Acute Heart Failure: The Scope of the Problem

Prof Avraham Shotan

Braunwald's Heart Disease – A Textbook of Cardiovascular Medicine 3rd edition 1988

Eugine Braunwald: Clinical Manifestation of Heart Failure

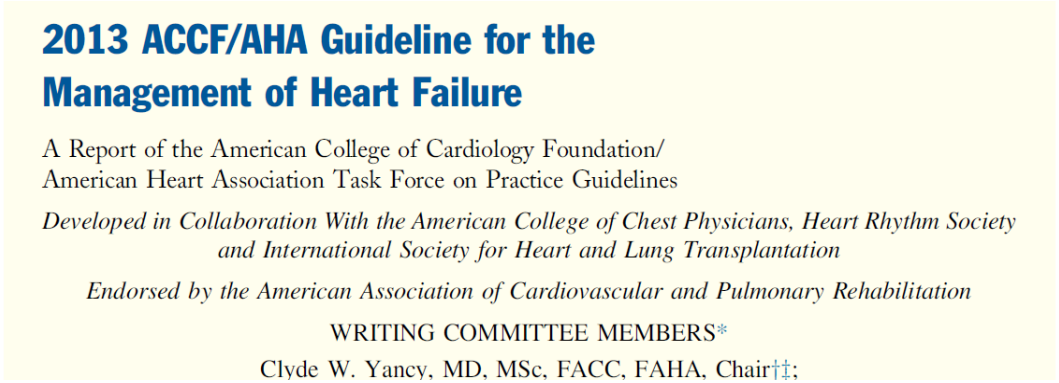
Acute vs Chronic Heart Failure

- The clinical manifestations of HF depend importantly on the **rate** the syndrome **develops** and specifically on whether **sufficient time** has elapsed for **compensatory mechanisms** to become operative …

- When a previously normal person **suddenly** develops a serious **anatomical** or **functional** abnormality … either a marked **sudden reduction in cardiac output** with symptoms due to **inadequate organ perfusion** and/or **acute congestion** …

- If the same anatomical abnormality develops **gradually**, or if the patient **survives the acute insult** a host of **compensatory mechanisms develop** …

Heart Failure Management – Diagnosis and treatment



המרכז הרפואי
הלל יפה

Acute Heart Failure

8. The Hospitalized Patient

- HF is the leading cause of hospitalization among pts >65 yrs.
- Recurrent hospitalizations – 50% at 6 months
- 1-year mortality ~30%

Acute Heart Failure

8. The Hospitalized Patient

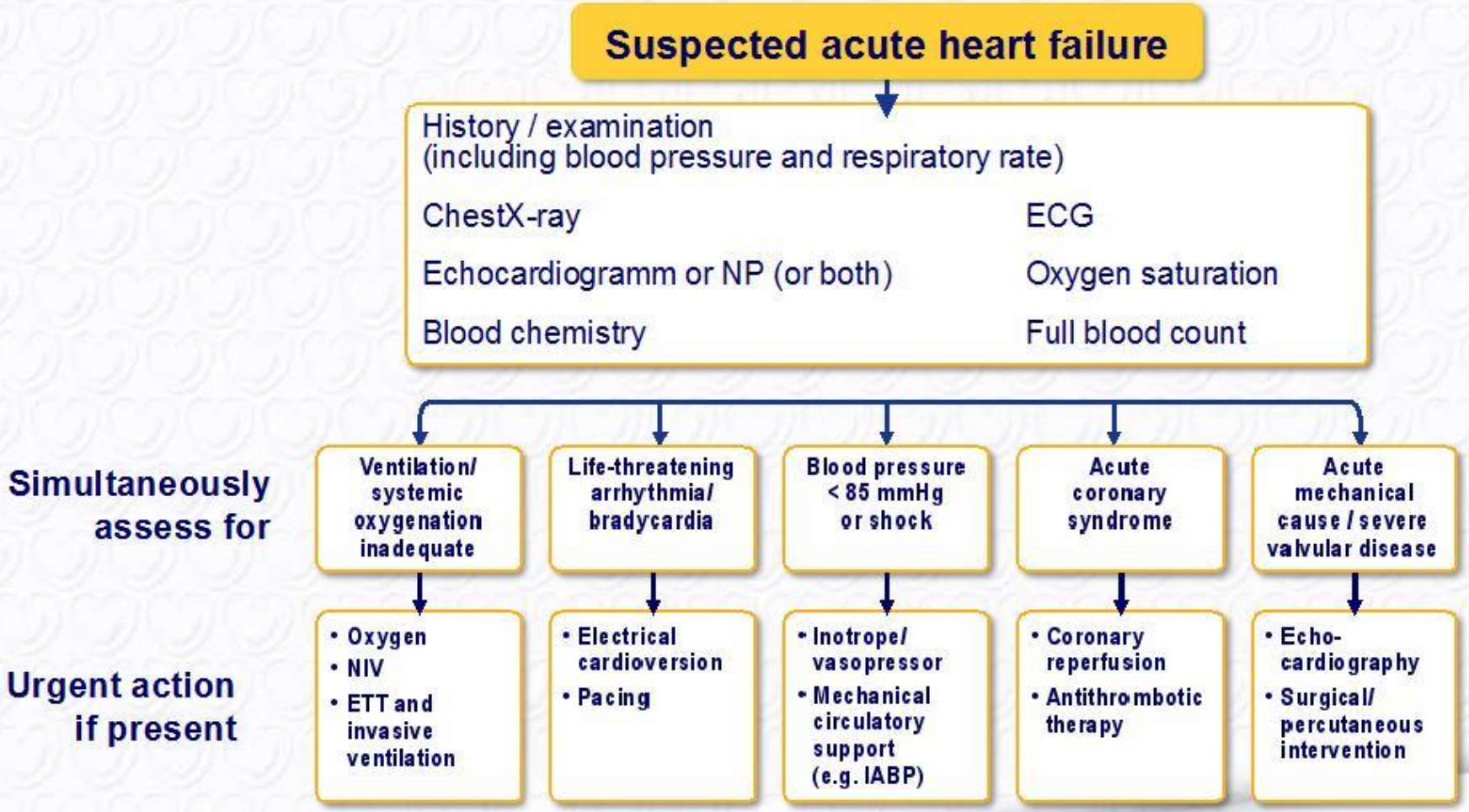
- Acute HF syndromes
- Acute decompensated HF
- Acute de novo HF

Hospitalized pts with HF can be classified into important subgroups:

- Acute coronary ischemia
- Accelerated hypertension
- Acutely decompensated HF
- Shock
- Acutely worsening right HF
- HF decompensation after surgical procedures

Each HF category has specific etiologic factors leading to decompensation, presentation, management and outcomes

Initial assessment of patient with suspected acute heart failure



www.escardio.org/guidelines

European Heart Journal (2012) 33, 1787–1847
European Journal of Heart Failure (2012) 14, 803–869

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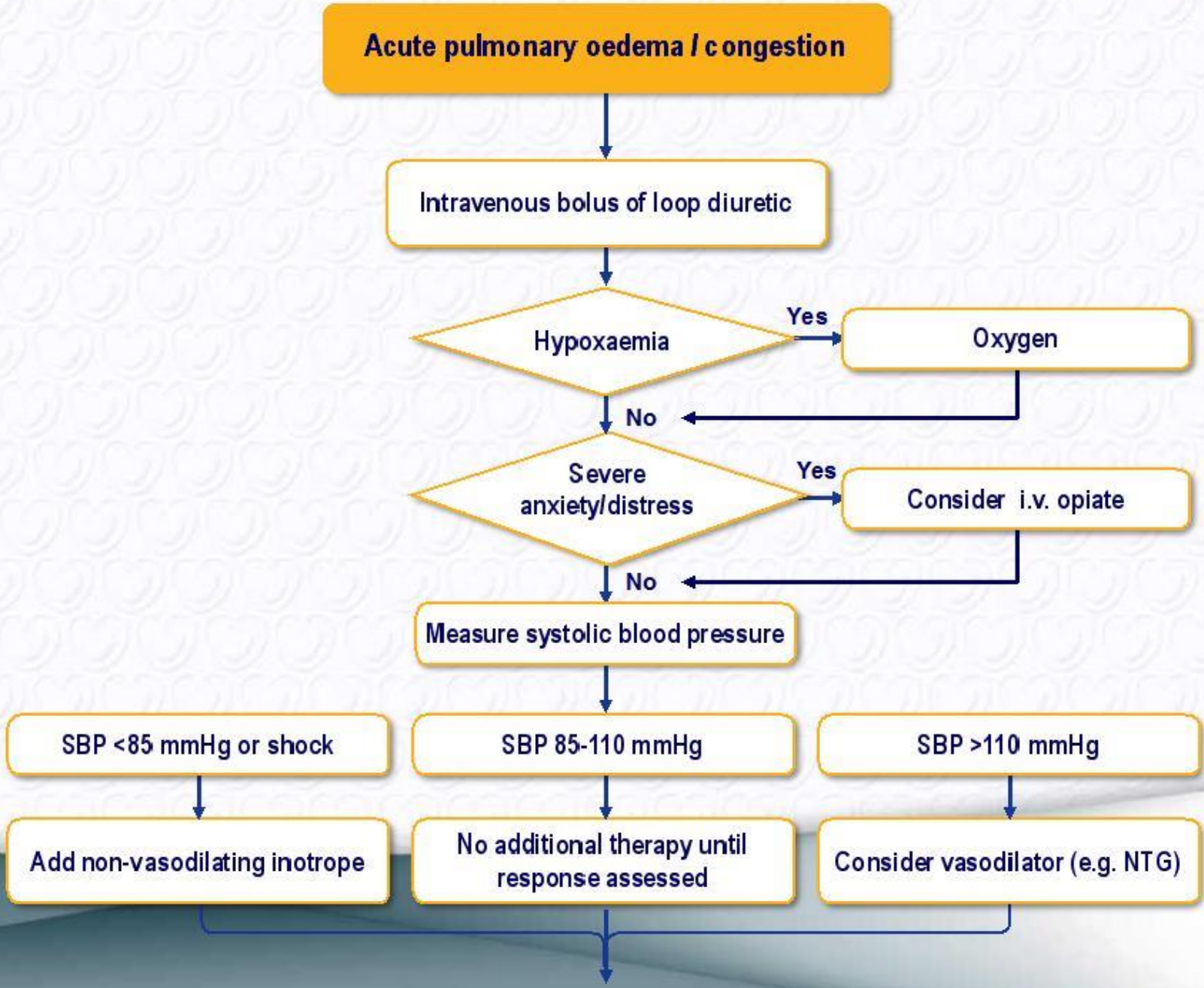
Algorithm for management of acute pulmonary oedema/congestion



