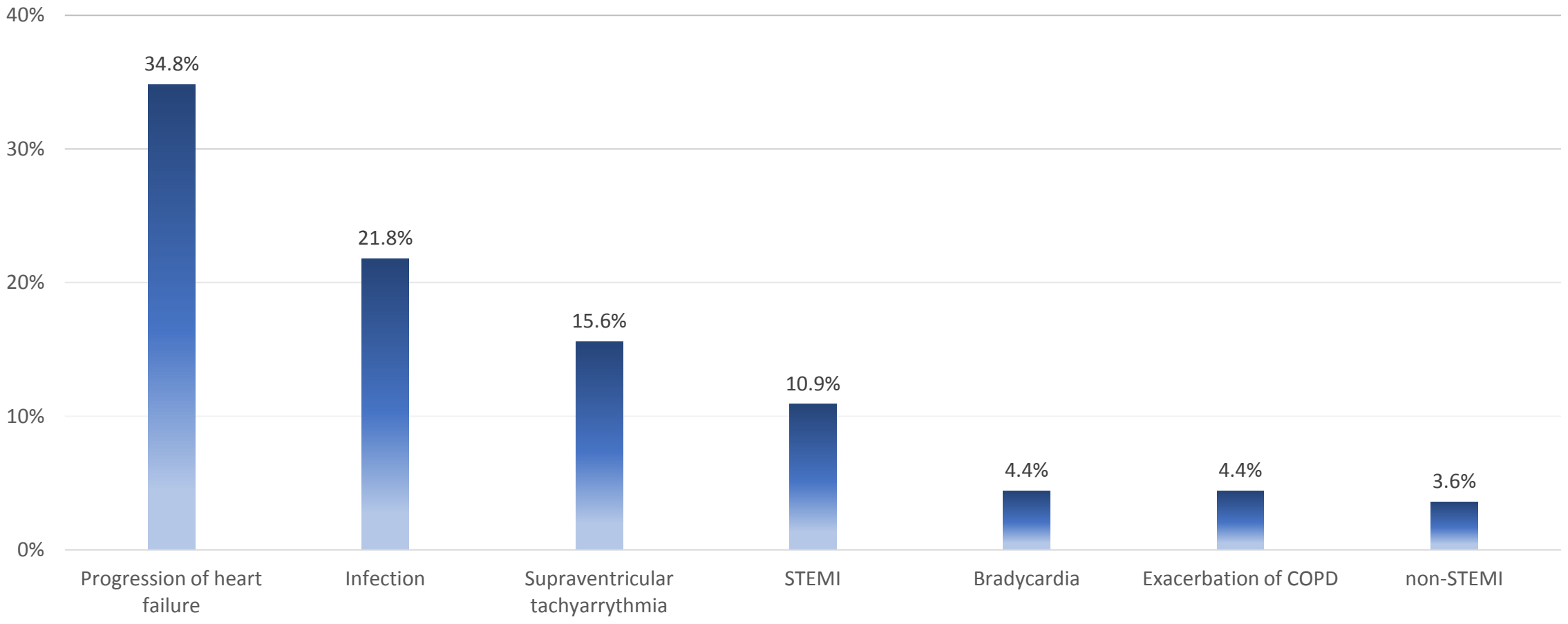
1-year mortality



Results: etiologies of heart failure

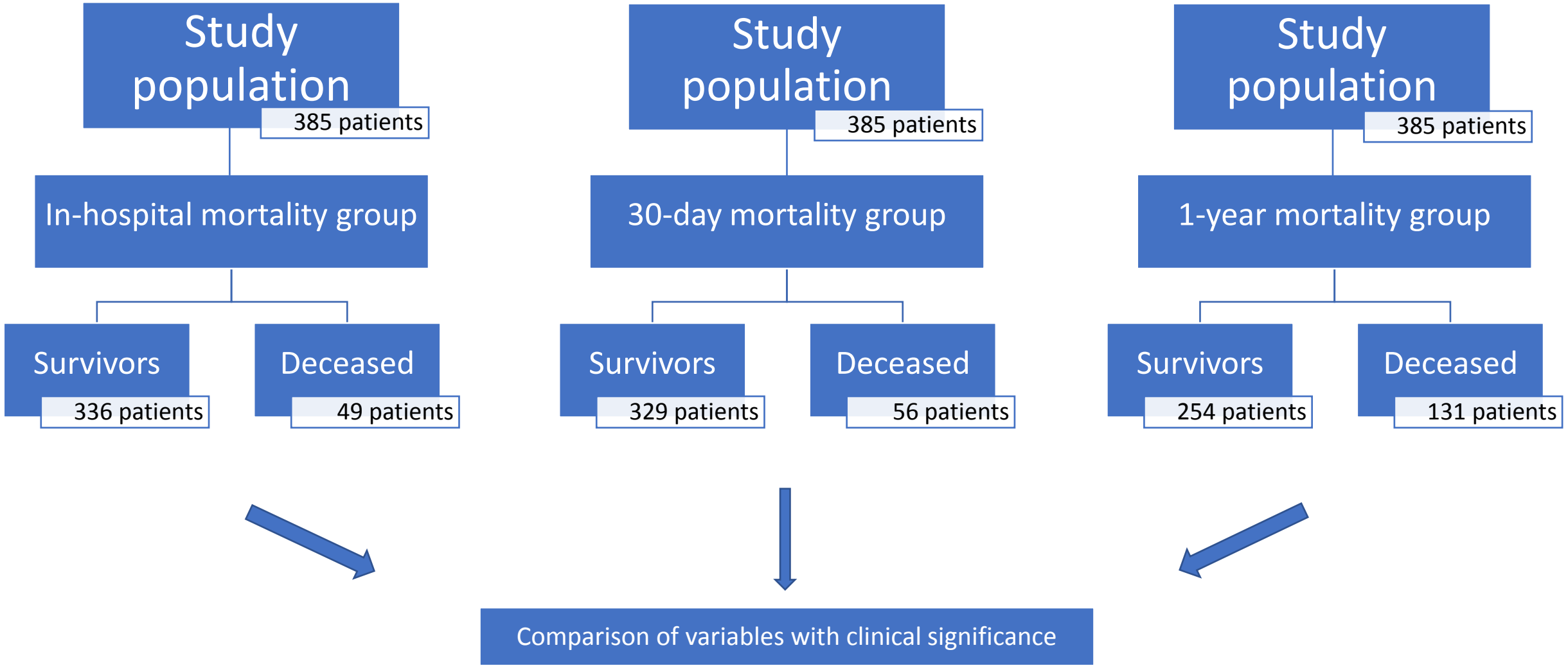


Results: precipitating factors of heart failure



Results: treatment and diagnostic procedures

	All (N = 385)
Artificial pulmonary ventilation, n (%)	73 (19)
invasive, n (%), N = 73	36 (49.3)
non-invasive, n (%), N = 73	40 (54.8)
Hemodialysis, n (%)	15 (3.9)
CRRT, n (%), N = 15	7 (46.7)
IRRT, n (%), N = 15	8 (53.3)
Coronarography, n (%)	159 (41.3)
intervention, n (%), N = 159	73 (45.9)
ECMO, n (%)	4 (1)
Intravenous furosemide, n (%)	331 (86)
Intravenous nitrate, n (%)	56 (14.6)
Dobutamine, n (%)	38 (9.9)
Noradrenaline, n (%)	69 (17.9)
Intravenous amiodarone, n (%)	46 (12)


Study population
385 patients
In-hospital mortality group
Survivors
336 patients
Deceased
49 patients
Study population
385 patients
