HR & Heart Failure Hospitalization :

How to Break the Vicious Cycle?

IRNIZARIFKA, MD, FIHA

Working Group on Heart Failure
Dept. of Cardiology and Vascular Medicine
Faculty of Medicine– Universitas Sebelas Maret
Moewardi General Hospital – UNS Hospital

Why is it important?

What is wrong?

Where is the problem?

How to overcome?

Who is Ivabradine?

Heart failure prevalence is expected to increase[1]

A person at age 40 has a 1 in 5 lifetime risk of developing heart failure, and more than 1 million hospitalizations due to heart failure are reported annually in Europe.[1,4]

MI = myocardial infarction

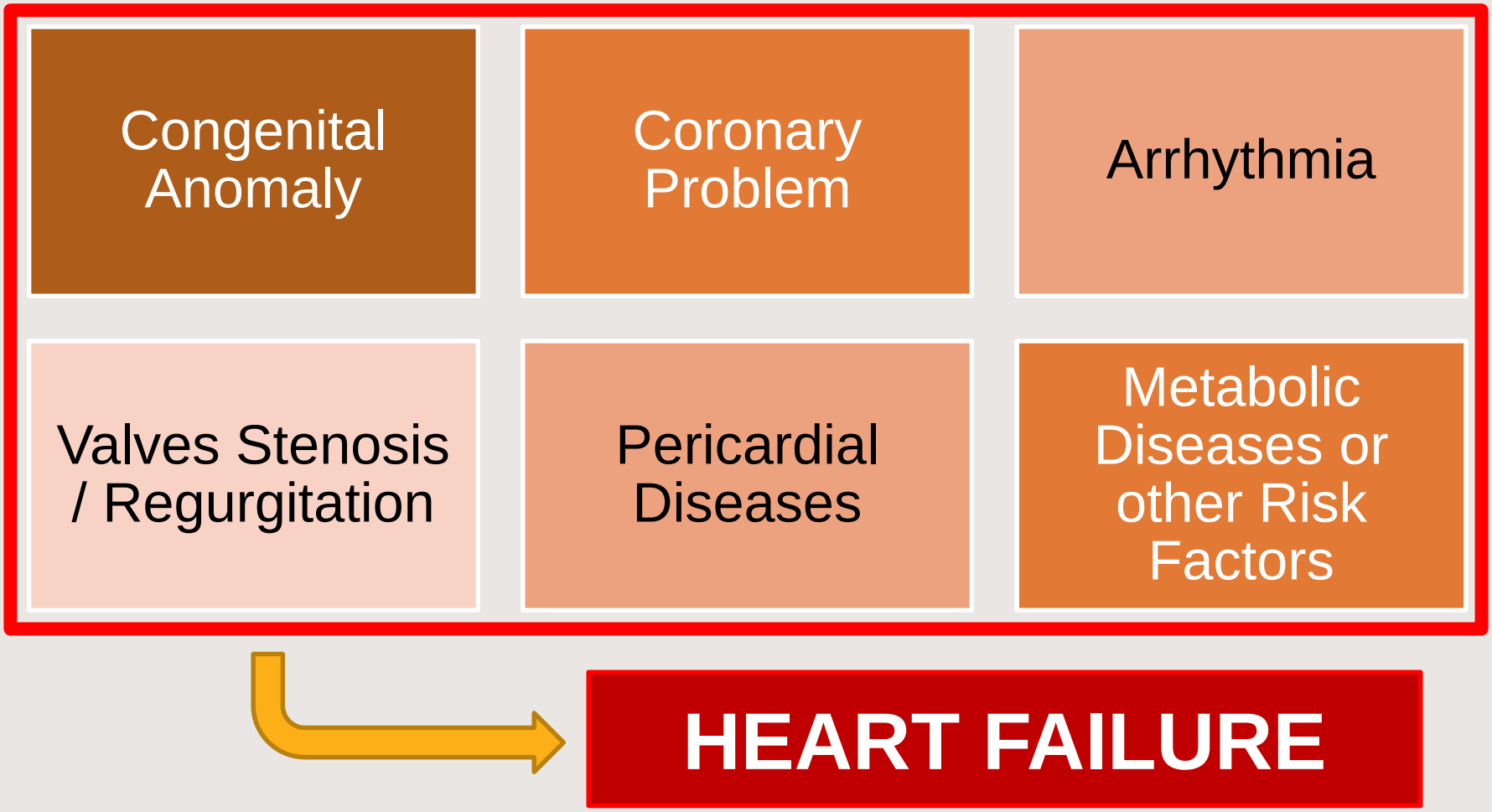
1. Mozaffarian D, Benjamin EJ, Go AS, et al; for American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2015 update: a report from the American Heart Association. Circulation. 2015;131(4):e29-e322. 2. Global Burden of Disease Study 2013 Collaborators. Global regional and national incidence prevalence and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013, Lancet 2015. 3. Velagaleti RS, Vasan R. Epidemiology of heart failure. In: Mann DL, ed. Heart Failure: A Companion to Braunwald's Heart Disease. 2nd ed. St Louis: Saunders; 2011. 4. Ponikowski P, Anker SD, AlHabib KF, et al. Heart failure: preventing disease and death worldwide. ESC Heart Failure. 2014;1(1):4-25.

Why is it important...?

	ADHF	ACS
Hospitalizations/year	1,000,000	1,000,000
Inpatient Mortality	3-4%	3-4%
30-days Readmission	10-15%	6-8%
Guidelines for :		
Risk Stratification	Yes	Yes
Therapy	Sort of (Lack in HFpEF)	Yes
Largest RCT	7,141	58,050

J Am Coll Cardiol 2009;54:386

The Most Important Thing to Remember

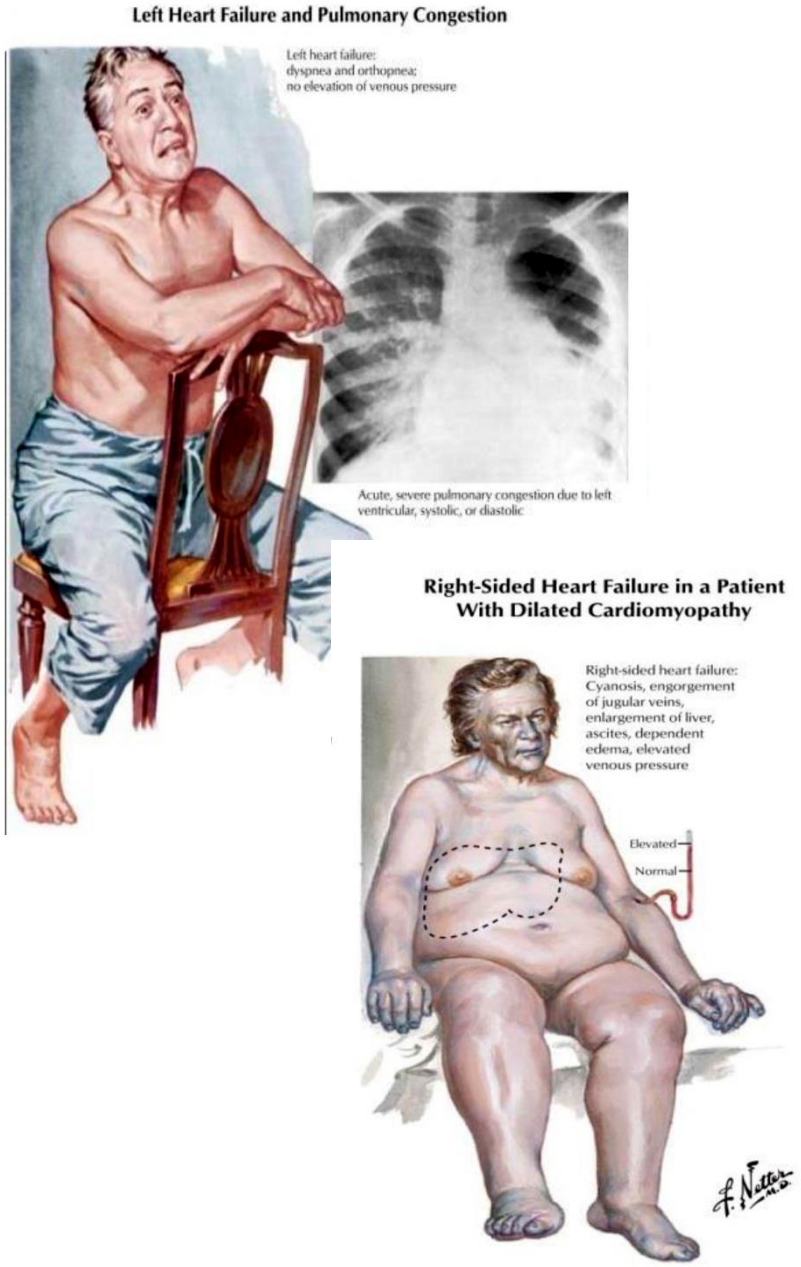


Guideline recommended treatment goals in heart failure[1,2]

- The goals of treatment in patients with HF are to:[1]
  - improve clinical status, functional capacity and quality of life
  - prevent hospital admission
  - reduce mortality

HF=heart failure

1. Ponikowski et al. Eur Heart J 2016;37:2129–200; 2. Yancy et al. Circulation 2016;134:e282–93



Heart Failure Challenges

Unmet needs

- **Poor survival**
- **Poor quality of life if symptoms not controlled**
- **High risk of (re)hospitalisation**
- **Delivering comprehensive services to all**

Why is it important?

What is wrong?

Where is the problem?

How to overcome?

Who is Ivabradine?