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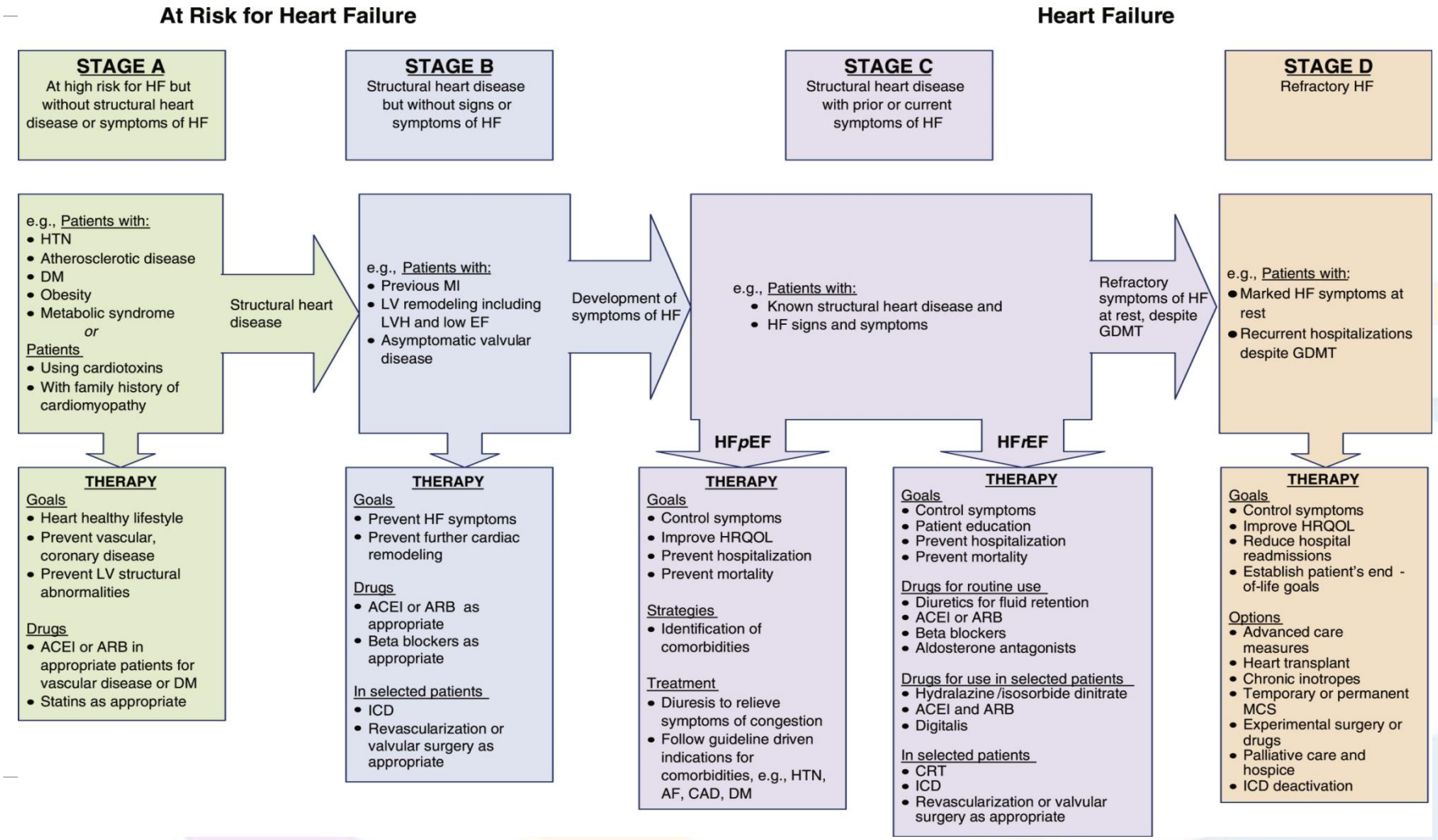
JACC Journals

From: 2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

J Am Coll Cardiol. 2013;62(16):e147-e239. doi:10.1016/j.jacc.2013.05.019



HFSIS – Heart Failure Survey in Israel 2003

Study Population

25/25 Hospitals

93/98 Internal Medicine Departments

24/25 Cardiology Departments (24 ICCU, 16 Intermediate)

The Steering Committee:

Moshe Garty	Avraham Shotan
Moshe Mittelman	Abraham Caspi
Avi Porath	Shmuel Gottlieb
Ehud Grossman	Basil Lewis
Reuven Zimlichman	Jonathan Leor

The Israel Society of Internal Medicine

The Israel Heart Society - The Working Group on Heart Failure

The Israeli National Center for Disease Control (ICDC)

Under the auspices of The Israeli Medical Association

Stages of Heart Failure

A At **high risk** for developing HF, but **without structural** heart disease or **symptoms** of HF

B **Structural** heart disease, but **without symptoms** of HF

Pre-heart failure

Heart Failure

C **Structural** heart disease **with prior** or **current symptoms** of HF

D **Refractory HF** requiring **specialized interventions**

Stages of Heart Failure

A At **high risk** for developing HF, but **without structural** heart disease or **symptoms** of HF

B **Structural** heart disease, but **without symptoms** of HF

C **Structural** heart disease **with prior** or **current symptoms** of HF

D **Refractory HF** requiring **specialized interventions**

Stages of Heart Failure

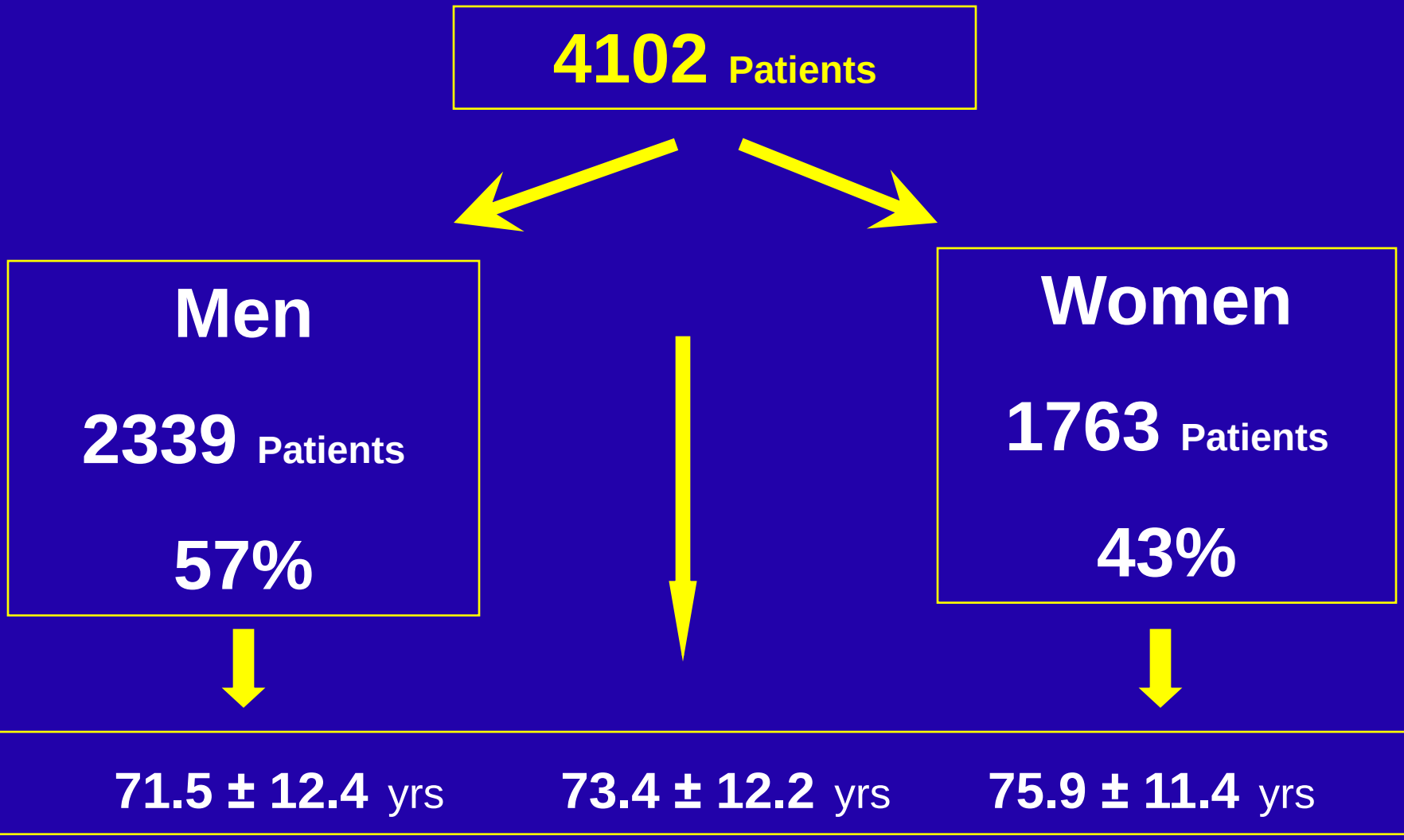
A At **high risk** for developing HF, but **without structural** heart disease or **symptoms** of HF

