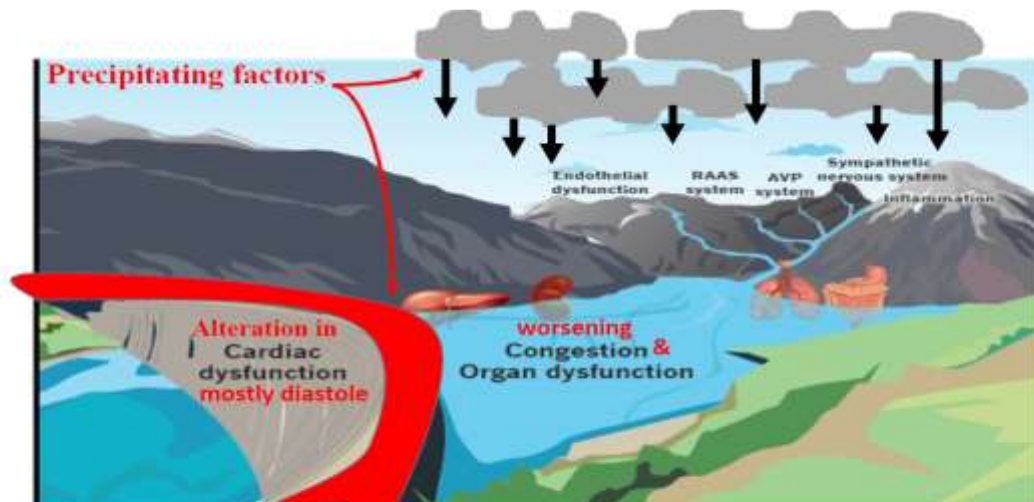


Acute Heart Failure

How to tackle congestion ?

Magdy Abdel Hamid , MD, FACC , FSCAI
Professor of Cardiovascular Medicine
Cairo University

Acute Heart Failure



Arrigo et al ., EHJ Suppl , 2016

Water and Sodium in Heart Failure: A Spotlight on Congestion

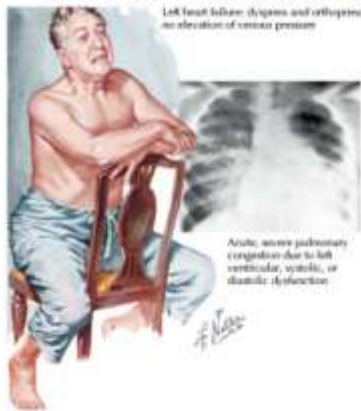
Heart Fail Rev (2015) 20:13-24

Gaspare Parrinello · Stephen J. Greene · Daniele Torres · Michael Alderman · Joseph Vincent Bonventre · Pietro Di Pasquale · Luna Gargani · Anju Sobria · Gregg C. Fonarow · Muthiah Vaduganathan · Javed Butler · Salvatore Paterna · Lynne Warner Stevenson · Mihai Gheorghiade



HF

- Hippocrates 460 - 377 BC:
 - The flesh is consumed and becomes water, the abdomen fills with water, the feet and legs swell, the shoulders, clavicles, chest, and thighs melt



History

Physical Exam

Lab testing

TO DO LiST

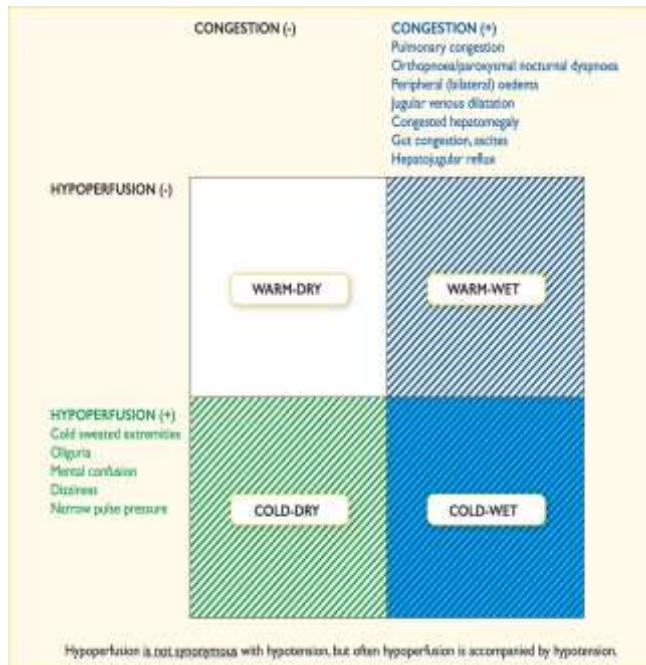
- 1.
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- 3.