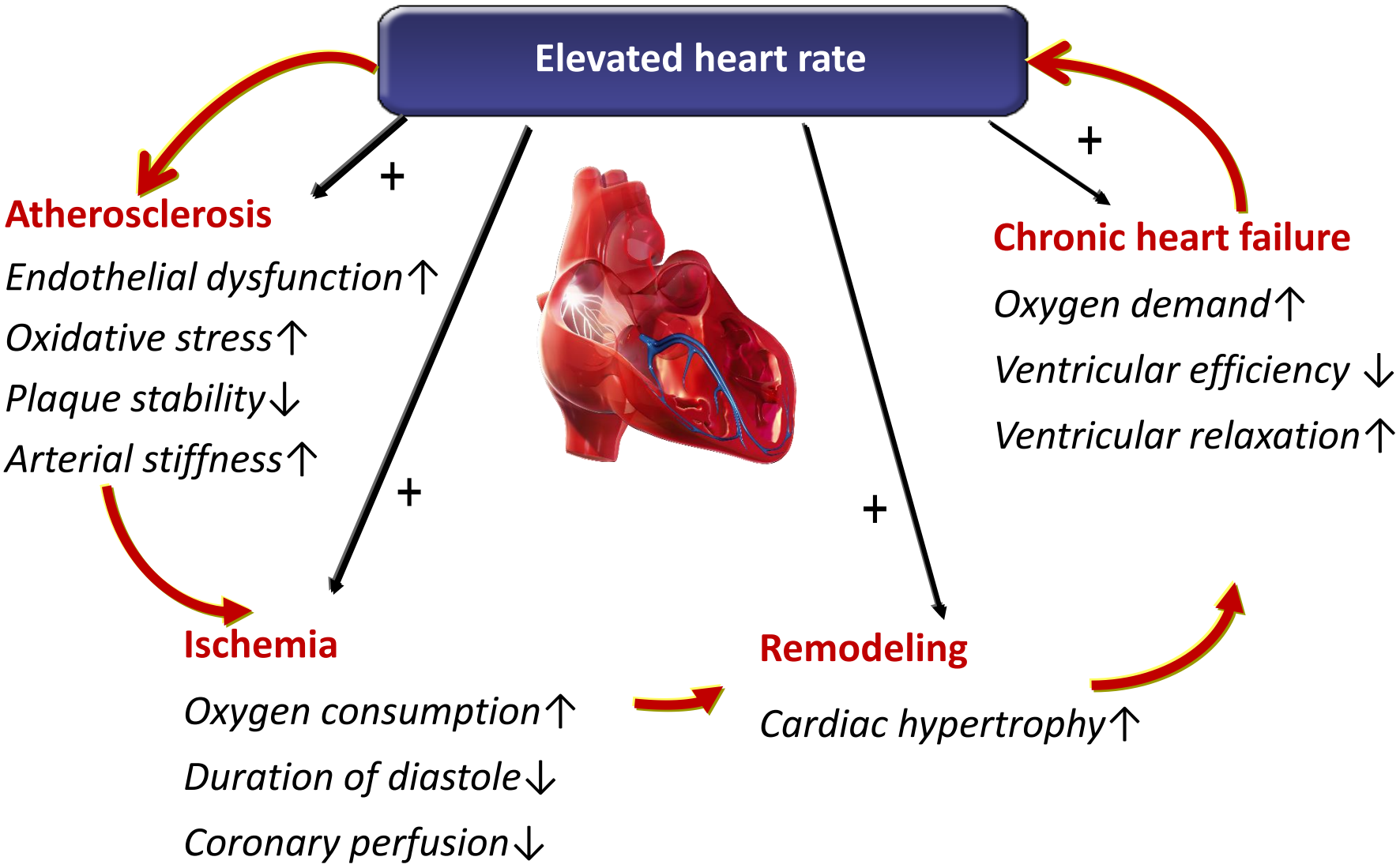
Prognostic importance of resting heart rate: epidemiological evidence (in general population and hypertensives)

During 25 years - more than 155 000 patients, follow-up 8-36 years

Study	Population	Follow-up	Cardiovascular mortality RR	
Chicago Gas Company ’80	1 233 M	15 y	>94 vs. ≤60 bpm	2.3
Chicago Heart Ass.Project ’80	33 781 M&W	22 y	≥90 vs. <70 bpm	M: 1.6 W: 1.1 (ns)
Framingham ’93	4 530 M&W HTN	36 y	>100 vs. <60 bpm	M: 1.5 W: 1.4 (ns)
British Regional Heart ’93	735 M	8 y	>90 vs. ≤ 90 bpm	IHD death 3.3
Spandau ’97	4 756 M&W	12 y	Sudden death	5.2 per 20 bpm
Benetos ’99	19 386 M&W	18.2 y	>100 vs. <60 bpm	M: 2.2 W: 1.1 (ns)
Castel ’99	1 938 M&W	12 y	5th vs. 3rd quintile	M: 1.6 W: 1.1
Cordis ’00	3 257 M	8 y	≥90 vs. <70 bpm	2.0
Reunanen ’00	10 717 M&W	23 y	M: 1.4 (>84 vs. <60)	W: 1.5 (>94 vs.<66)
Thomas ’01	60 343 M HTN	14 y	>80 vs. ≤ 80 bpm	<55y:1.5 >55y:1.3
Matiss ’01	2 533 M	9 y	per 20 bpm: 1.5	≥90 vs. <60 bpm: 2.7
Ohasama ’04	1 780 M&W	10 y	M: 1.2 W: 1.1 (ns) per 5 bpm	
Okamura ’04	8 800 M&W	16.5 y	per 11 bpm (1 SD) M: 1.3 W: 1.2	
Jouven ’05	5 713 M	23 y	Sudden death from AMI	3.92 (>75 bpm)

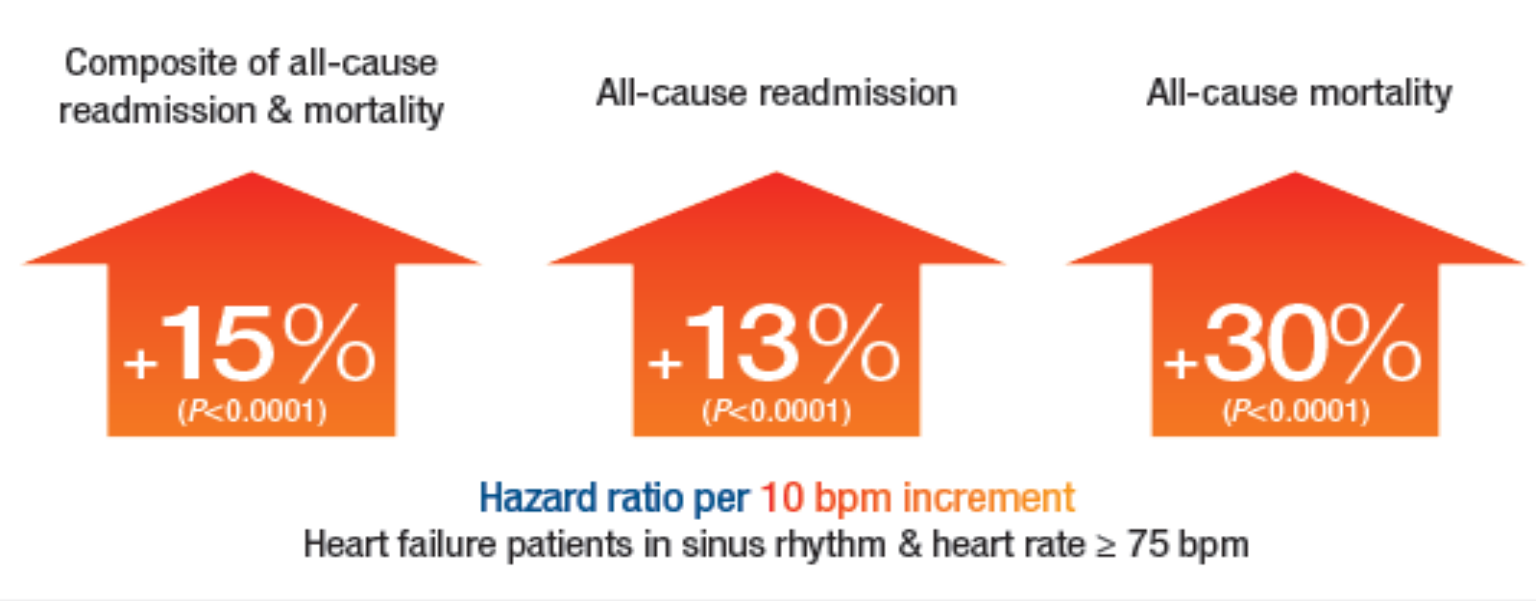
Adapted from V. Aboyans et al., *J Clin Epidemiol*. 2006;59:547-558.

The role of heart rate in cardiovascular disease



Heart Failure Hospitalization:
a key opportunity *in view of discharge phase…*

Elevated **discharge heart rate** increases the risk of **adverse 30-day outcomes**.



"By targeting heart rate as a potentially modifiable risk factor in the progression of HF, the SHIFT trial has implicated heart rate in the causal pathway of HF progression"

1. Laskey WK et al. Heart rate at hospital discharge in patients with heart failure is associated with mortality and rehospitalization. J Am Heart Assoc. 2015;4:e001626.
2. 2. Habal MV et al. Association of heart rate at hospital discharge with mortality and hospitalizations in patients with heart failure. Circ Heart Fail. 2014;7(1):12-20

Evolution of Heart Failure Management

Kidney disease
Back/forward story
Digitalis, diuretics, rest

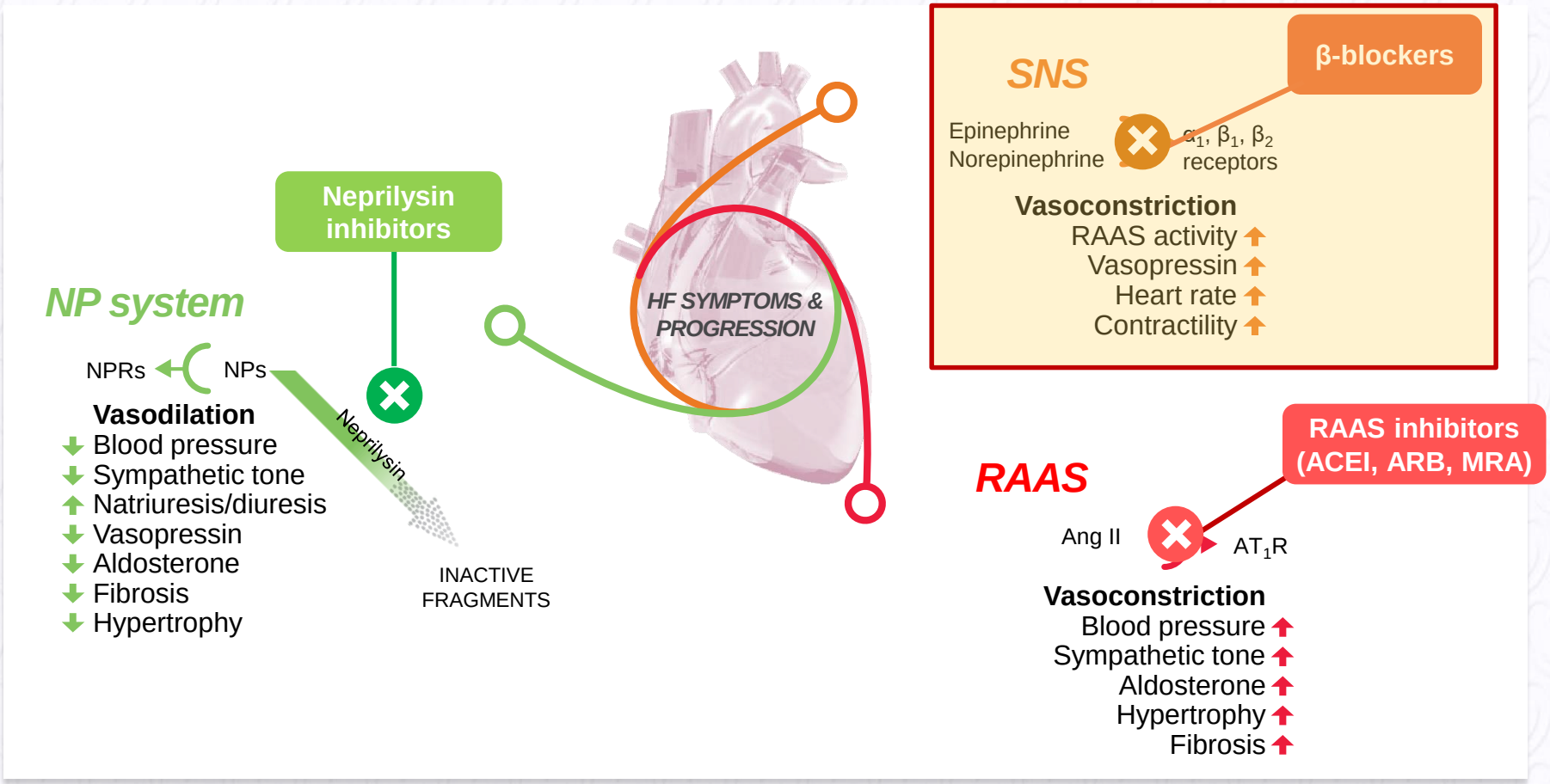
Cardiovascular disease
Inotropism, pre/after load
Inotrops, vasodilators

Neuroendocrine disease
Evidence based medicine, prognosis vs. symptoms
ACEi, B-Blockers, training

TODAY

Epidemic syndrome
Remodelling, **HEART RATE**
Devices, HF/transplant centres
And OPTIMIZE HF Care

Evolution of Pharmacologic Approaches in HF



ACEI=angiotensin-converting enzyme inhibitor; Ang=angiotensin; ARB=angiotensin receptor blocker; AT_1R=angiotensin II type 1 receptor; HF=heart failure; HFrEF=heart failure with reduced ejection fraction; MRA=mineralocorticoid receptor antagonist; NP=natriuretic peptide; NPRs=natriuretic peptide receptors; RAAS=renin-angiotensin-aldosterone system; SNS=sympathetic nervous system

1. McMurray et al. Eur J Heart Fail 2013;15:1062–73
Figure references: Levin et al. N Engl J Med 1998;339:321–8 Nathisuwan & Talbert. Pharmacotherapy 2002;22:27–42
Kemp & Conte. Cardiovascular Pathology 2012;365–71
Schrier & Abraham. N Engl J Med 2009;341:577–85

Eur J Heart Fail. 2017 Oct;19(10):1230-1241. doi: 10.1002/ejhf.902. Epub 2017 Jun 19.