B **Structural** heart disease, but **without symptoms** of HF

C **Structural** heart disease **with prior** or **current symptoms** of HF

D **Refractory HF** requiring **specialized interventions**

HFSIS March-April 2003 – Age by Gender



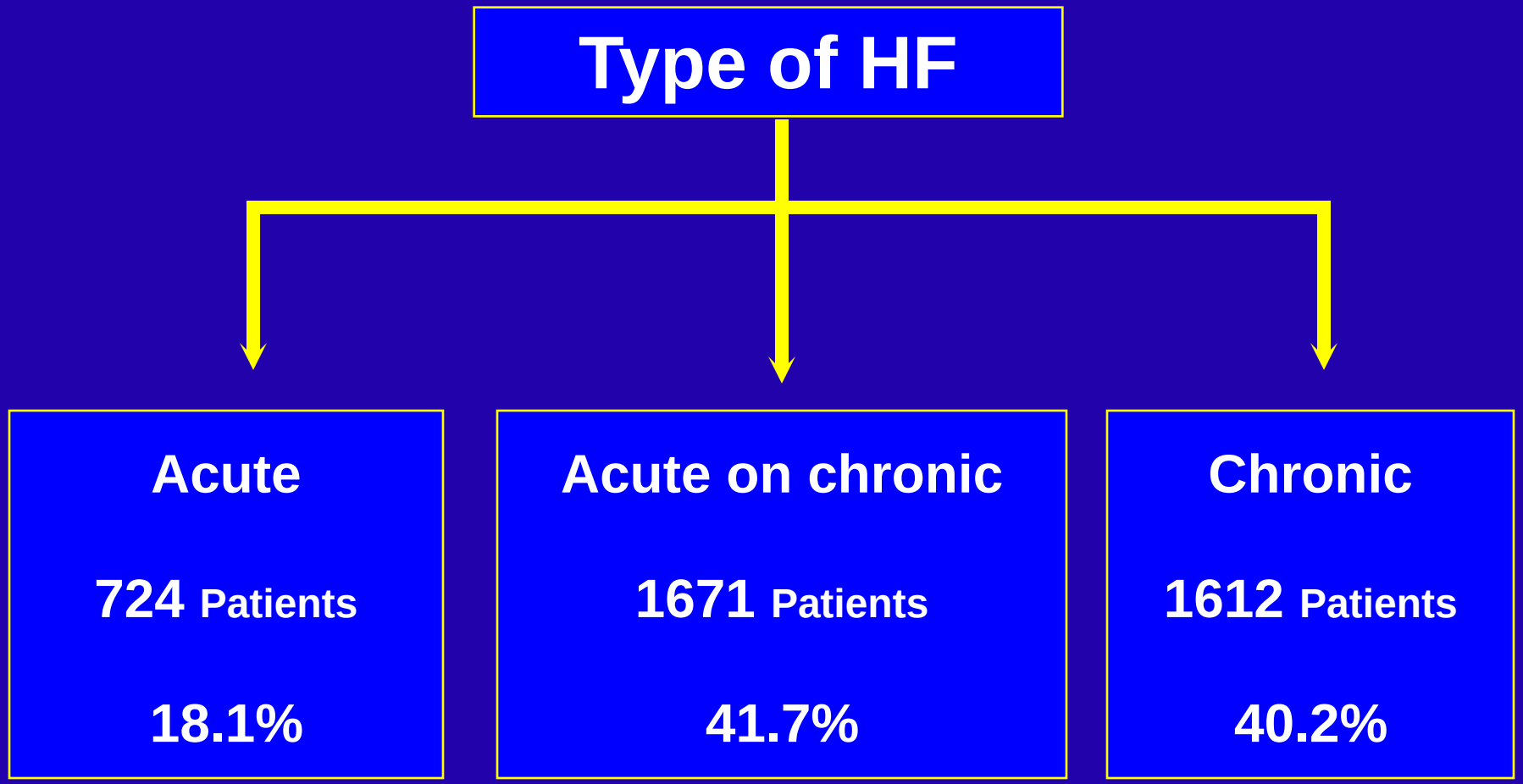
HFSIS 2003 – Site of 1st Hospitalization

Department (First)	All* n = 4,066 %
Internal Medicine	3,223 **79.3**
CCU / Cardiology	756 **18.6**
Other	87 **2.1**

* Missing 36

P = 0.001

HFSIS 2003



*Missing 95

HFSIS 2003 – Co-Morbidity

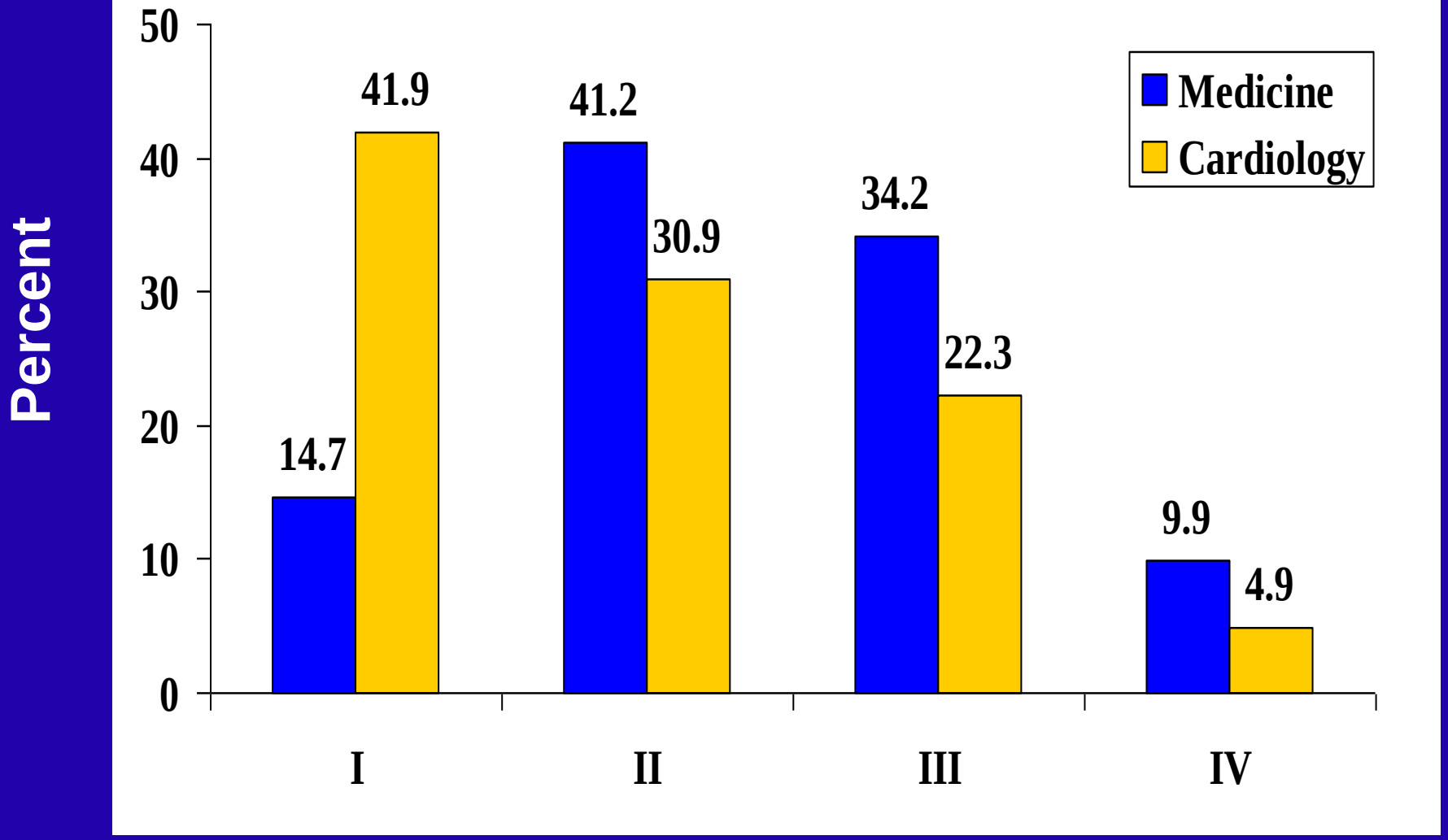
	n = 4,102	%
Ischemic Heart Disease	3,372	82.2
Acute Coronary Syndrome	1,505	36.7
Renal Failure (creat ≥1.5 mg%)	1,672	40.8
Anemia (Hb ≤ 12.0 gr%)	2,026	49.4
Hypertension	3,088	75.3
Diabetes Mellitus	2,050	50.0
Insulin treated	514	12.5 (25.1)
P.O.	1,059	25.8 (51.7)
Stroke / TIA	511	12.5
Atrial Fibrillation	1,360	33.2

HFSIS 2003 – NYHA Functional Class

NYHA – Functional Class (prior to hospitalization)	n = 3,999	%
I	798	**19.9**
II	1,572	**39.3**
III	1,267	**31.7**
IV	362	**9.0**

*Missing 103

HFSIS 2003 – NYHA by Ward



Killip Classification

This classification is usually used for **Acute MI** patients **on admission**

We applied it to **all HF** patients **during the entire hospitalization**

Stage I – No signs of HF (no rales at lung bases, no S_3)