30-day mortality group
Survivors
329 patients
Deceased
56 patients
Study population
385 patients
1-year mortality group
Survivors
254 patients
Deceased
131 patients
Comparison of variables with clinical significance

Risk factors of mortality

In-hospital mortality	OR	95% CI	p
Haemodialysis	15.8	2.9 – 84.6	0.0008
Chronic heart failure	4.3	1.7 – 11.0	0.001
STEMI	4.2	1.2 – 14.2	0.023
PAD	3.7	1.5 – 9.0	0.004
APV	2.9	1.3 – 7.0	0.015
Acute kidney injury	2.3	1.1 – 5.1	0.045
30-day mortality	**OR**	**95% CI**	**p**
Haemodialysis	13.7	1.3 – 148.3	0.031
Chronic heart failure	4.3	1.5 – 12.0	0.003
Depression	4.1	1.2 – 14.5	0.035
Atrial fibrillation	3.6	1.4 – 9.4	0.005
Acute kidney injury	3.4	1.4 – 8.2	0.007
Age	1.1	1.0 – 1.1	0.045
1-year mortality	**OR**	**95% CI**	**p**
Haemodialysis	4.3	1.2 – 15.6	0.025
Depression	3.5	1.4 – 8.4	0.005
Age	1.1	1.1 – 1.2	0.0004