Heart rate and its reduction in chronic heart failure and beyond.

Nikolovska Vukadinović A[1], Vukadinović D[1], Borer J[2], Cowie M[3], Komajda M[4], Lainscak M[5], Swedberg K[6], Böhm M[1].

Author information

Abstract

Heart rate (HR) is associated with cardiovascular outcomes in all the stages of the cardiovascular continuum as well as in patients with pulmonary, cerebrovascular, and renal disease, sepsis, cancer, and erectile dysfunction. In patients with cardiovascular disease, but also in the general population, increased HR represents an important indicator of mortality with each acceleration of HR over 70 b.p.m. increasing the risk. In patients in sinus rhythm with chronic heart failure with reduced ejection fraction (HFrEF), a HR >70 b.p.m. increased the risk of hospitalization, and >75 b.p.m. the risk of cardiovascular death as shown in the Systolic Heart Failure Treatment with the I_f Inhibitor Ivabradine Trial (SHIFT). Reducing HR with ivabradine by 11 b.p.m. (placebo-controlled) reduced the primary composite endpoint (cardiovascular death and hospitalization for worsening heart failure). Ivabradine was well tolerated showing benefit irrespective of age or diabetes status, and also in the presence of low systolic blood pressure and severe heart failure (SHIFT trial). Therefore, HR qualifies as a modifiable risk factor in heart failure. In patients with stable coronary disease, HR is a risk marker but HR reduction with ivabradine does not improve outcomes. The role of selective HR lowering remains unclear in patients with pulmonary, renal, cerebrovascular, and other diseases, as the potential benefit of interventions on HR has not been explored in these conditions. Future studies should scrutinize if HR reduction improves outcomes, defining HR as a potential risk factor and therapeutic target in other conditions beyond heart failure.

Why is it important?
What is wrong?
Where is the problem?
How to overcome?
Who is Ivabradine?

International Journal of Cardiology 223 (2016) 163–167

Contents lists available at ScienceDirect

International Journal of Cardiology

journal homepage: www.elsevier.com/locate/ijcard

Review

Heart failure across Asia: Same healthcare burden but differences in organization of care☆

Eugenio B. Reyes [a], Jong-Won Ha [b], Isman Firdaus [c], Azmee Mohd Ghazi [d], Arintaya Phrommintikul [e], David Sim [f], Quynh Nga Vu [g], Chung Wah Siu [h], Wei-Hsian Yin [i], Martin R. Cowie [j,*]

[a] Section of Cardiology, Department of Internal Medicine, University of the Philippines, Philippine General Hospital, Manila, Philippines
[b] Cardiology Division, Yonsei University College of Medicine, Seoul, South Korea
[c] Department of Cardiology and Vascular Medicine, Faculty of Medicine, University of Indonesia/National Cardiovascular Center Harapan Kita, Indonesia
[d] National Heart Institute, Kuala Lumpur, Malaysia
[e] Department of Internal Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand
[f] Department of Cardiology, National Heart Center, Singapore
[g] Department of Internal Medicine, Ha Noi Heart Hospital, Ha Noi, Viet Nam
[h] Cardiology Division, Department of Medicine, Li Ka Shing Faculty of Medicine, the University of Hong Kong, Hong Kong, China
[i] Cardiology Division, Cheng Hsin General Hospital, Faculty of Medicine, National Yang-Ming University, Taipei, Taiwan
[j] National Heart and Lung Institute, Imperial College London (Royal Brompton Hospital), London, UK

Mean length of stay are relatively similar, but mortality rate 30-days after discharge are very high

Table 2
Heart failure (HF) hospitalization and mortality in the 9 Asian countries or regions, and Europe and the USA [3,20,22–24,35–38].

Hospitalization characteristics	Asia									Europe	USA
	Hong Kong	Indonesia	Malaysia	Philippines	Singapore	South Korea	Taiwan	Thailand	Vietnam		
Hospitalizations											
HF hospitalizations per year	18,000	–	–	–	6000	–	40,000	–	–	–	>1M
% of total hospitalizations	–	–	–	9%	–	–	2.2%	10%	15%	–	–
Readmission rate											
By 30 days										–	25%
Hospital stay											
Mean (days)										–	–
Median (range) (days)										8	5
Mortality											
Inpatient										6%	4%
Within 30 days of discharge										–	10%
Annual cost of HF (US$ million)											
Cost of hospitalization (US$ per pt)										–	23,077

Missing data are not available

Hospitalization characteristics	Asia				
	Hong Kong	Indonesia	Malaysia	Philippines	Singapore
Hospitalizations					
HF hospitalizations per year	18,000	–	–	–	6000
% of total hospitalizations	–	–	–	9%	–
Readmission rate					
By 30 days	–	7%	8%	–	17.6% (90 days)
Hospital stay					
Mean (days)	6–10	5	9.24	10	5.1
Median (range) (days)	–	5	7 (4–11)	7 (1–133)	–
Mortality					
Inpatient	–	3%	6%	7%	1.1%
Within 30 days of discharge	–	17%	1%	10%	–
Annual cost of HF (US$ million)					
Cost of hospitalization (US$ per pt)	2916–4860	813	–	–	–

Reyes et al, 2016. Heart failure across Asia, International Journal of Cardiology, 223, 163–167

Under-usage of guideline-recommended HF pharmacological therapies in Indonesian patients

Table 3
Pharmacological treatment of HF in 9 Asian countries or regions, and Europe and the USA [26,28,35,39].

Pharmacological treatment of HF	Asia									Europe	USA
	Hong Kong	Indonesia	Malaysia	Philippines	Singapore	South Korea	Taiwan	Thailand	Vietnam		
RAAS inhibitor	52%	78%	67%	70%	74%	65%	61%	77%	90%	89%	66%
Beta-blocker	39%	32%	72%	38%	65%	44%	57%	78%	41%	87%	81%
Calcium channel blocker	–	–	17%	12%	–		12%	–	–	10%	–
Ivabradine	–	–	–	0%	–		–	6%	21%	–	–
Diuretic	84%	78%	99%	76%	87%		80%	92%	–	83%	–
Digo											–
Lipi											62%
Anti											65%
Missin											

Pharmacological treatment of HF	Asia					
	Hong Kong	Indonesia	Malaysia	Philippines	Singapore	South Korea
RAAS inhibitor	52%	78%	67%	70%	74%	65%
Beta-blocker	39%	32%	72%	38%	65%	44%
Calcium channel blocker	–	–	17%	12%	–	
Ivabradine	–	–	–	0%	–	
Diuretic	84%	78%	99%	76%	87%	
Digoxin	11%	21%	44%	53%	27%	
Lipid-lowering agent	–	–	76%	–	72%	
Anticoagulant	–	–	25%	26%	12%	

Missing data are not available.

Reyes et al, 2016. Heart failure across Asia, International Journal of Cardiology, 223, 163–167

Why is it important?
What is wrong?
Where is the problem?
How to overcome?
Who is Ivabradine?

Heart Failure Hospitalization:
a key opportunity *key moment to optimize care…*

Initiating therapy during hospitalization is suggested to reduce the risk of adverse outcomes. At discharge, patients can be considered to be in a stable chronic heart failure state at high risk for adverse outcomes.

- ***"Initiating therapies in patients who are stabilized in the hospital and continued long-term provides a potent option to improve long-term clinical outcomes."***

- ***"Delaying initiation of potentially effective therapies for weeks to months post discharge risks unabated high risk for adverse events in the meantime."***

Gheorghiade M et al. Heart Failure Clin. 2013.9;285-290.

- **Adherence to guidelines**

Compliance with evidence-based clinical practice guidelines is associated with an improvement of heart failure patients' outcomes.

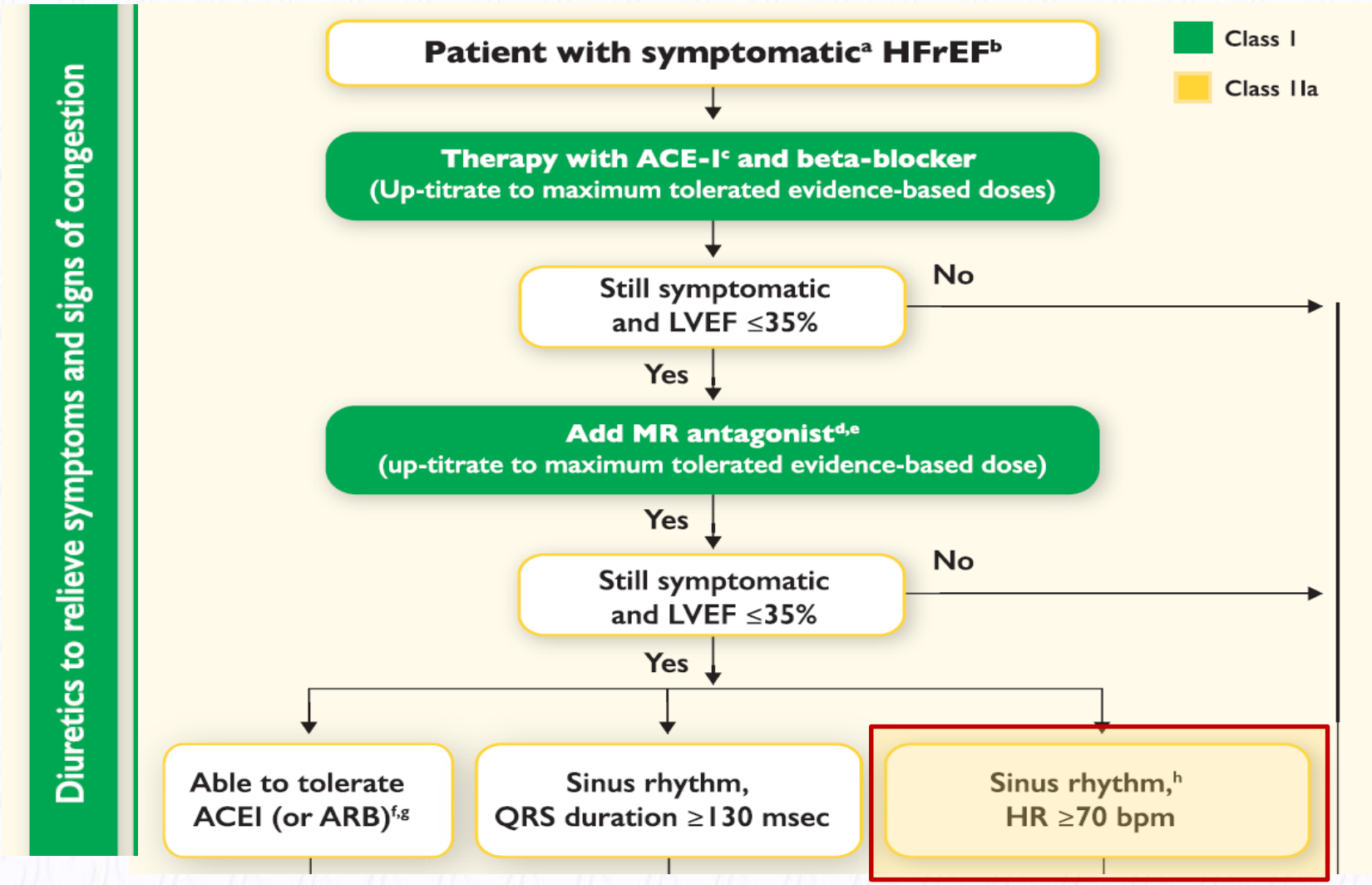
2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