Stage II – Rales over the lower half of lung fields and/or **S_3**

Stage III – Rales >50% lung fields or **Pulmonary Edema**

Stage II – Cardiogenic Shock

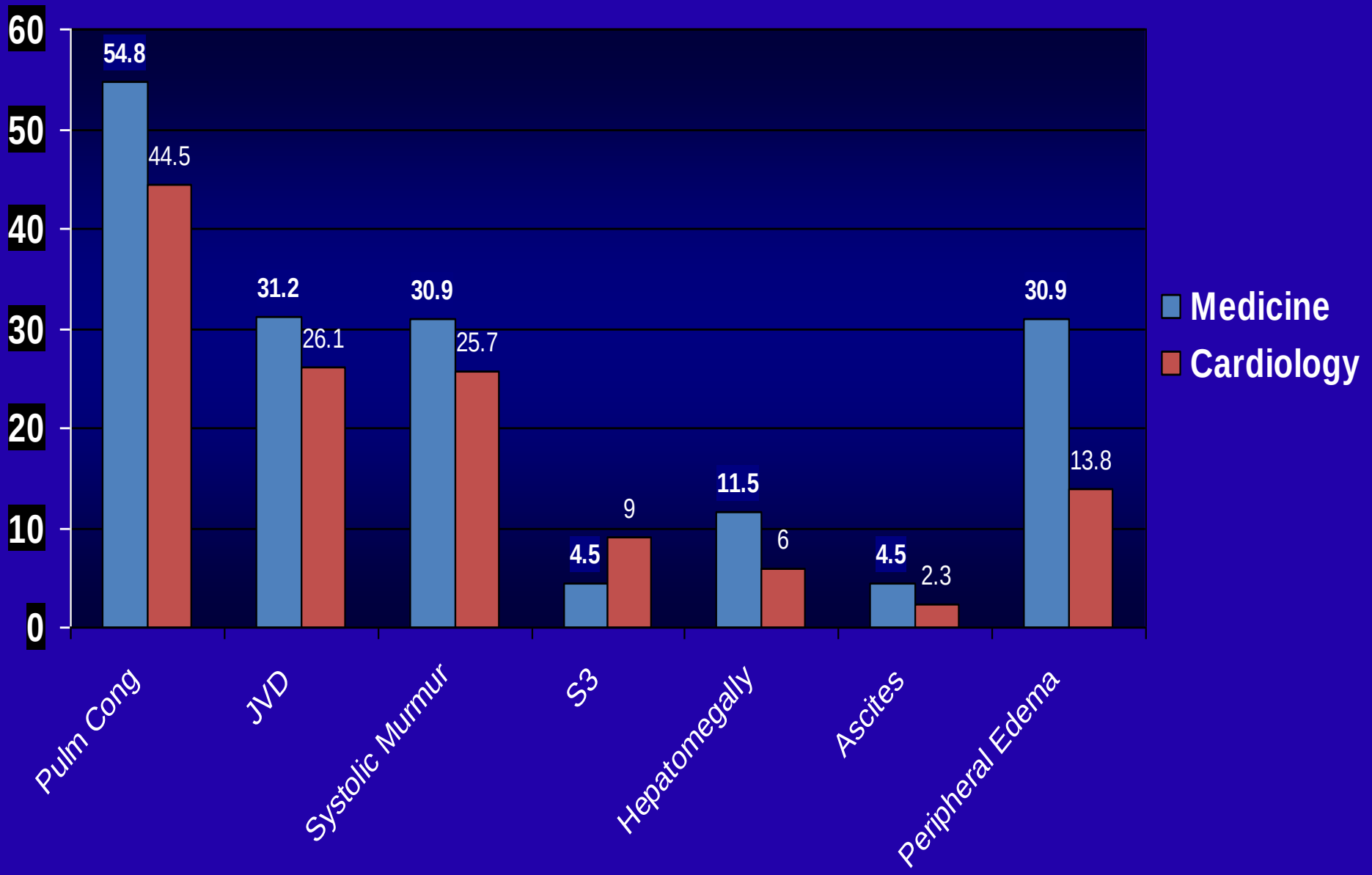
1965

HFSIS 2003 – Hospital Course %

Killip Class (all patients, not only acute MI)	n = 4,099*	%
I	905	22.1
II	1,443	35.2
III	1,527	37.2
IV	224	5.4

*Missing 3

HFSIS 2003 – Physical Examination

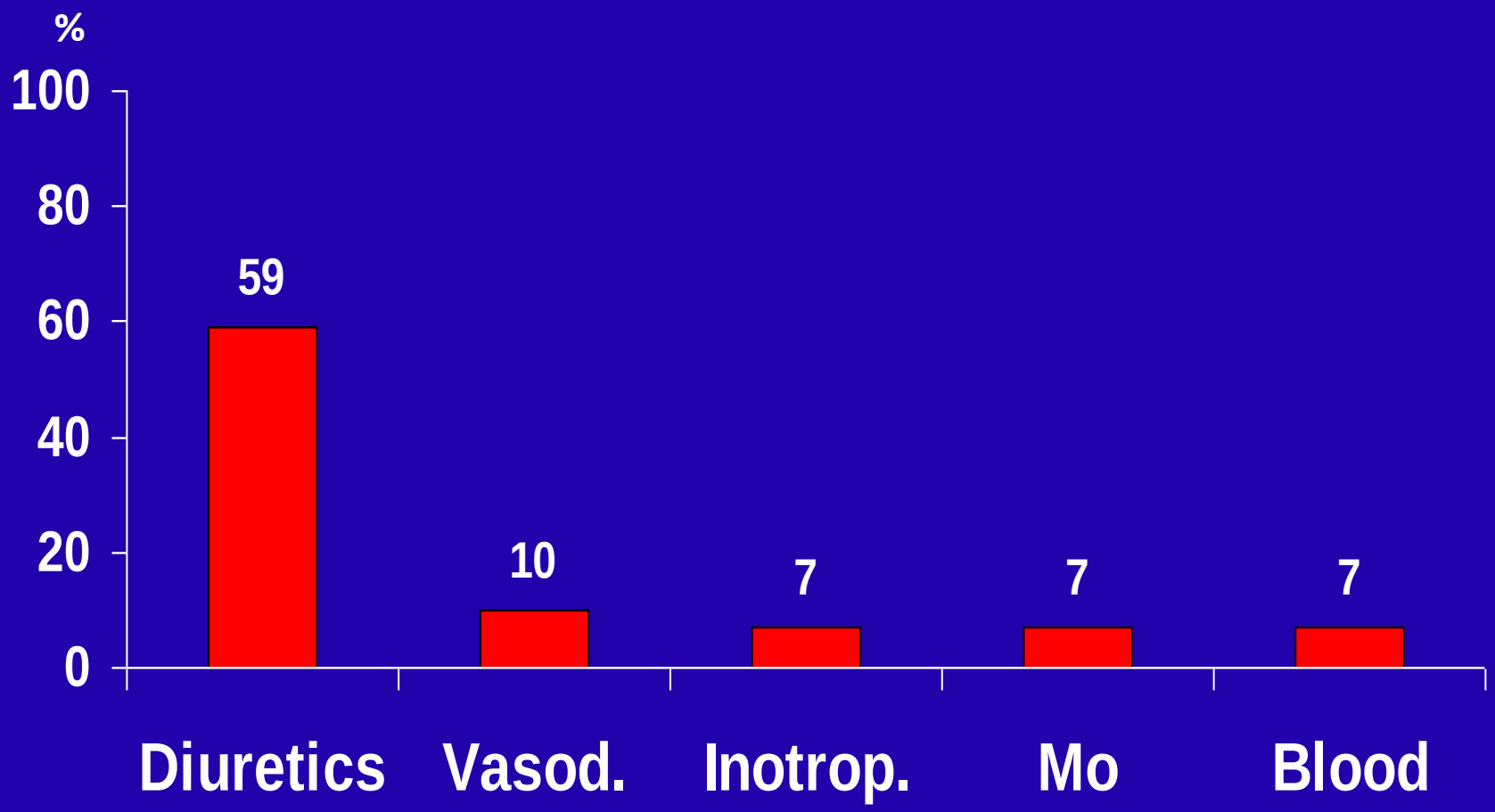


HFSIS 2003 – Left Ventricular Ejection Fraction

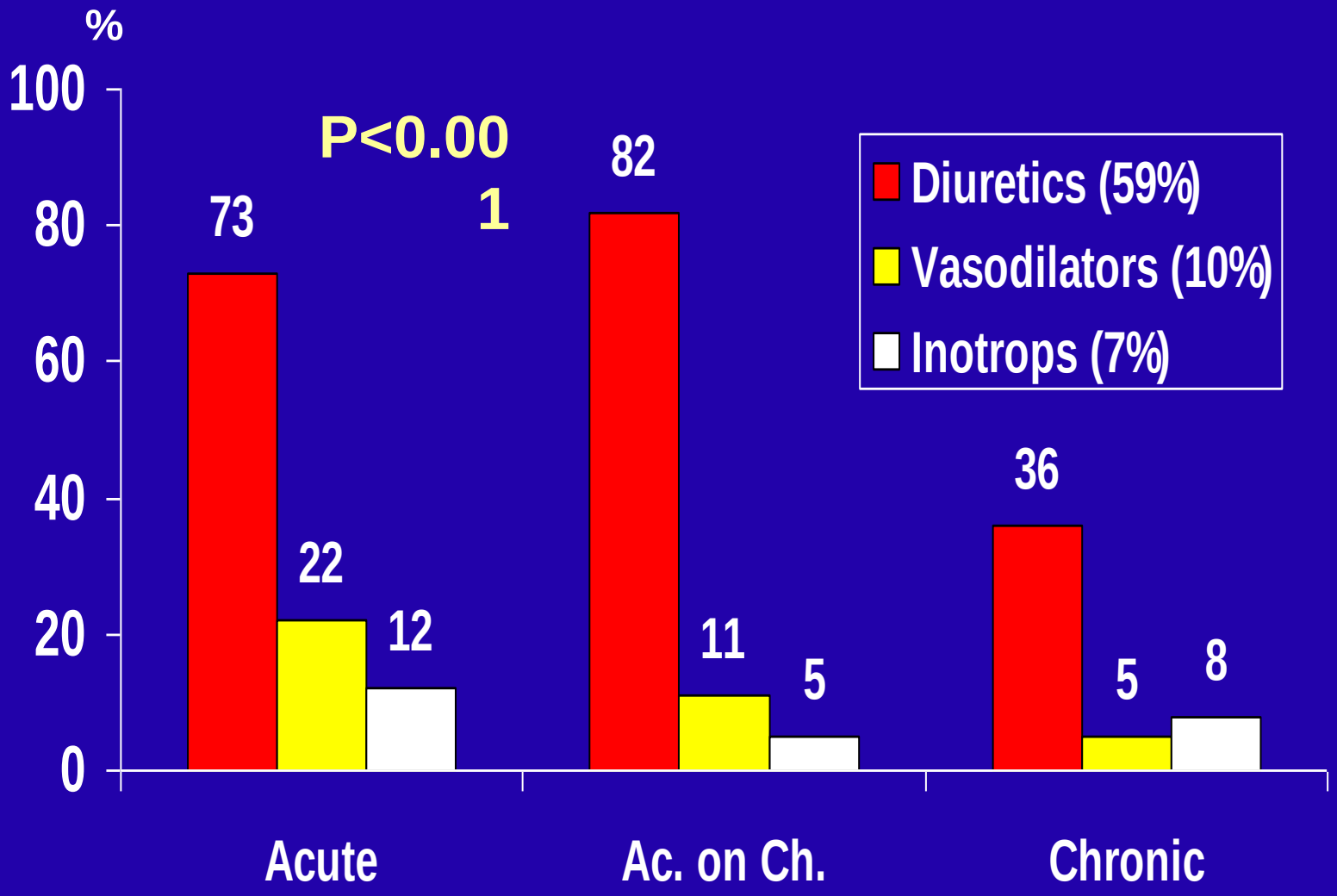
LVEF	n = 2,842*	%
Normal (≥50%)	763	**26.8**
Mild (40-49%)	601	**21.1**
Preserved (≥40%)	1,364	**48.0**
Moderate (30-39%)	735	**25.9**
Severe (<30%)	743	**26.1**