Discussion and conclusion

- Our study confirms high mortality rates among patients hospitalized for acute heart failure
- High rates of comorbidities are accompanied with a wide range of etiologies of heart failure and precipitating factors of heart failure decompensation
- Comorbidities, precipitating factors of heart failure, complications occurring during the early phase of hospitalization and the age of patients should be included in the risk stratification of in-hospital, 30-day and 1-year mortality

Limitations

- Retrospective and single centre design of our study
- Inclusion of patients admitted to our department only
- Incomplete follow-up in all patients

Thank you for your attention

In-hospital mortality group

Variables	Survivors (N = 336)	Deceased (N = 49)	p
Days of hospitalization, median (IQR)	11 (7 - 18)	5 (2 - 15)	<0.0001
Coronary artery disease, n (%)	205 (61)	38 (77.6)	0.025
Peripheral artery disease, n (%)	61 (18.2)	16 (32.7)	0.018
Chronic heart failure, n (%)	133 (39.6)	30 (61.2)	0.004
Acute kidney injury, n (%)	121 (36)	32 (65.3)	<0.0001
Hemodialysis, n (%)	6 (1.8)	9 (18.4)	<0.0001
Artificial pulmonary ventilation, n (%)	52 (15.5)	21 (42.9)	<0.0001
Systolic blood pressure, median (IQR)	131 (115 - 151)	116 (92 - 132)	<0.0001
Diastolic blood pressure, median (IQR)	77 (66 - 90)	65 (52 - 75)	<0.0001
LV ejection fraction, median (IQR)	38 (25 - 50)	30 (18 - 50)	0.047

30-day mortality group

Variables	Survivors (N = 329)	Deceased (N = 56)	p
Days of hospitalization, median (IQR)	11 (7 - 19)	5 (2 - 9)	<0.0001
Age, median (IQR)	73 (67 - 79)	77 (71 - 85)	0.003
Coronary artery disease, n (%)	201 (61.1)	41 (75)	0.046
Atrial fibrillation, n (%)	172 (52.3)	38 (67.9)	0.03
Depression, anxiety, n (%)	22 (6.7)	9 (16.1)	0.029
Chronic heart failure, n (%)	132 (40.1)	31 (55.4)	0.033
Acute kidney injury, n (%)	119 (36.2)	34 (60.7)	0.0005
Hemodialysis, n (%)	9 (2.7)	6 (10.7)	0.013
Artificial pulmonary ventilation, n (%)	52 (15.8)	21 (37.5)	0.0001
Systolic blood pressure, median (IQR)	132 (117 - 153)	116 (99 - 131)	<0.0001
Diastolic blood pressure, median (IQR)	77 (66 - 89)	67 (58 - 80)	0.0005
Pulse pressure, median (IQR)	52 (41 - 70)	45 (30 - 61)	0.002
LV ejection fraction, median (IQR)	38 (25 - 52)	30 (20 - 47)	0.021

1-year mortality group

Variables	Survivors (N = 254)	Deceased (N = 131)	p
Age, median (IQR)	72 (65 - 78)	76 (71 – 84)	<0.0001
Coronary artery disease, n (%)	149 (58.7)	94 (71.8)	0.012
Atrial fibrillation, n (%)	129 (50.8)	81 (61.8)	0.039
Peripheral artery disease, n (%)	41 (16.1)	36 (27.5)	0.008
Depression, anxiety, n (%)	15 (5.9)	16 (12.2)	0.031
Chronic heart failure, n (%)	90 (35.4)	73 (55.7)	0.0001
Acute kidney injury, n (%)	89 (35)	64 (48.9)	0.009
Hemodialysis, n (%)	5 (2)	10 (7.6)	0.007
Artificial pulmonary ventilation, n (%)	40 (15.8)	33 (25.2)	0.025
Spirolonaltone, n (%)	52 (20.5)	41 (31.3)	0.019
Furosemide, n (%)	113 (44.5)	82 (62.6)	0.0008
Systolic blood pressure, median (IQR)	134 (117 - 153)	122 (110 - 141)	0.001
Diastolic blood pressure, median (IQR)	77 (66 - 90)	73 (62 - 84)	0.009
BMI, median (IQR) (on admission)	29.6 (26.5 - 34.8)	27.6 (24.4 - 32.2)	0.003
BSA, median (IQR) (on admission)	2.02 (1.87 - 2.23)	1.97 (1.76 - 2.16)	0.028