Developed with the special contribution of the Heart Failure Association (HFA) of the ESC

Authors/Task Force Members: Piotr Ponikowski* (Chairperson) (Poland), Adriaan A. Voors* (Co-Chairperson) (The Netherlands), Stefan D. Anker (Germany), Héctor Bueno (Spain), John G. F. Cleland (UK), Andrew J. S. Coats (UK), Volkmar Falk (Germany), José Ramón González-Juanatey (Spain), Veli-Pekka Harjola (Finland), Ewa A. Jankowska (Poland), Mariell Jessup (USA), Cecilia Linde (Sweden), Petros Nihoyannopoulos (UK), John T. Parissis (Greece), Burkert Pieske (Germany), Jillian P. Riley (UK), Giuseppe M. C. Rosano (UK/Italy), Luis M. Ruilope (Spain), Frank Ruschitzka (Switzerland), Frans H. Rutten (The Netherlands), Peter van der Meer (The Netherlands)

Therapeutic algorithm for a patient with symptomatic HF with reduced ejection fraction.

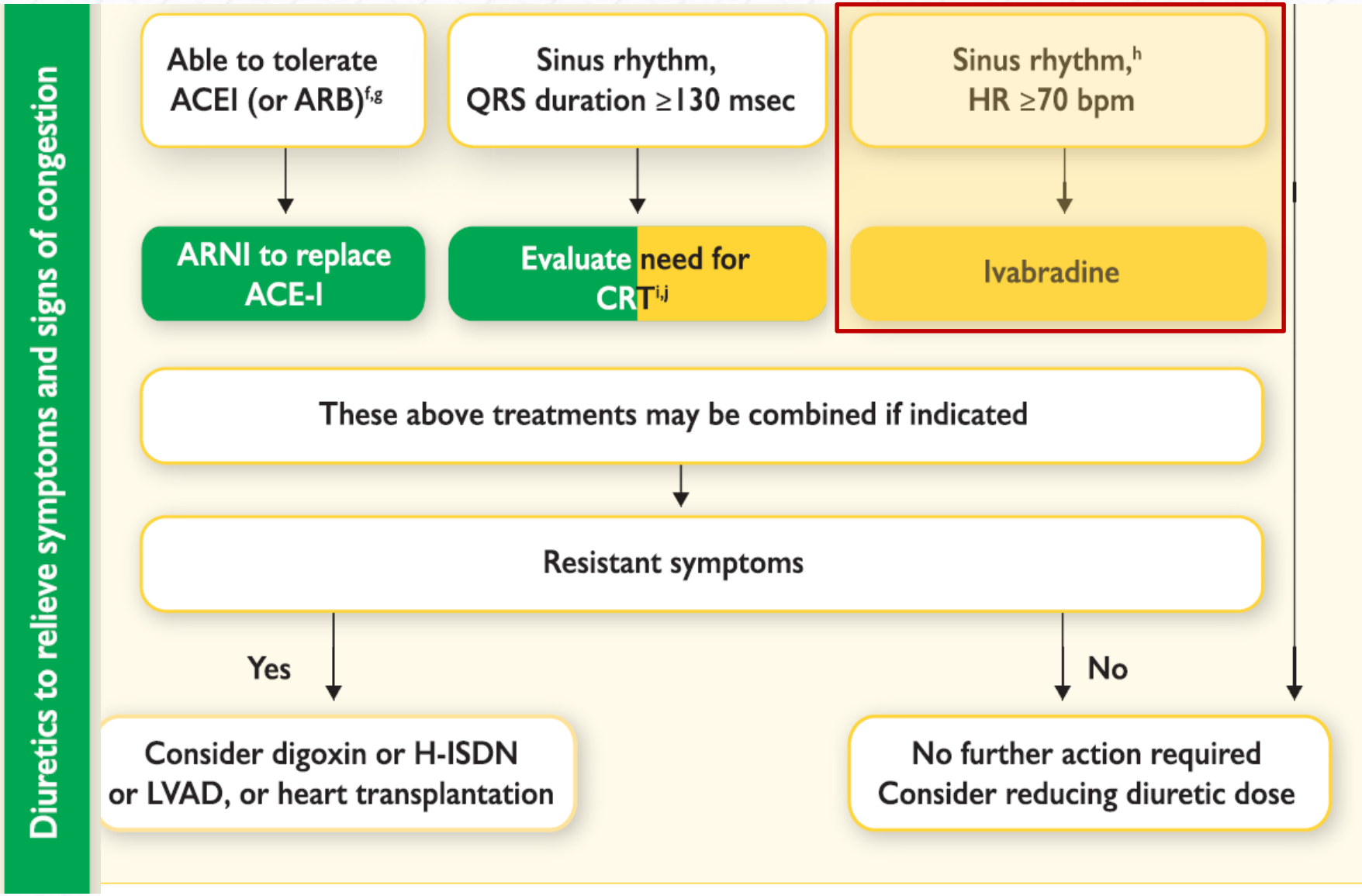


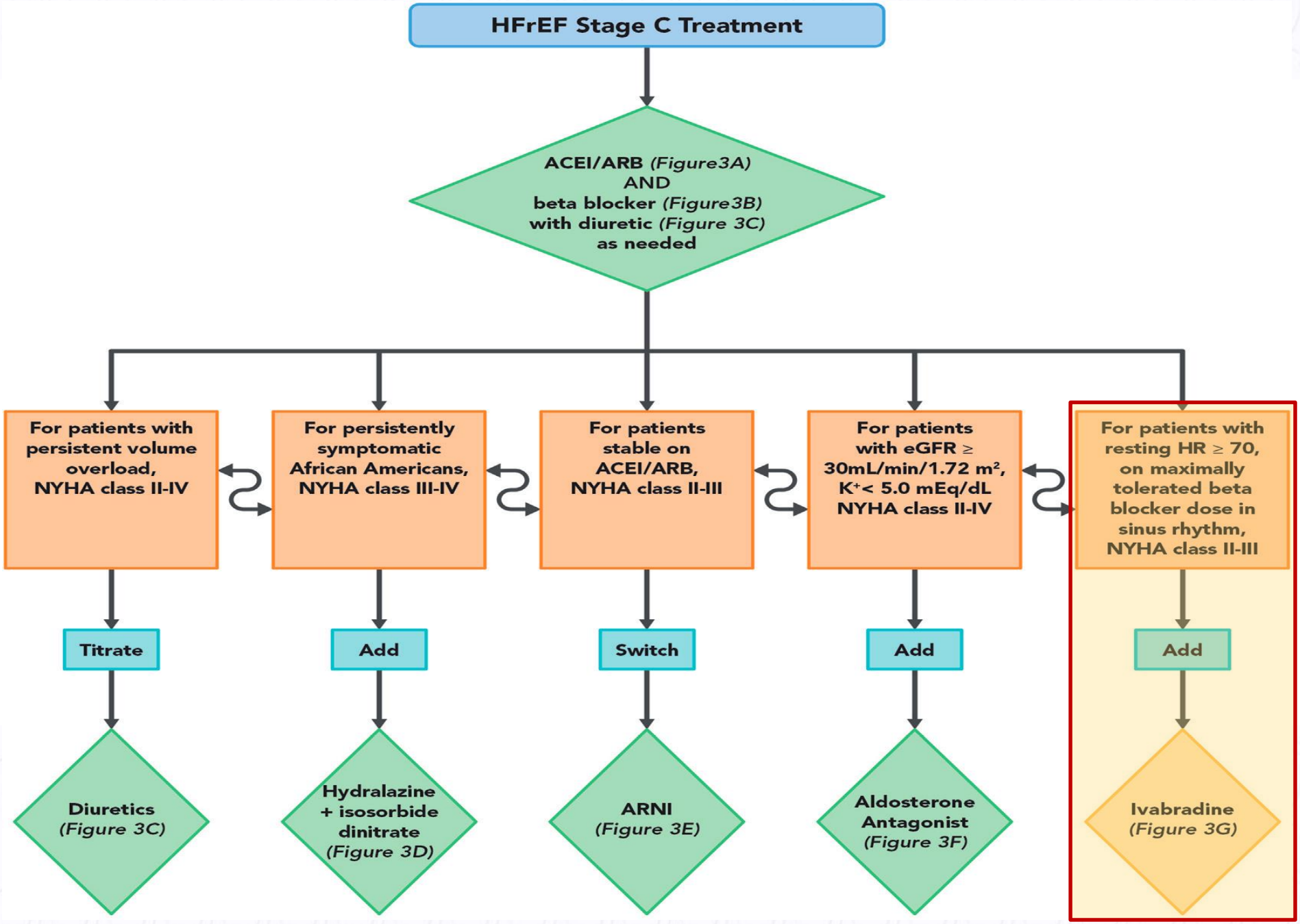
www.escardio.org/guidelines

Available online on Eur J Heart Fail

EUROPEAN SOCIETY OF CARDIOLOGY®

Therapeutic algorithm for a patient with symptomatic HF with reduced ejection fraction. (cont..)





Heart Failure Pathway Writing C, Yancy et al. Journal of the American College of Cardiology. 2017.