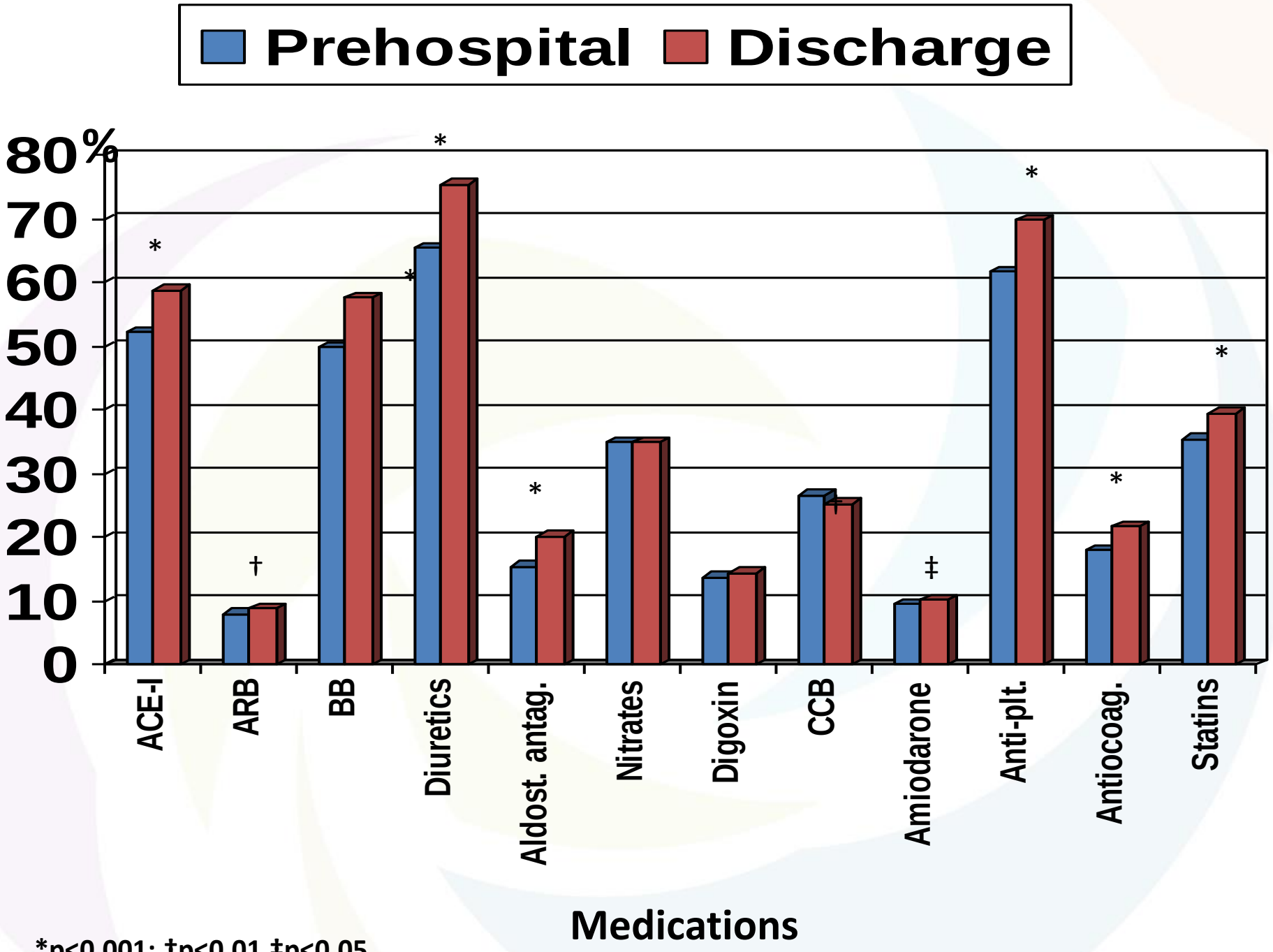
***Missing 1,260 (echo done – 394)**

HFSIS 2003 Acute Management



HFSIS 2003 – I.V. Medications





*p<0.001; †p<0.01 ‡p<0.05

HFSIS 2003 – All-Cause Mortality

	Mortality	
Period	**HFSIS 2003** **n = 4,102** **%** **Age: 73**	**ACSIS 2002 - STEMI** **n = 649** **%** **Age: 63**
Hospital	**4.7**	**5.1**
30-day	**7.6**	**7.1**
6-month	**18.7**	**9.9**
1-year	**28.2**	**10.9**
2-year	**40.2**	
3-year	**50.3**	
4-year	**57.7**	