Panduan Praktek Klinik PP PERKI

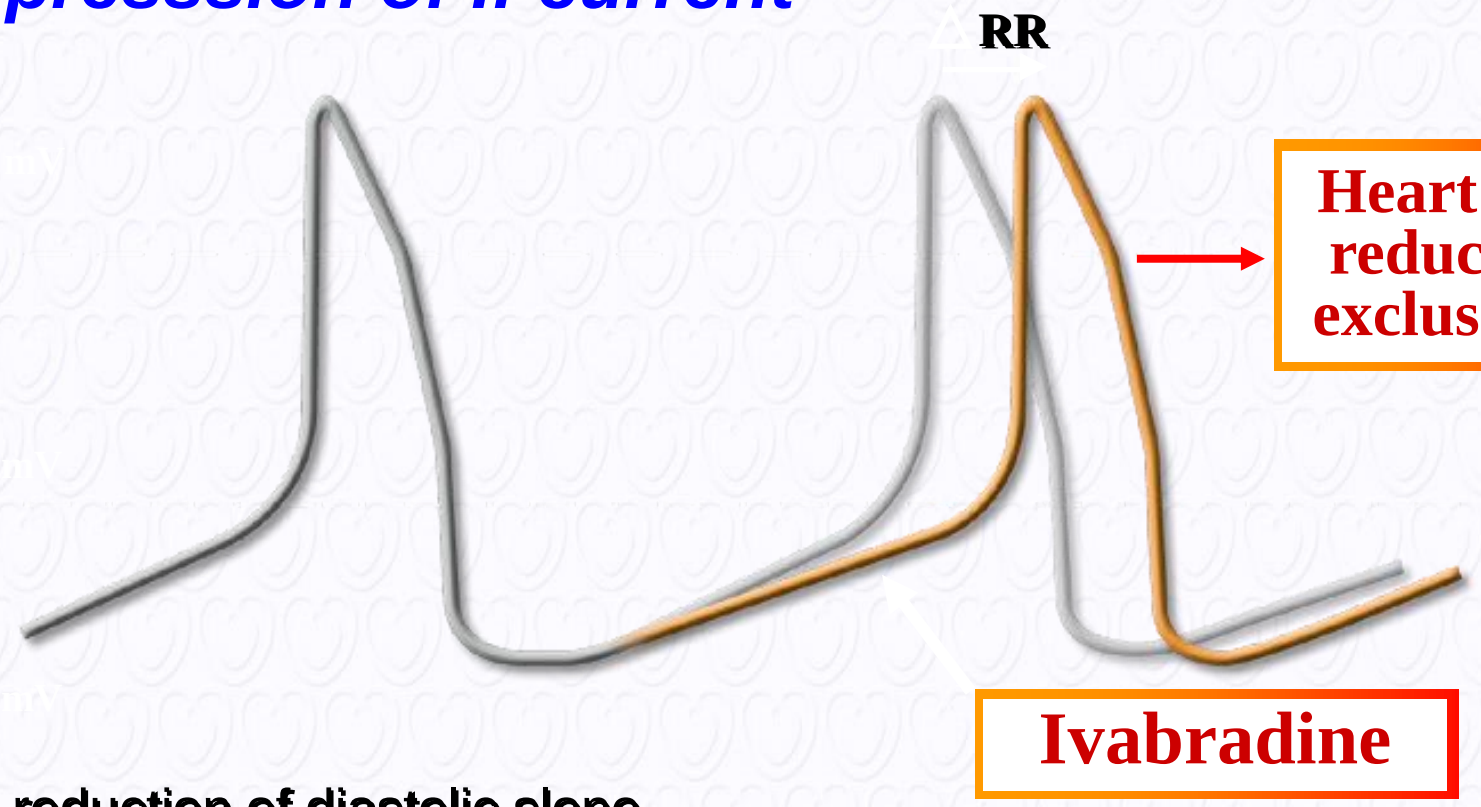
Rekomendasi
Pemberian ACEi direkomendasikan , bagi semua pasien dengan EF ≤ 40%, untuk menurunkan risiko hospitalisasi akibat gagal jantung dan kematian dini
Pemberian penyekat β, setelah pemberian ACEi atau ARBs pada semua pasien dengan EF ≤ 40% untuk menurunkan risiko hospitalisasi akibat gagal jantung dan kematian prematur
MRA direkomendasikan bagi semua pasien dengan gejala gagal jantung yang persisten dan EF≤ 35, walaupun sudah diberikan dengan ACEi dan penyekat β

Rekomendasi
Angiotensin Receptor Blockers (ARB) • Direkomendasikan untuk menurunkan risiko hospitalisasi gagal jantung dan kematian dini pada pasien dengan EF ≤ 40 % dan tidak toleran dengan ACEi, dikarenakan batuk (pasien tetap sudah harus mendapat β blocker dan MRA) **Ivabradine** • Harus dipertimbangkan, untuk **menurunkan risiko hospitalisasi gagal jantung** pada pasien dengan irama sinus, **EF ≤ 35 % dan laju nadi tetap ≥ 70 x/ menit,** dan simtom **(NYHA II-IV)** yang persisten walaupun sudah **mendapatkan terapi dengan ACE/ ARB, β blocker dan MRA yang optimal** • Dapat dipertimbangkan untuk menurunkan risiko hospitalisasi gagal jantung pada pasien dengan irama sinus, EF ≤ 35 % dan laju nadi ≥ 70 x/ menit, yang tidak toleran terhadap β blocker. Pasien harus sudah mendapatkan terapi dengan ACE/ ARB dan MRA

Why is it important?
What is wrong?
Where is the problem?
How to overcome?
Who is Ivabradine?

Ivabradine: Mechanism of action

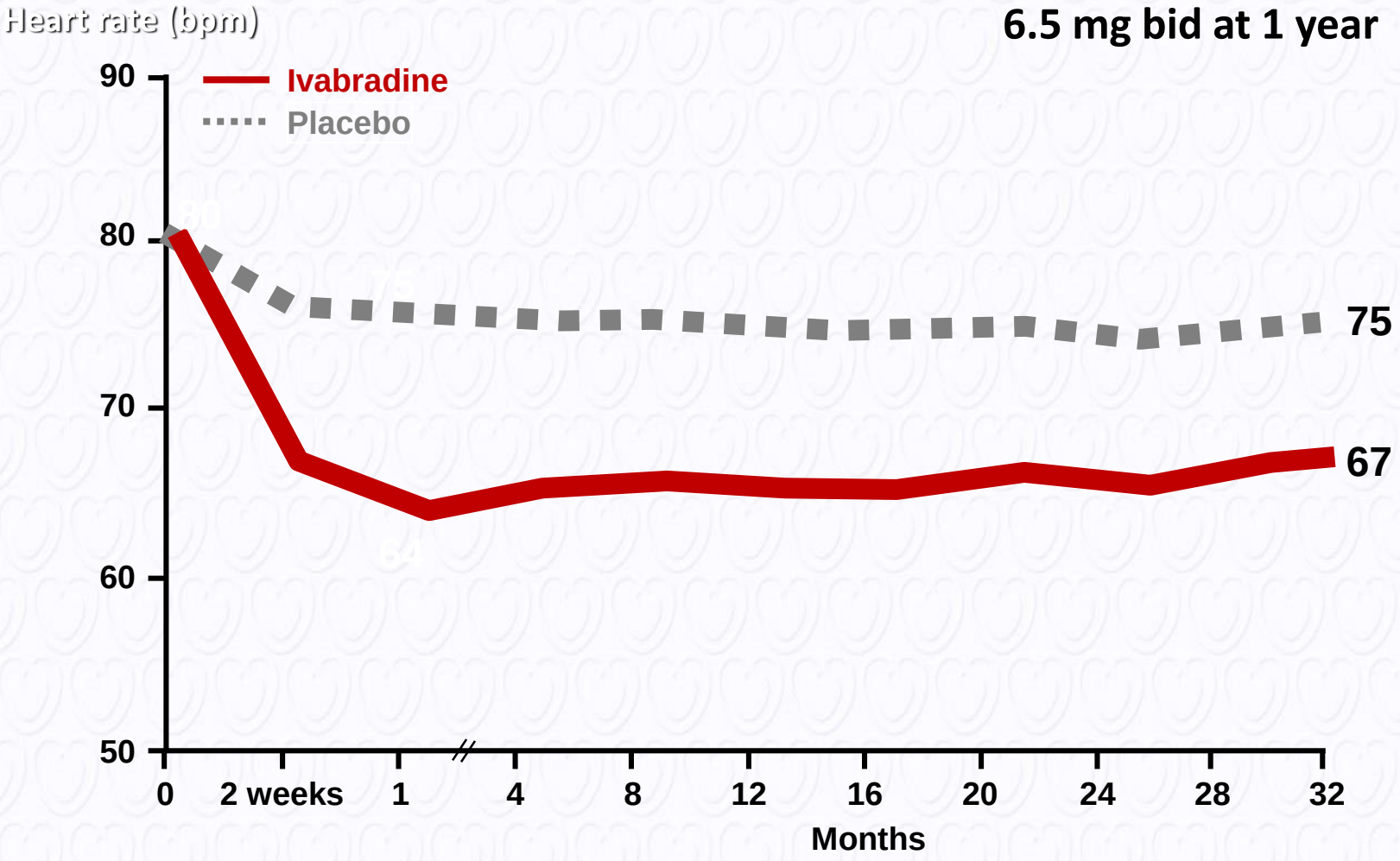
Suppresssion of If current



- 30% reduction of diastolic slope
- other currents maintain pacemaker activity
- safety factor of ivabradine

Mean heart rate reduction

Mean ivabradine dose: 6.4 mg bid at 1 month
6.5 mg bid at 1 year



Reduces heart rate depending on baseline heart rate

Excellent Tolerability[1,2]

85 bpm

75-84 bpm

65-74 bpm

60-64 bpm

≈ 55-60 bpm

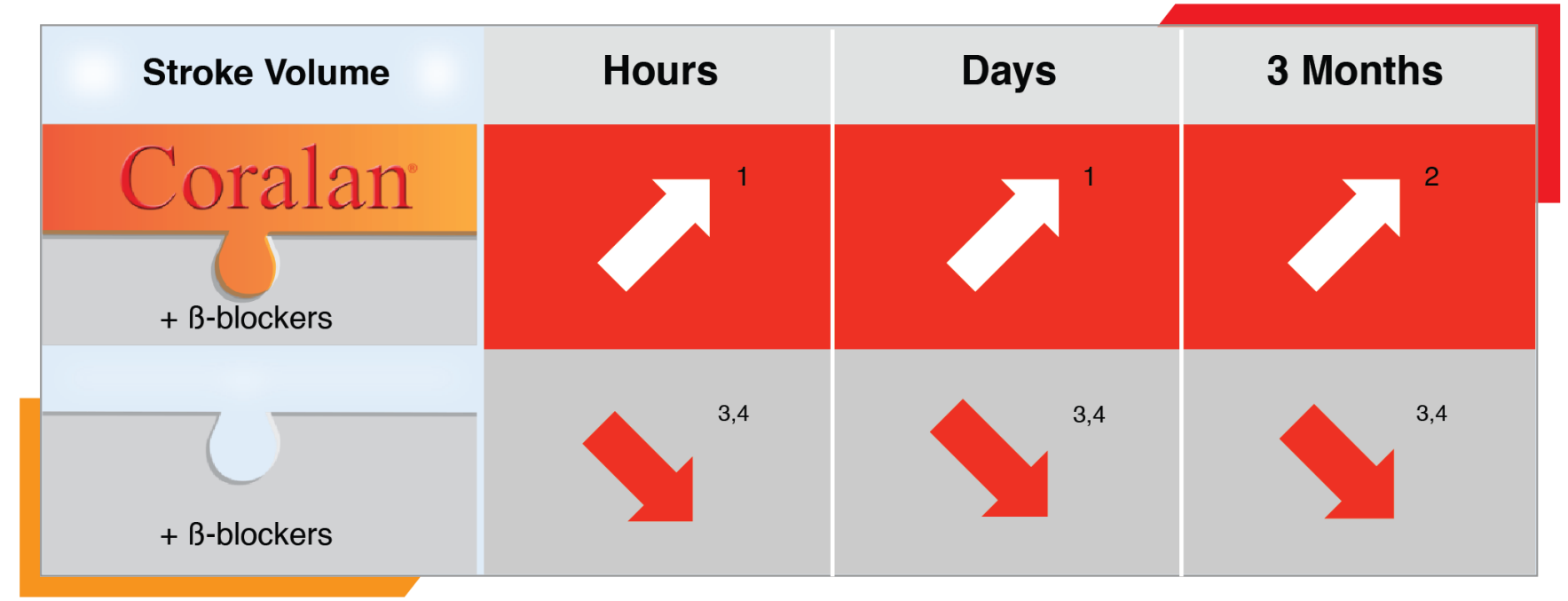
Does Not Affect Blood Pressure

Less Bradycardia

Ivabradine in the management of heart failure

optimization of the treatment…

Improves Stroke Volume RAPIDly

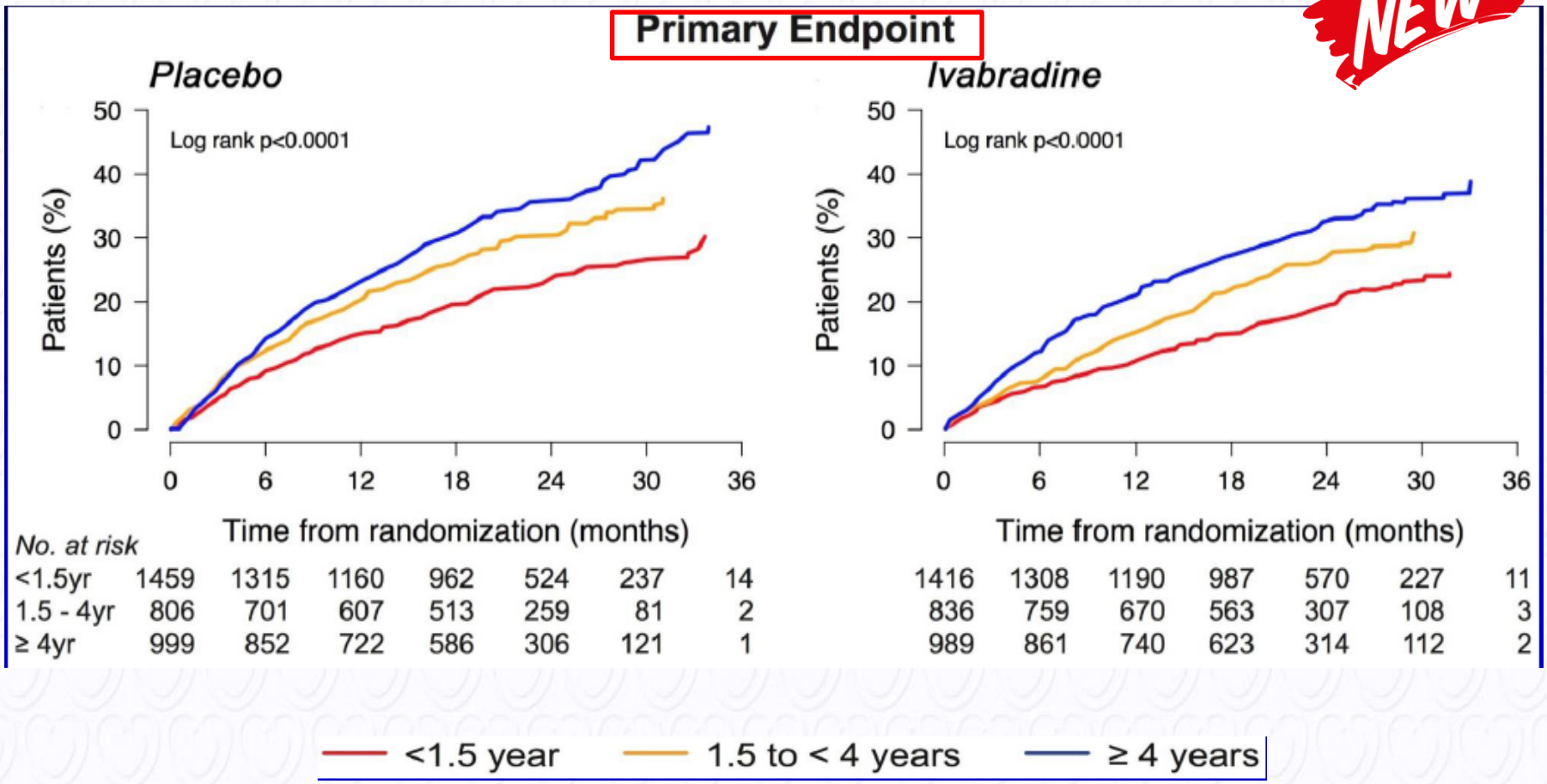


*for patients who are **stabilized in the hospital** and continued **long term***

1.Procoralan Summary of Product characteristics 2.McMurray J et al. J Heart Fail. 2012;14(8):803-869.
3.Tardif JC et al; SHIFT Investigators.. Eur Heart J. 2011;32(20):2507-2515. 4. Reil JC et al; J Am Coll Cardiol. 2013;19;62(21):1977-1985

Early treatments matters for the treatment of HF

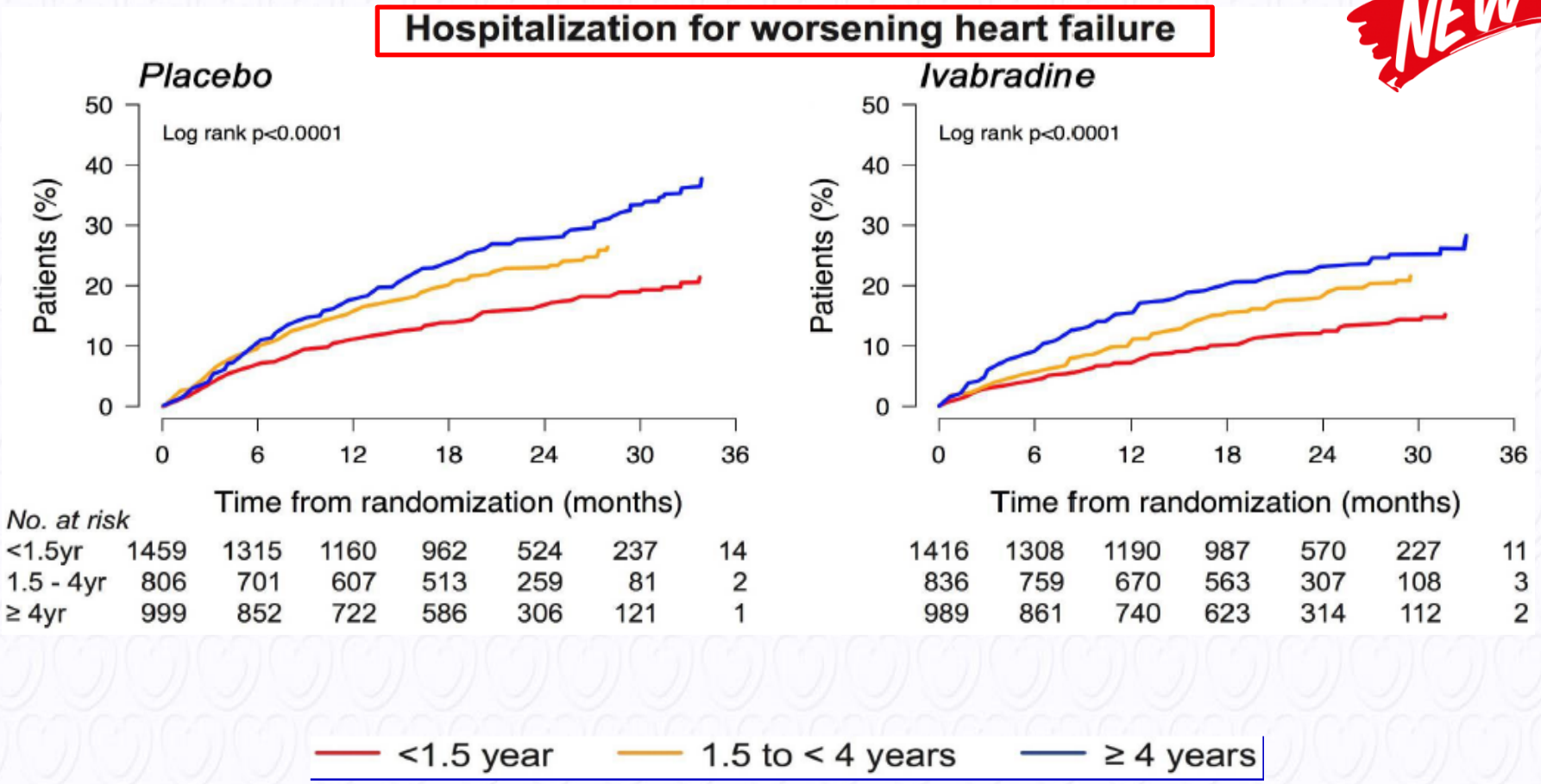
Böhm M. et al,



Böhm M. et al, *EJHF*(2017): in preparation

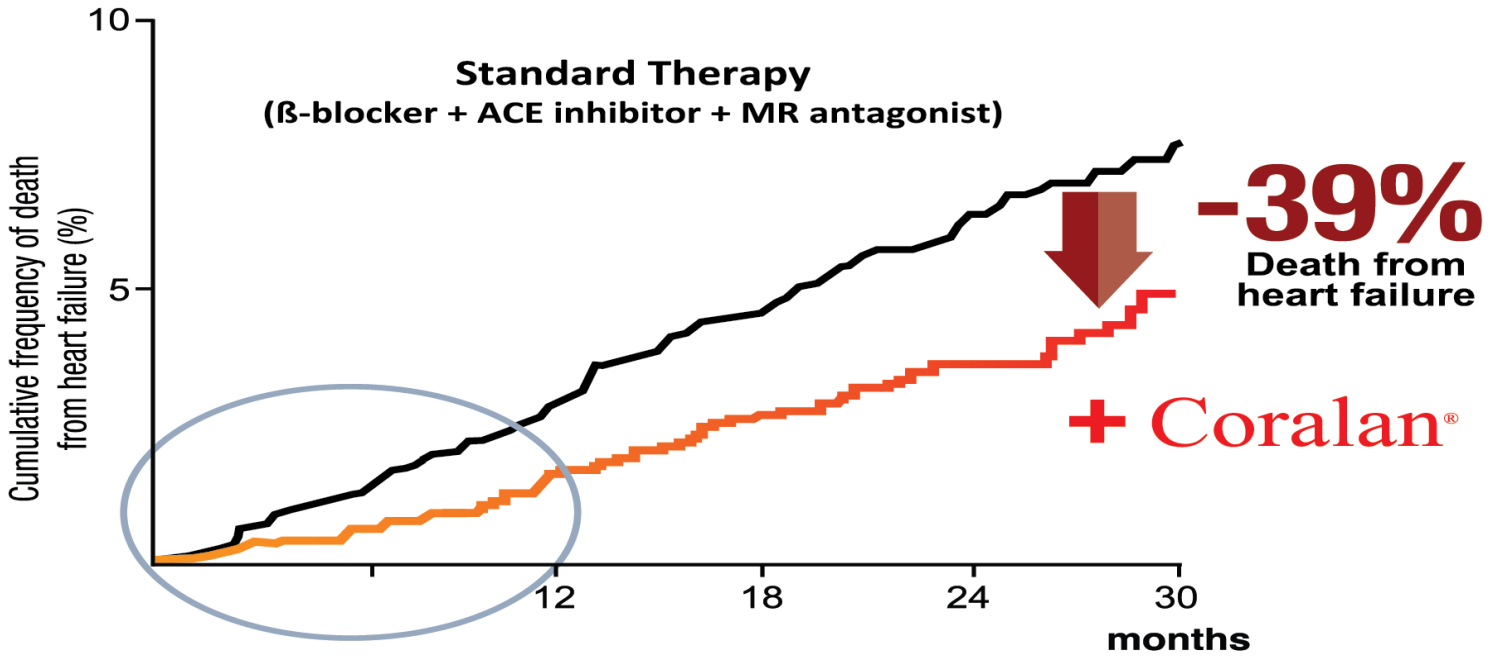
Early treatments matters for the treatment of HF