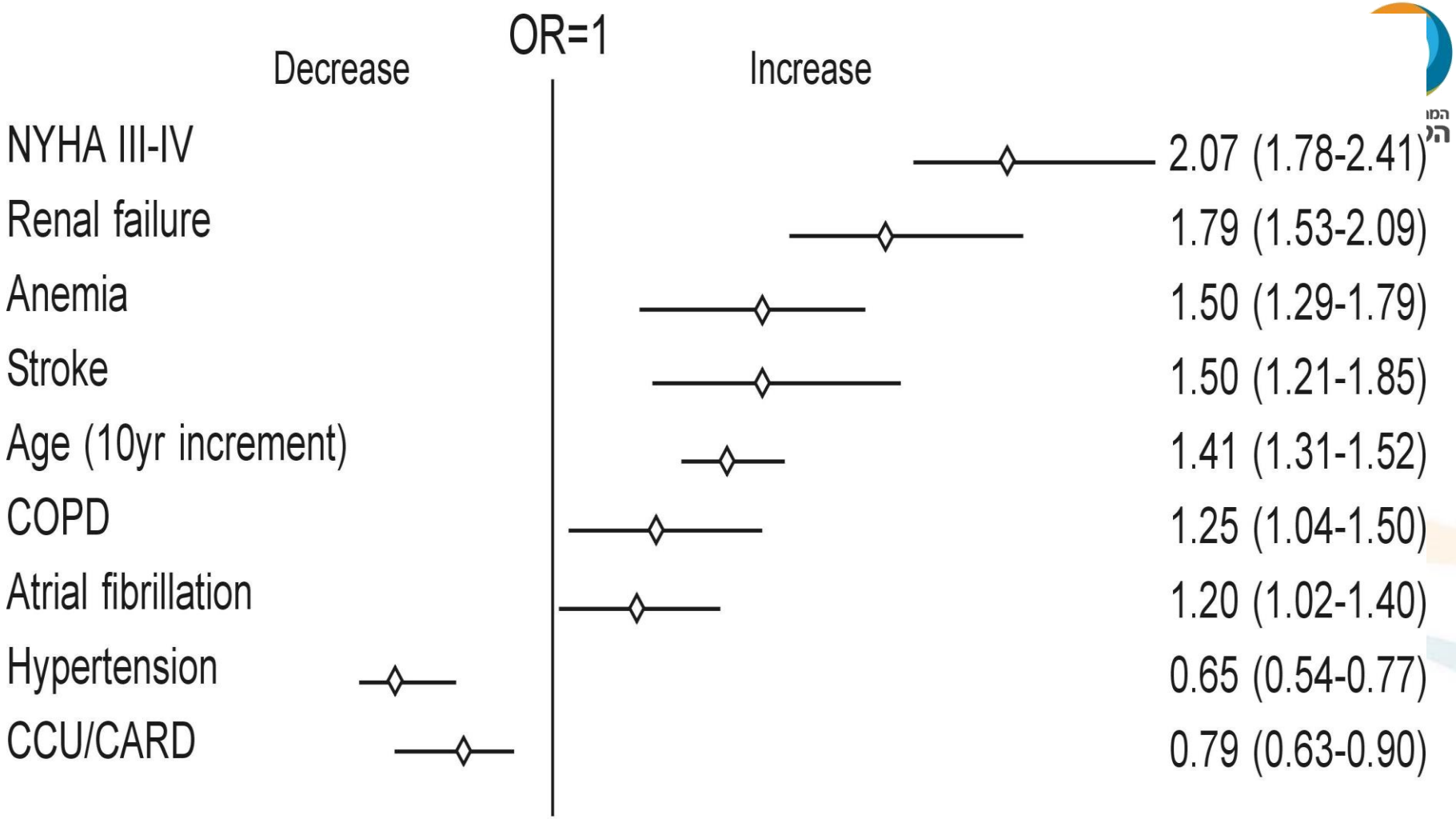


Fig.2: parameters associated with1year mortality

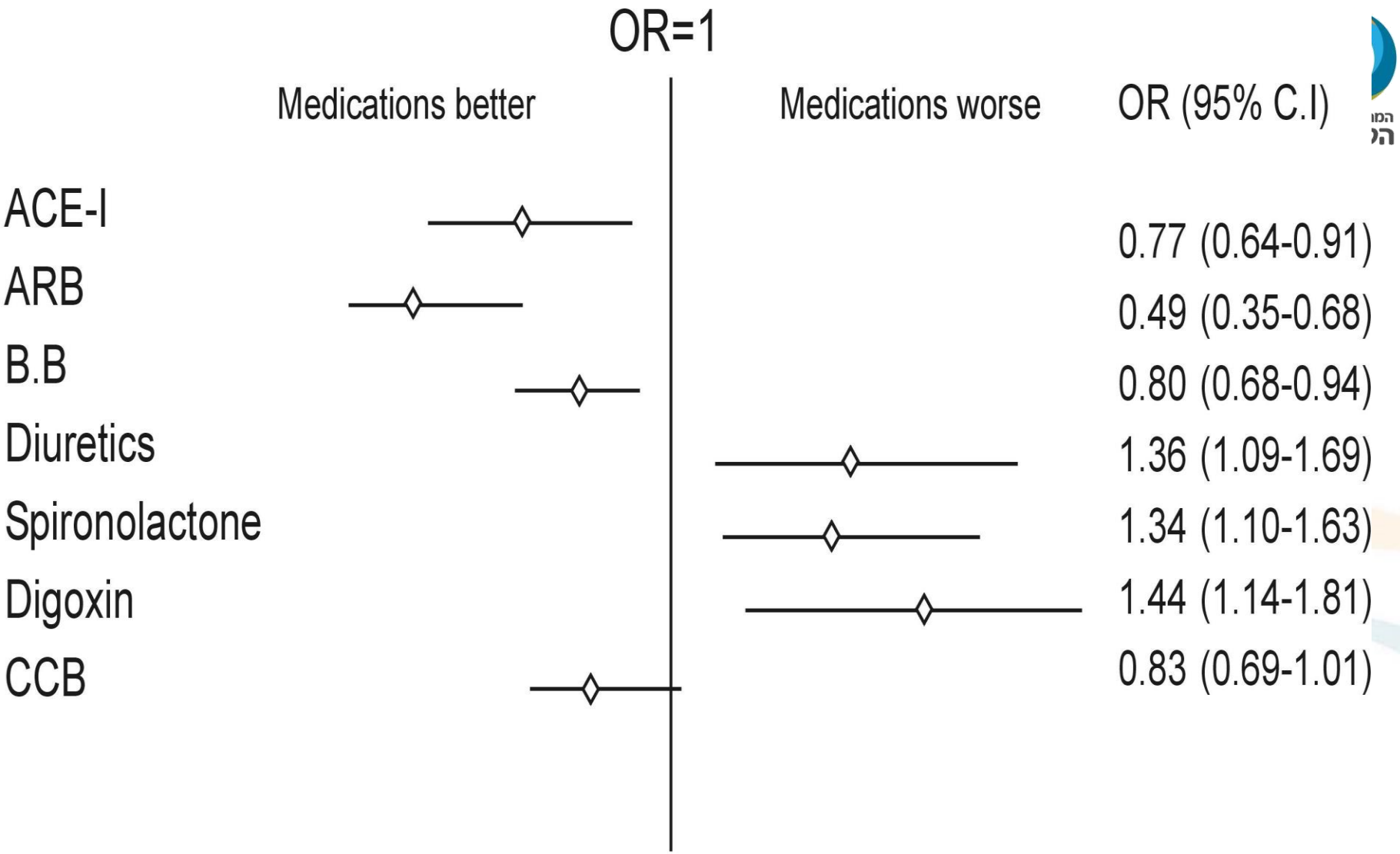
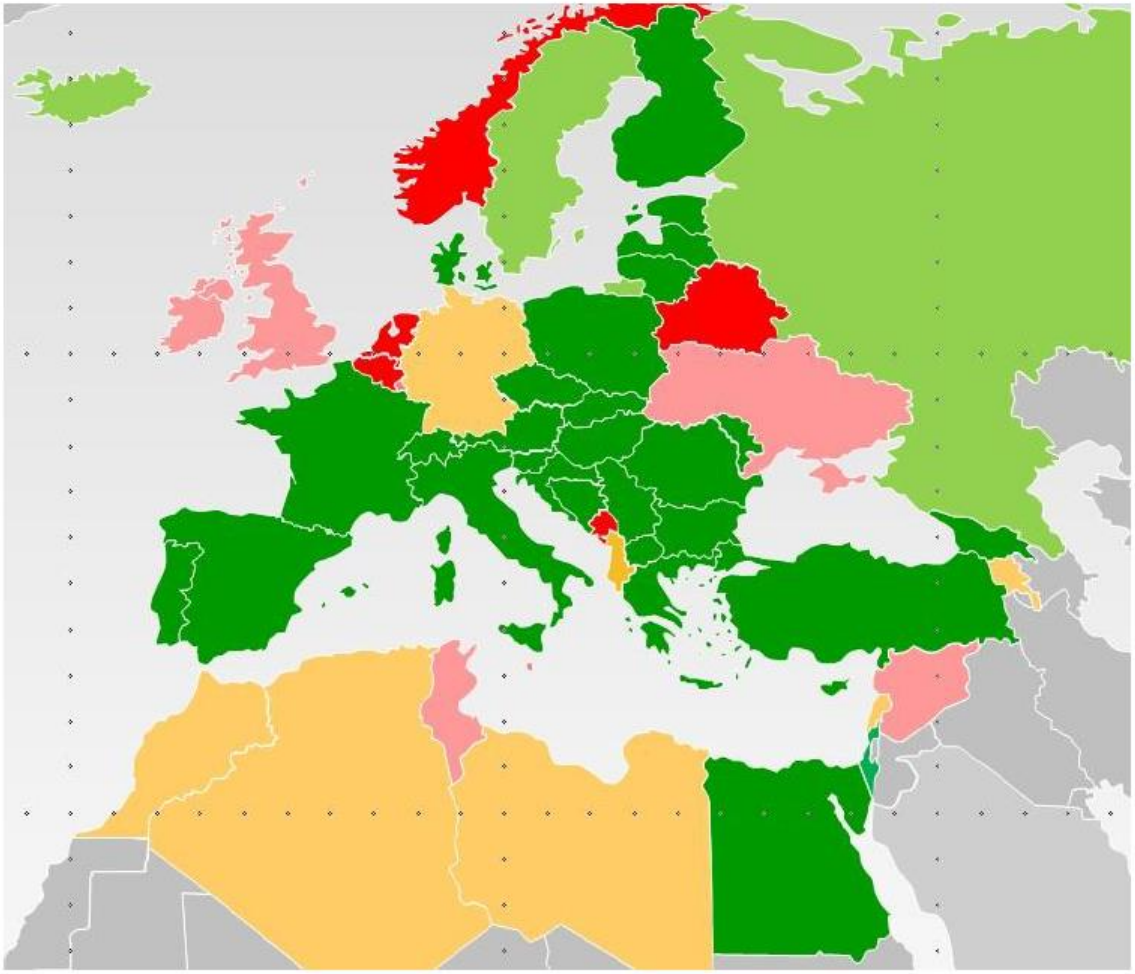


Fig. 3: medications at discharge associated with 1 year mortality

Heart Failure Long-Term Registry

Participating countries as of August 19th, 2013



32 Potential participants (ESC):

- **29 started enrolment**
- **3 accepted to merge National database** (Sweden, Iceland, Russia)

8 Expressed interested but did not confirm or start

8 Did not answer (Ireland, Luxembourg, Malta, San Marino, Syria, Tunisia, Ukraine, UK)

5 Did not accept (Belarus, Belgium, Montenegro, Netherlands, Norway)

+ Participation of:
Affiliated Countries: Argentina, Uruguay
Asian Pacific Society of Cardiology

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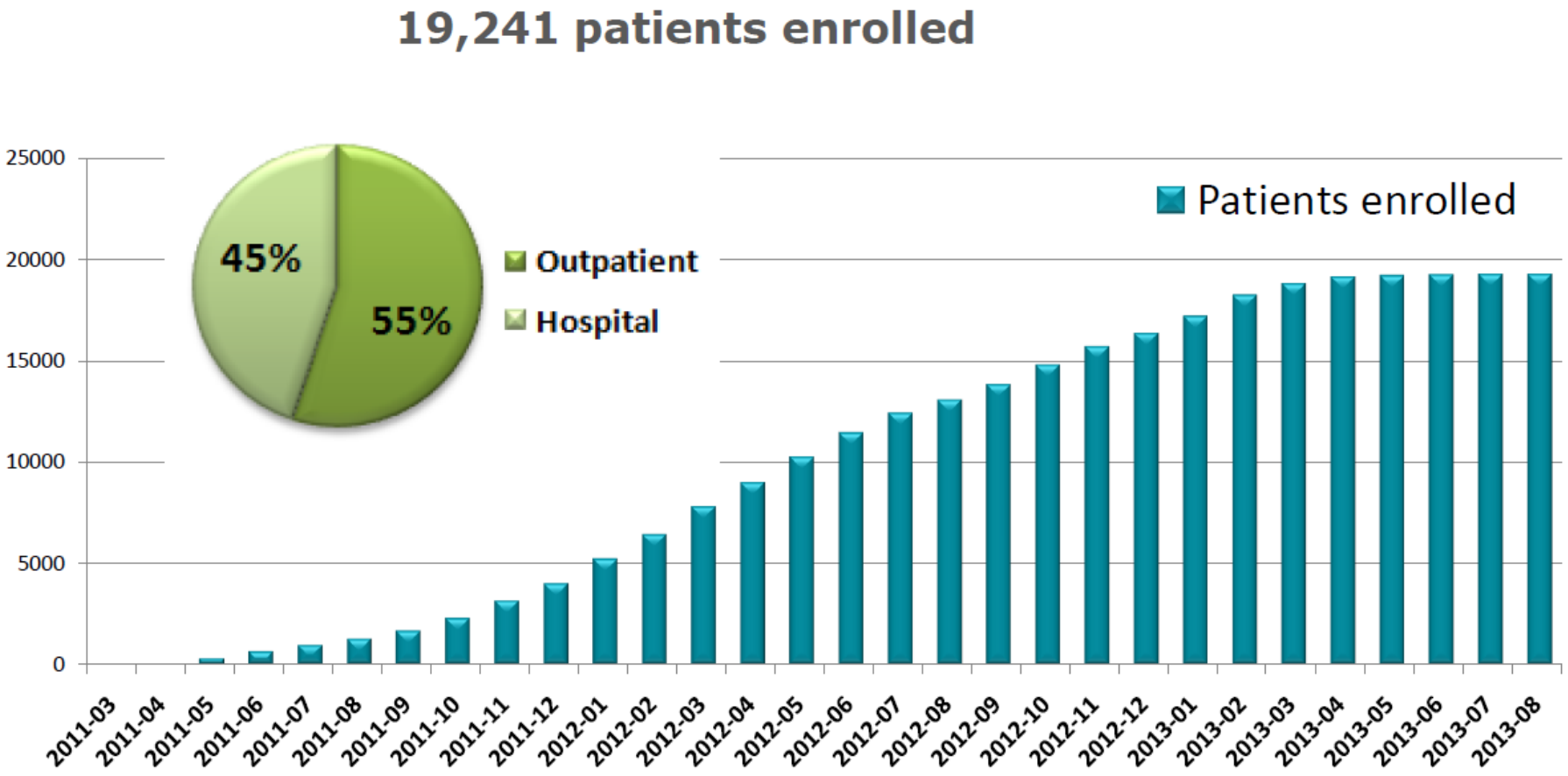
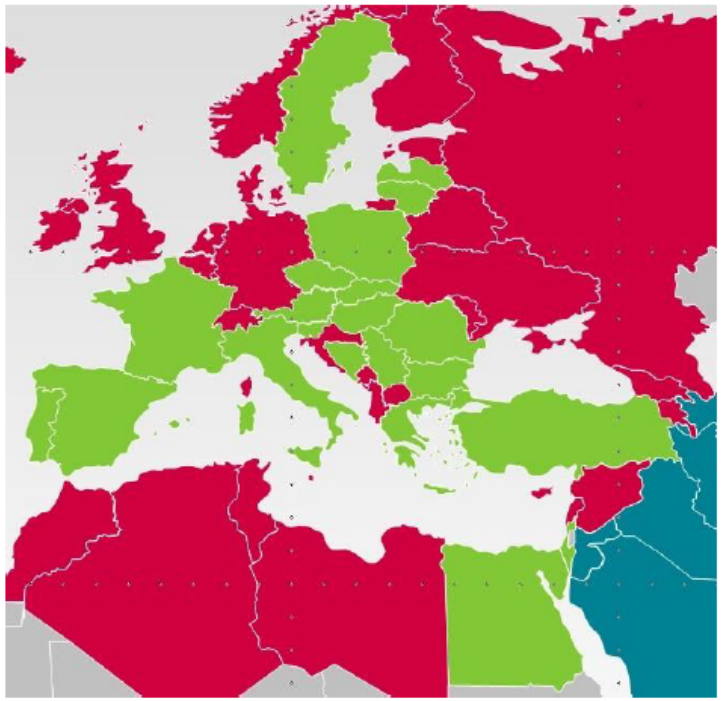
Heart Failure Long-Term Registry