Böhm M. et al,



Böhm M. et al, *EJHF*(2017): in preparation

Ivabradine : Ensure Survival Patients



adding more life to years

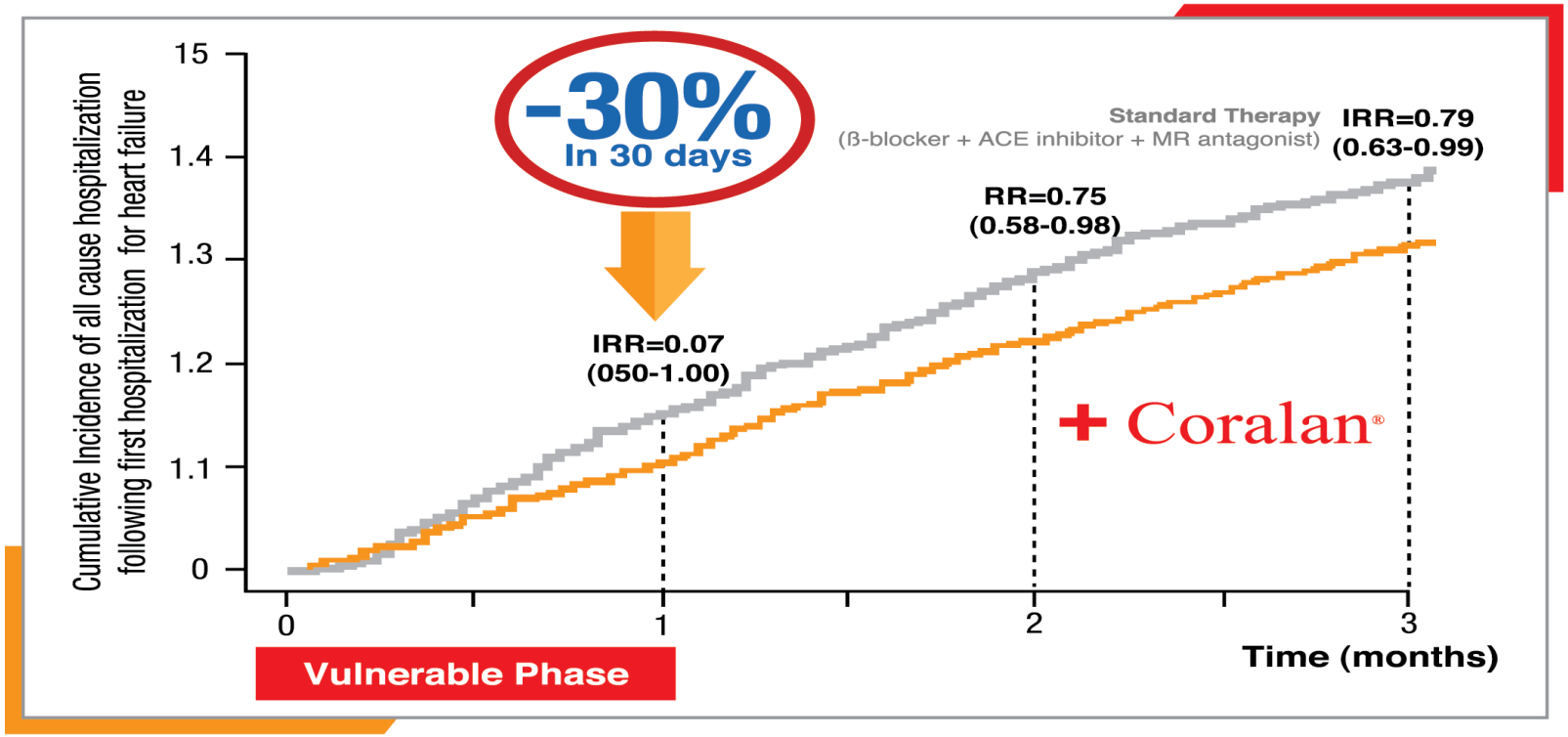
Heart rate ≥ 75 bpm n=4150 Hazard rate=0.61 p=0.0006

Recognize by :

NEW

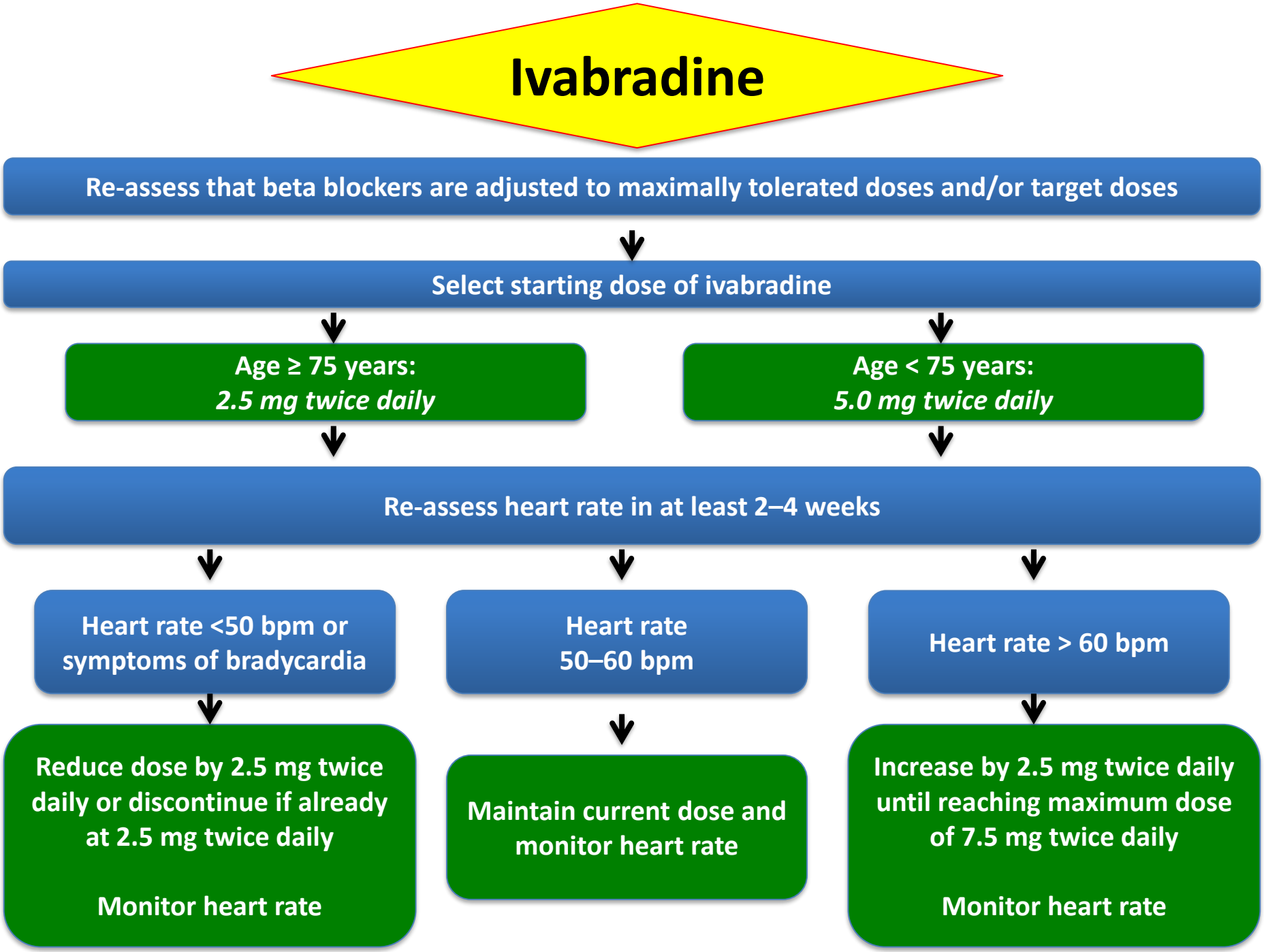
Ivabradine :

Reduces re-hospitalization RAPIDLY



HF patients are protected during the vulnerable phase

Komajda, et al. Eur Heart J. 2016;33:2813-2820
Abrahamsson.et al.Eur J Heart Fail.2013:15(8):885-891.



Heart Failure Pathway Writing C, Yancy et al. Journal of the American College of Cardiology. 2017.

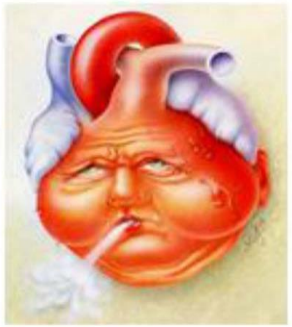
KEY-POINTS

- Heart Failure is the ending of any cardiovascular diseases.
- Mortality due to HF still high despite medical therapies.
- Targeting heart rate as a potentially modifiable risk factor.
- Early co-administration of Ivabradine (and BB), or on top of optimal tolerated dose of GDMT is safe and be an integral part of all HF guidelines.

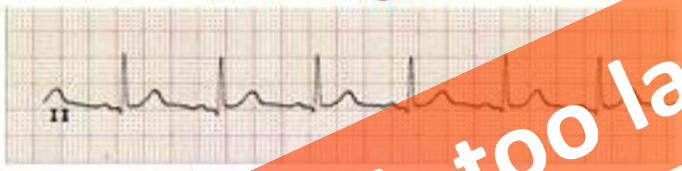
EUROPEAN SOCIETY OF CARDIOLOGY®

American Heart Association

EF < 35%



SR > 70 bpm



Listed in :

Jaminan Kesehatan Nasional

INHEALTH

PERTAMEDIKA

IHC

BUMN

Hadir untuk negeri

Don't wait until it's too late

Diuretic
ACEi/ARB
Beta Blocker
MRA

+ Ivabradine

THANK YOU

End of Presentation

Association between high heart rate and cardiovascular risk

High heart rate as an independent risk factor

- Increased ventricular wall stress
- Reduced arterial compliance
- Increased mean blood pressure
- Increased pulsatile pressure
- Decreased arrhythmic threshold
- Increased risk for atherosclerotic plaque instability

High heart rate as a risk indicator of adrenergic hyperactivity

- Left ventricular hypertrophy
- Insulin resistance
- Lower arrhythmic threshold
- Lower exercise capacity
- Increased risk for coronary thrombosis

Tavazzi L. Eur Heart J suppl 2003;5(suppl G):G15-G18

The burden of heart failure hospitalization

Overview in figures…

- Heart failure is a life-threatening disease estimated to be present in **1% to 2% of the general population**.
- **The prevalence of the disease is tending to increase** due to aging of the population and improved survival in many diseases. This global pandemic is known to have a survival rate that is worse than that of some cancers.

26 million

Worldwide number of patients affected by heart failure

74%

Heart failure patient suffering from at least 1 comorbidity: more likely to worsen the patient's overall health status

1. McMurray J et al. ESC guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. Eur J Heart Fail. 2012;14(8):803-869. 2. Ambrosy PA et al. The Global Health and Economic Burden of Hospitalizations for Heart Failure. Lessons Learned From Hospitalized Heart Failure Registries. J Am Coll Cardiol. 2014;63:1123–1133. 3. Butler J, Braunwald E, Gheorghiade M. Recognizing worsening chronic heart failure as an entity and an end point in clinical trials. JAMA. 2014;312(8):789-790. 4. van Deursen VM et al. Co-morbidities in patients with heart failure: an analysis of the European Heart Failure Pilot Survey. Eur J Heart Fail. 2014;16:103-111.

The burden of heart failure hospitalization

from the society's perspective …

Increase in health care expenses

3 X

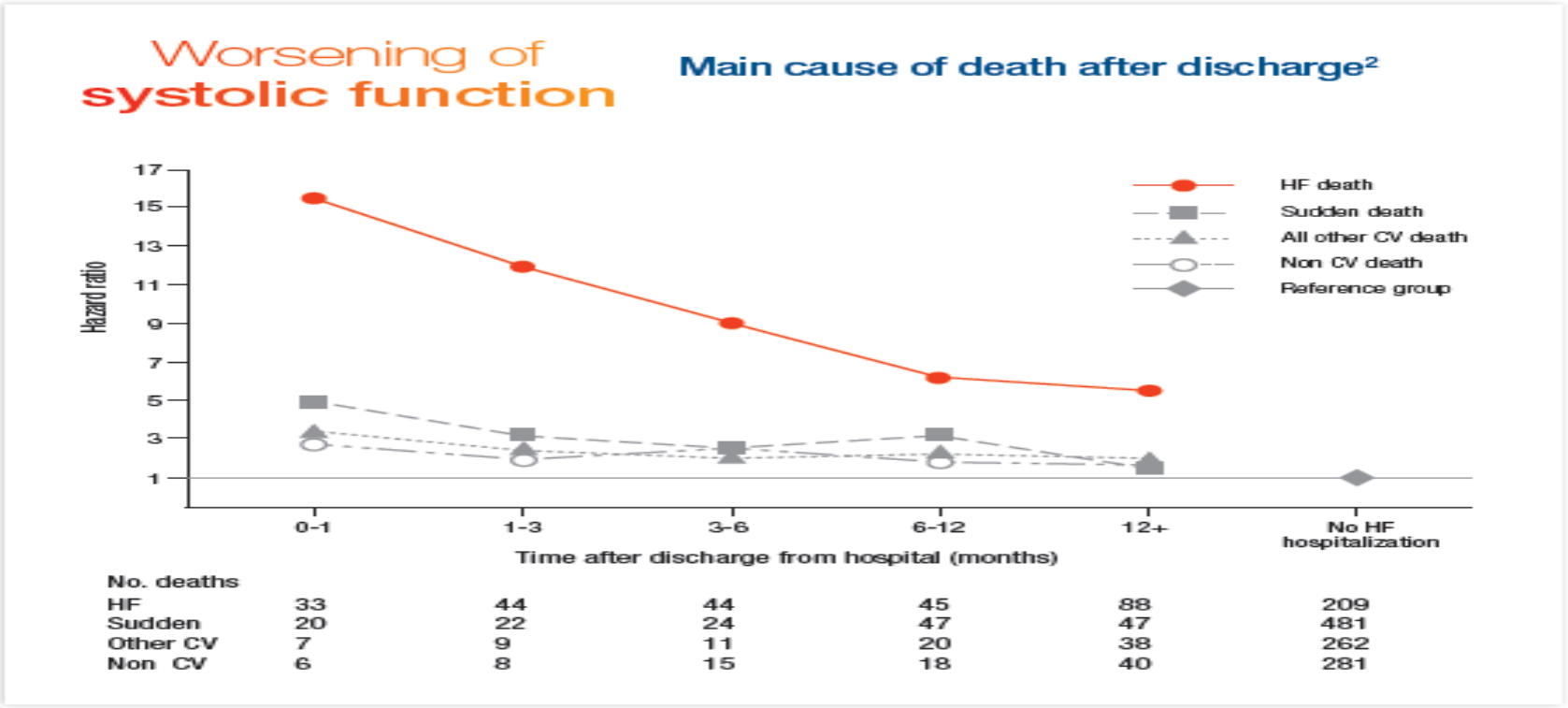
higher

by *2030*

The 2030 projected cost estimates of treating patients with heart failure will be 3 fold higher than in 2010, mainly due to the aging of the population

The burden of heart failure hospitalization

Overview in figures…



Heart failure is the leading cause of hospitalization in patients aged over 65 years with average length of hospital stay 5-10 days

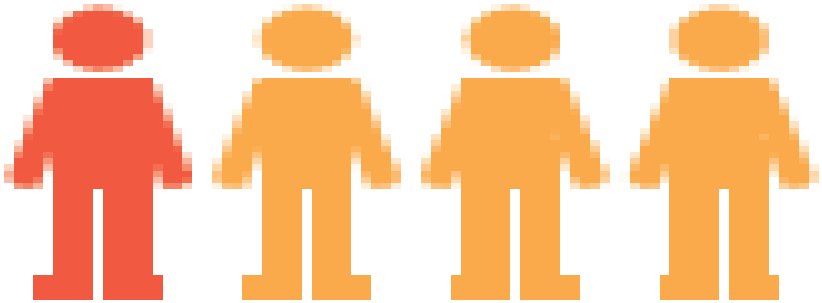
HF Hospitalization Impact :
Psychological, social, relational and physical capacity

1. Cowie MR et al. Improving care for patients with acute heart failure. 2014. Oxford PharmaGenesis. ISBN 978-1-903539-12-5. Available at: http://www.oxfordhealthpolicyforum.org/reports/acute-heart-failure/improving-care-for-patients-with-acute-heart-failure. 2. Solomon SD et al. Inluence of Nonfatal Hospitalization for Heart Failure on Subsequent Mortality in Patients With Chronic Heart Failure. Circulation. 2007;116:1482-1487.

Heart Failure Hospitalization: a key opportunity

in view of the early post discharge phase …

Re-hospitalization is particularly high in the early phase after hospitalization:



Almost 1 out of 4 heart failure readmissions (24%)
will happen in the first 30 days post-discharge

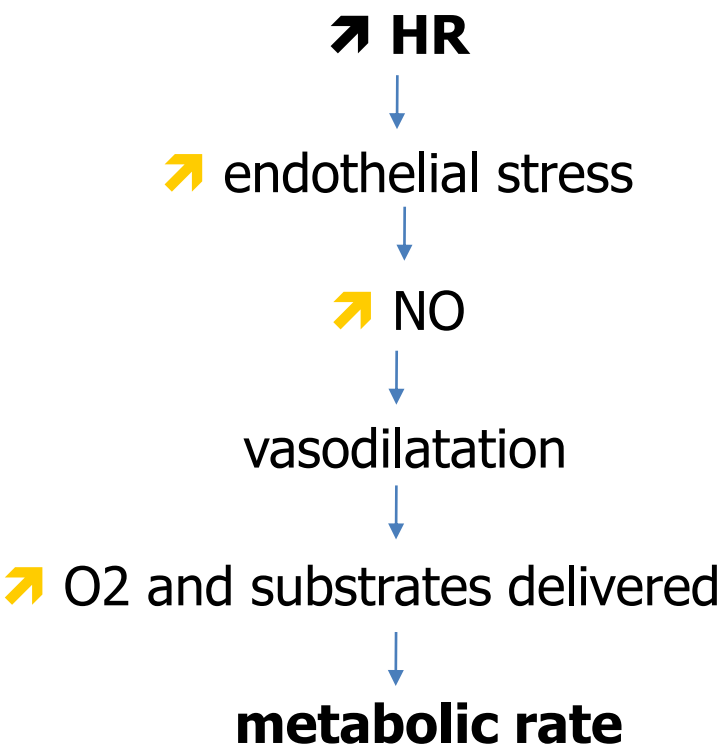
The vulnerable phase is a critical determinant of prognosis.
In order to avoid adverse outcomes, patients should be discharged
"when they are hemodynamically stable for at least 24-48 hours, euvolemic, and managed on evidence-based oral medication, and when they have stable organ function, including the kidney and liver"

HEART RATE as PREDICTOR of CV Death, Hospitalization HF

1. Butler J, Braunwald E, Gheorghiade M. Recognizing worsening chronic heart failure as an entity and an end point in clinical trials. JAMA. 2014 ;312:789-790. 2. AbrahamssonP. Risk following hospitalization in stable chronic systolic heart failure. Eur J Heart Fail. 2013;15(8):885-891. 3. O'Connor CM et al. Causes of death and rehospitalization in patients hospitalized with worsening heart failure and reduce left ventricular ejection fraction: results from eficacy of vasopressin antagonism in heart failure outcome stuy with tolvaptan (EVEREST) program. Am Heart J. 2010;159:841-849.e1. 4. Krumholz HM. Post-hospital Syndrome – An acquired, Transient Condition of Generalized Risk . N Engl J Med. 2013;368;2. 5. Marti NC et al. Timing and duration of interventions in clinical trials for patients with hospitalized heart failure. Circ Heart Fail. 2013;6:1095-1101. 6. Yilmaz MB, Mebazaa A. Deinition and characteristics of the vulnerable phase in heart failure. Medicographia. 2015;37(2):144-148. 7. Mebazaa A et al. Recommendations on pre-hospital & early hospital management of acute heart failure: a consensus paper from the Heart Failure Association of the European Society of Cardiology, the European Society of Emergency Medicine and the Society of Academic Emergency Medicine. Eur JHeart Fail. 2015;17(6):544-558

There is a close relationship between heart rate and life expectancy

- Heart Rate is a marker for metabolic rate and energetic needs



Life expectancy is predetermined by the basic energetics of living cells

The less the energy is needed, the longer the life span

Ref : Azbel MY. Universal biological scaling and mortality. Proc Nat Acad Sci USA 1994;91:12453-7

Heart Failure Hospitalization: a key opportunity

key success factor …

OPTIMIZATION OF TREATMENT

- **Hospitalization is the key moment to optimize heart failure care**

Hospitalization implies several phases: an acute phase and a stable phase.

By initiating therapies in patients who are stabilized in the hospital and continued long-term, It improves long-term clinical outcomes.

It is also important to **prevent heart failure progression** and to take into **consideration the comorbidities of heart failure patients.**

- **Adherence to guidelines**

Compliance with evidence-based clinical practice guidelines is associated with an improvement of heart failure patients' outcomes.

EUROPEAN SOCIETY OF CARDIOLOGY®

Heart Failure Hospitalization: a key opportunity

key success factor …

PATIENT EDUCATION

- **Knowledge associated with self-care for people suffering from heart failure**

Increasing patient knowledge about self-care has a positive influence on health and well-being by respecting exercise
and dietary, interpreting symptoms to seek appropriate care, and complying with treatments prescribed

- **Involvement of health care professionals in terms of availability, continuity, and quality**

The positive involvement of health care professionals helps patients and their families timely care, improve confidence, and maintain self-care practice.

Heart Failure Hospitalization: a key opportunity

key success factor …

Continuity of care

- **Establishment of a discharge plan**

Discharge plans are defined in several recommendations (2010 NICE guidance, 2013 ACCF/AHA guidelines) in order to follow up patients carefully, particularly during the post-discharge phase, which is a period of vulnerability