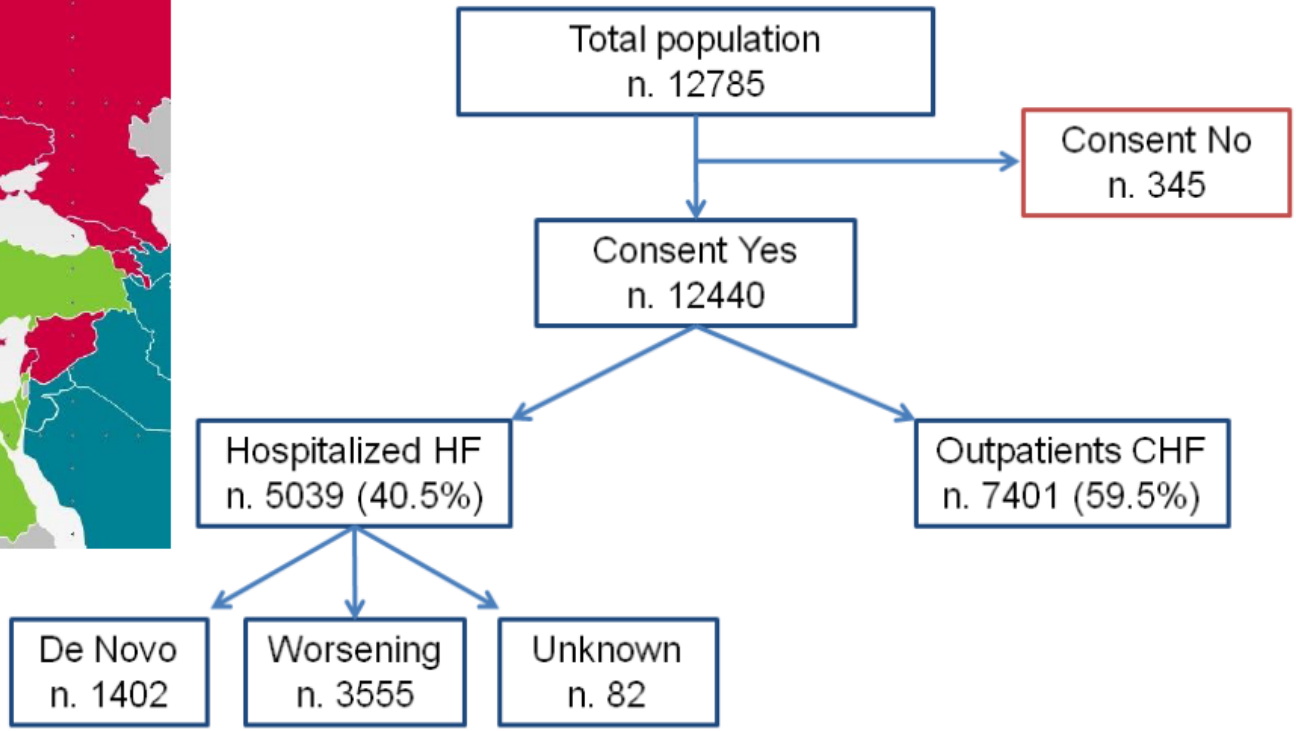
Recruitment by month as of August 19th, 2013



12,440 patients from 211 centres of 21 ESC Countries



Patient disposition



Maggioni AP, et al: Are hospitalized or ambulatory patients with heart failure treated in accordance with European Society of Cardiology guidelines? Evidence from 12 440 patients of the ESC Heart Failure Long-Term Registry. Eur J Heart Fail. 2013;15:1173-84

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HF LT Registry: Baseline characteristics

	HHF (n. 5039)	CHF (n. 7401)	p
Age (years), median [IQR]	71 [61-79]	66 [57-75]	<0.0001
≥75 years, %	39.5	26.0	<0.0001
Females, %	37.3	28.8	<0.0001
SBP (mmHg), median [IQR]	130 [110-150]	120 [110-136]	<0.0001
HR ≥70 bpm, %	83.0	55.6	<0.0001
EF >45%, %	32.8	23.1	<0.0001
Mitral regurgitation, %	44.4	26.2	<0.0001
Ischaemic aetiology, %	54.0	43.0	<0.0001

HF LT Registry: Comorbidities

	HHF (n. 5039)	CHF (n. 7401)	p
Atrial fibrillation, %	44.0	37.6	<0.0001
Diabetes mellitus, %	38.9	31.8	<0.0001
PAD, %	14.2	12.3	0.0021
Hypertension, %	64.5	58.2	<0.0001
COPD, %	20.2	13.8	<0.0001
Prior stroke/TIA, %	13.0	9.4	<0.0001
Renal dysfunction, %	26.4	18.2	<0.0001
Hepatic dysfunction, %	8.4	3.4	<0.0001
Depression, %	7.9	7.6	0.553

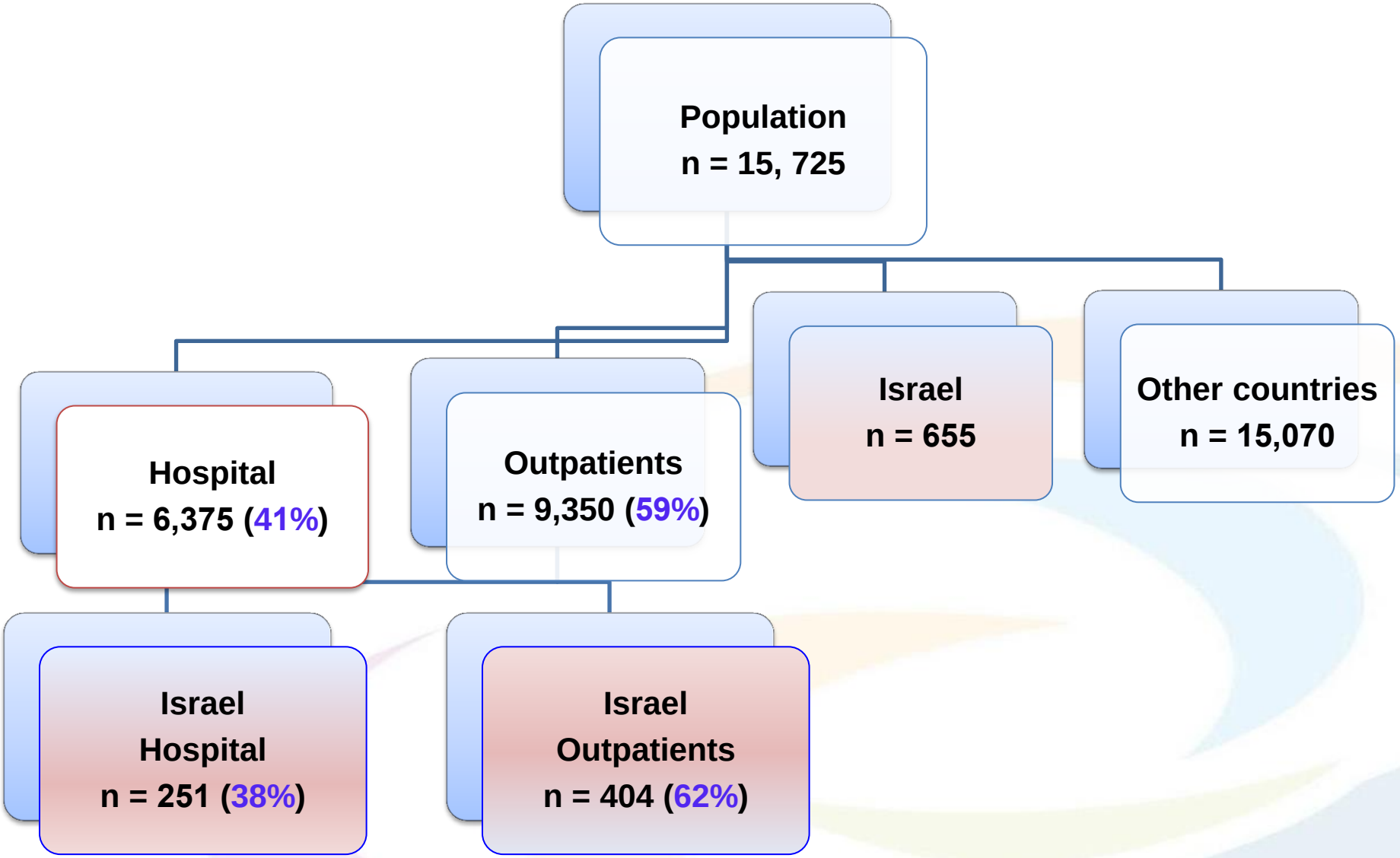
Intravenous and oral treatments of hospitalized HF patients (n. 5039)

IV treatments at hospital entry (for 296 patients SBP at entry was not reported)

According to 2012 ESC guidelines *(Eur J Heart Fail 2012; 14:803-869)*				
	Total (n. 5039)	**<85 mmHg (n. 90)**	**85-110 mmHg (n. 1169)**	**>110 mmHg (n. 3484)**
IV inotropes, %	11.9	73.3	22.3	6.8
IV nitrates, %	20.4	10.0	13.3	23.0
IV diuretics, %	81.5	77.8	82.9	81.1

EuroObservetation – Heart Failure Long-Term Registry

13/1/2014



EuroObservetation – Heart Failure Long-Term Registry

13/1/014

המרכז הרפואי הלל יפה

	Hillel Yaffe n=228	Carmel n=455	Odds Ratio (±95% CI)	Israel n=655	Other Countries n=15,070	Odds Ratio (±95% CI)
Outpatient	105 (46%)	299 (70%)	**0.37** (0.26-0.51)	404 (62%)	8,946 (59%)	1.10 (0.94-1.29)
Hospital	123 (54%)	128 (30%)	**2.74** (1.96-3.82)	251 (38%)	6,124 (41%)	0.91 (0.77-1.07)

EuroObservetation – Heart Failure Long-Term Registry

Outpatients – Baseline Characteristics

	Hillel Yaffe n=105	Carmel n=299	Odds Ratio (±95% CI)	Israel n=404	Other Countries n=8,946	Odds Ratio (±95% CI)
Age (yrs) [IQR]	69 (62-76)	67 (59-77)		68 (60-77)	65 (56-74)	
Age > 65 (%)	78	84	0.73 (0.38-1.39)	82	61	**2.87** (2.07-3.98)
Gender – **Male** (%)	88	71	**2.90** (1.45-5.46)	75	71	1.22 (0.97-1.54)
Ischemic Etiology (%) (Coronary angiography)	63	52	**1.57** (1.00-2.48)	55	36	**2.13** (1.74-2.60)
Diabetes Mellitus (%)	50	50	1.00 (0.64-1.56)	50	30	**2.36** (1.93-2.88)
Outpatients – 12 months Follow-Up						
NYHA III & IV (%)	25	40	**0.50** (0.28-0.90)	35	21	**1.96** (1.49-2.59)
Death (%)	11.4	16.4	0.64 (0.31-1.35)	14.6	8.1	**1.94** (1.37-2.75)

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – Baseline Characteristics

המרכז הרפואי הלל יפה

	Hillel Yaffe n=123	Carmel n=128	Odds Ratio (±95% CI)	Israel n=251	Other Countries n=6,124	Odds Ratio (±95% CI)
Age (yrs) [IQR]	**77** (69-85)	**78** (71-84)		**77** (70-85)	**69** (60-78)	
Age > 65 (%)	**78**	**84**	0.73 (0.38-1.39)	**82**	61	**2.87** (2.07-3.98)
BMI (Kg/m^2)	**28.7**	**28.0**		**28.7**	**27.7**	
Gender – **Male** (%)	**58**	**58**	1.03 (0.62-1.70)	58	63	0.82 (0.64-1.06)
Sys BP (mmHg),	**139**	138		138	130	
Heart rate (bpm),	**81**	83		82	89	
LVEF (%)	**35** (30-60)	**55** (35-60)		**45** (30-60)	**38** (29-50)	
Clinical Trials (%)	**4**	2		3	3	

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – Baseline Characteristics

המרכז הרפואי הלל יפה

	Hillel Yaffe n=123	Carmel n=128	Odds Ratio (±95% CI)	Israel n=251	Other Countries n=6,124	Odds Ratio (±95% CI)
Ischemic Etiology (%) (Coronary angiography)	54	30	**2.74** (1.63-4.61)	41	29	**2.13** (1.74-2.60)
Ischemic Etiology (%) (No coronary angiography)	10	15	0.62 (0.29-1.34)	12	28	**0.37** (0.25-0.54)
Non-Ischemic Etiology (%)	37	55	**0.46** (0.28-0.77)	46	43	1.13 (0.87-1.45)
Current smoking (%)	27	5	**>5.0** (2.60-14.98)	16	17	0.91 (0.65-1.29)
AF – Permanent (%)	24	14	**1.97** (1.03-3.76)	19	26	**0.67** (0.48-0.92)
AF – Persistent (%)	2	15	**0.09** (0.02-0.42)	8	6	1.43 (090-2.27)
AF – Paroxysmal (%)	13	32	**0.32** (0.17-0.60)	23	10	**2.63** (1.93-3.57)
Diabetes Mellitus (%)	58	52	1.33 (0.81-1.50)	55	38	**1.98** (1.54-2.55)

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – Baseline Characteristics

המרכז הרפואי הלל יפה

	Hillel Yaffe n=123	Carmel n=128	Odds Ratio (±95% CI)	Israel n=251	Other Countries n=6,124	Odds Ratio (±95% CI)
Stroke/TIA (%)	26	21	1.32 (0.73-2.36)	23	12	**2.27** (1.68-3.07)
PVD (%)	18	25	0.65 (0.35-1.20)	21	14	**1.67** (1.23-2.28)
Valvular surgery (%)	6	8	0.82 (0.31-2.15)	7	5	1.41 (0.86-2.32)
COPD (%)	24	21	1.15 (0.64-2.09)	22	20	1.18 (0.87-1.60)
Chronic Kidney Dis (%)	64	62	1.11 (0.67-1.86)	63	24	**> 5** (4.11-6.96)
Current Cancer (%)	4	14	**0.26** (0.09-0.72)	9	4	**2.12** (1.36-3.31)
HF previous hospitalization (%)	34	37	0.89 (0.53-1.50)	35	31	1.20 (0.92-1.57)
NYHA I & II (%)	11	44	**0.15** (0.61-1.49)	27	16	**2.06** (1.55-2.74)
NYHA III & IV (%)	89	56	**> 5** (3.36-12.89)	73	84	**0.49** (0-.37-0.65)

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – Baseline Characteristics

המרכז הרפואי הלל יפה

	Hillel Yaffe n=123	Carmel n=128	Odds Ratio (±95% CI)	Israel n=251	Other Countries n=6,124	Odds Ratio (±95% CI)
Hemoglobin (gr%)	11.7	11.7		11.7	12.7	
Creatinine (mg%)	1.3	1.2		1.3	1.2	
Sinus Rhythm (%)	63	52	1.57 (0.95-2.60)	57	59	0.91 (0.70-1.17)
Atrial Fibrillation / Flutter (%)	24	41	**0.46** (0.27-0.78)	33	32	1.05 (0.80-2.11)
Paced Rhythm (%)	13	7	1.98 (0.84-4.66)	10	7	1.38 (0.90-2.11)
QRS duration (ms)	100 (86-121)	80 (80-120)		90 (80-120)	100 (81-120)	

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – Hospital Treatment

	Hillel Yaffe n=123	Carmel n=128	Odds Ratio (±95% CI)	Israel n=251	Other Countries n=6,124	Odds Ratio (±95% CI)
No Inotropic Support (%)	99	94	7.06 (0.86-58.23)	97	88	**4.12** (2.03-8.36)
Dobutamine (%)	0	1		0.4	5	**0.07** (0.01-0.53)
Dopamine (%)	1	5	0.17 (0.02-1.41)	3	3	1.06 (0.49-2.29)
Levosimendan (%)	0	0		0	1.4	
Norepinephrine (%)	0	0		0	0.7	
Nitrates IV (%)	2	3	0.78 (0.17-3.54)	3	22	**0.10** (0.05-0.22)

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – Baseline Characteristics

המרכז הרפואי הלל יפה

	Hillel Yaffe n=123	Carmel n=128	Odds Ratio (±95% CI)	Israel n=251	Other Countries n=6,124	Odds Ratio (±95% CI)
Echo-Doppler performed (%)	80	40	**4.17** (2.38-7.30)	64	80	**0.44** (0.34-0.58)
Rt Heart Catheterization (%)	0	1		0	2	
CRT / D Implanted (%)	15	3	**> 5** (1.74-16.19)	9	3	**2.73** (1.72-4.32)
CRT / D Indicated (%)	11	6	1.93 (0.78-4.77)	9	8	1.04 (0.66-1.62)
ICD Implanted (%)	13	8	1.76 (0.77-4.06)	10	6	**1.76** 1.16-2.68)
ICD Indicated (%)	7	5	1.61 (0.55-4.65)	6	9	0.60 (0.36-1.02)

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – Medications

המרכז הרפואי הלל יפה

	Hillel Yaffe n=123	Carmel n=128	Odds Ratio (±95% CI)	Israel n=251	Other Countries n=6,124	Odds Ratio (±95% CI)
ACE-I / ARBs (%)	73	66	1.38 (0.80-2.37)	70	78	0.67 (0.50-0.88)
Beta Blockers (%)	79	73	1.40 (0.78-2.51)	76	73	1.13 (0.85-1.52)
MRA (%)	28	9	**4.06** (1.95-8.46)	18	57	**0.17** (0.12-0.23)
Diuretics (%)	97	87	**4.25** (1.38-13.10)	92	82	**2.45** (1.54-3.88)
Digitalis (%)	15	5	**2.96** (1.19-7.37)	10	26	**0.31** (0.20-0.47)

EuroObservetation – Heart Failure Long-Term Registry

Hospitalized Patients – 12 months Follow-Up

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	Hillel Yaffe n=107	Carmel n=80	Odds Ratio (±95% CI)	Israel n=187	Other Countries n=2,224	Odds Ratio (±95% CI)
Death (%)	21.5	27.5	0.72 (0.37-1.42)	24.1	23.3	1.04 (0.74-1.48)
NYHA I & II (%)	34	70	**0.22** (0.10-0.50)	46	73	**0.32** (0.22-0.46)
NYHA III & IV (%)	66	30	**4.45** (2.01-9.85)	54	27	**3.11** (2.15-4.50)
Re-Hospitalization No. 1 (%)	79	70	1.63 (0.83-3.18)	75	46	**3.46** (2.45-4.89)
Re-Hospitalization No. 2 (%)	66	51	1.86 (0.92-3.74)	60	45	**1.85** (1.28-2.67)

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Thank You