Guideline directed therapy

ESC GUIDELINES

Guidelines for Practice Guidelines and Policy Committees
To improve the quality of clinical practice and patient care in Europe

GUIDELINES FOR THE DIAGNOSIS AND TREATMENT OF CHRONIC HEART FAILURE

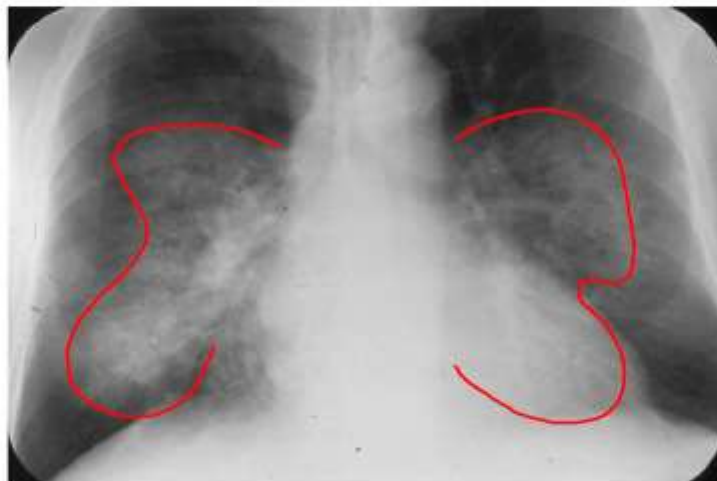


Grading congestion in Heart Failure

Variable	Score				
	-1	0	1	2	3
Bedside assessment					
Orthopnoea*		None	Mild	Moderate	Severe/worst
JVP (cm)	<8 and no hepatjugular reflux		8-10 or hepatjugular reflux	11-15	>16
Hepatomegaly	Absent in the setting of normal JVP	Absent	Liver edge	Moderate pulsatile enlargement	Massive tender enlargement extending to midline
Oedema		None	1+	2+	3+/4+
Laboratory					
Natriuretic peptides (one)					
BNP		<100	100-299	300-500	>500
NT pro-BNP		<400	400-1500	1500-3000	>3000
Dynamic manoeuvres					
Orthostatic testing	Significant decrease in SBP or increase in HR	No change in SBP or HR			
6 min walk test	>400 m	No difficulty 300-400 m	Mild 200-300 m	Moderate 100-200 m	Severe/worst <100 m
Valsalva manoeuvre	Normal response		Absent overshoot pattern	Square wave pattern	

Gheorghide et al. Eur J Heart Failure 201

"Butterfly" pattern on chest X-ray



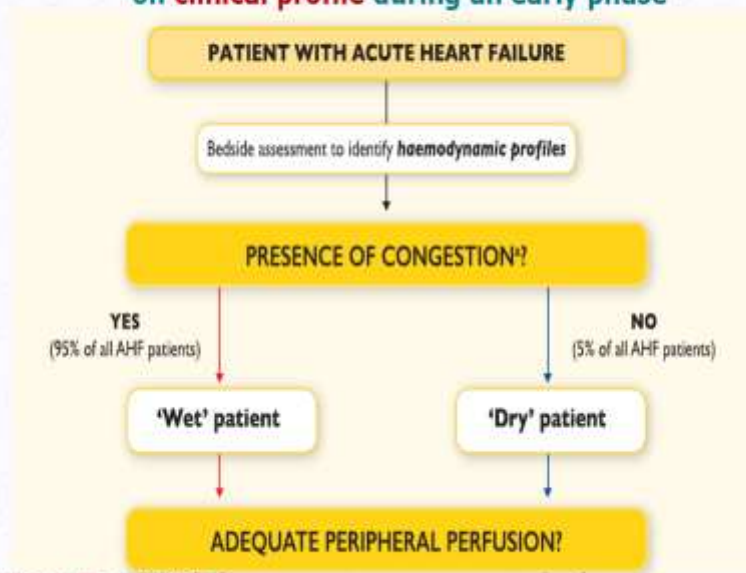
*Monnier-Cholley L. Chest X-ray in Acute Heart Failure in Mehrazaa A et al (Eds) Acute Heart Failure (2009) Springer Science & Business Media

CXR:

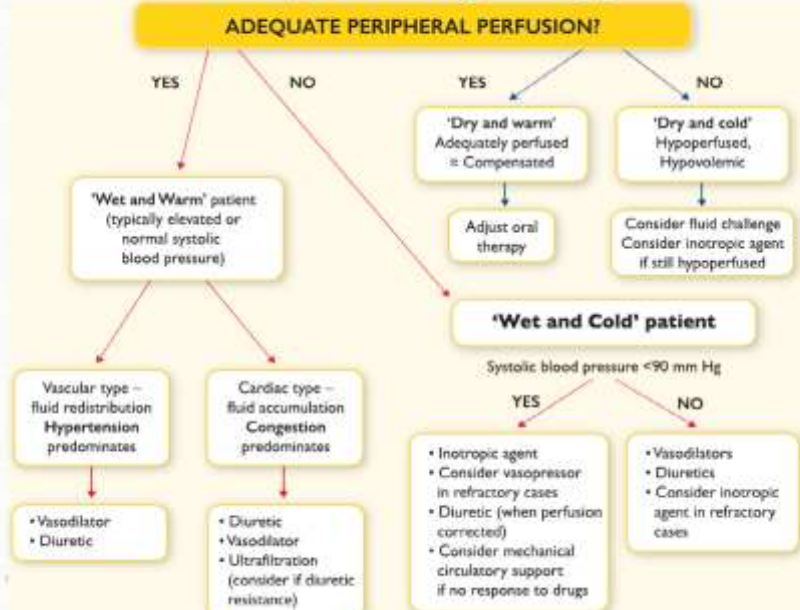
Cardiomegaly
 pleural effusions
 interstitial edema
 Pulmonary venous redistribution



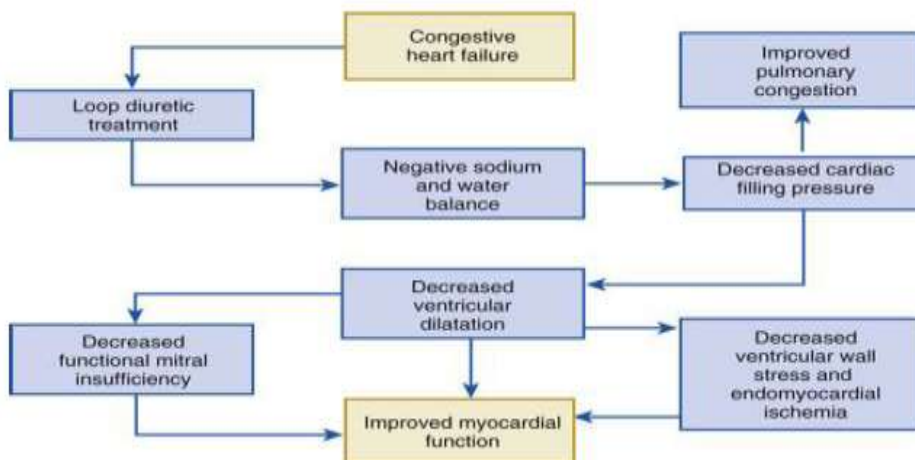
Management of patients with acute heart failure based on clinical profile during an early phase



Management of patients with acute heart failure based on clinical profile during an early phase



Loop Diuretics



Braunwald's Heart Disease, 2018

Loop Diuretics

▪ Rationale :

- Decongestion (pulmonary and peripheral)
- Fluid removal

▪ Considerations :

- ✓ Renal dysfunction
- ✓ Hypokalemia
- ✓ Hypovolemia
- ✓ Possible increased risk of mortality

▪ Additional points :

Creatinine elevation may be due to low cardiac output or aggressive diuresis and not worsening intrinsic renal function

Recommendations for the management of patients with acute heart failure: pharmacotherapy

Diuretics

Intravenous loop diuretics are recommended for all patients with AHF admitted with signs/symptoms of fluid overload to improve symptoms. It is recommended to regularly monitor symptoms, urine output, renal function and electrolytes during use of i.v. diuretics.

I

C

In patients with new-onset AHF or those with chronic, decompensated HF not receiving oral diuretics the initial recommended dose should be 20–40 mg i.v. furosemide (or equivalent); for those on chronic diuretic therapy, initial i.v. dose should be at least equivalent to oral dose.

I

B

It is recommended to give diuretics either as intermittent boluses or as a continuous infusion, and the dose and duration should be adjusted according to patients' symptoms and clinical status.

I

B

Combination of loop diuretic with either thiazide-type diuretic or spironolactone may be considered in patients with resistant oedema or insufficient symptomatic response.

IIb

C

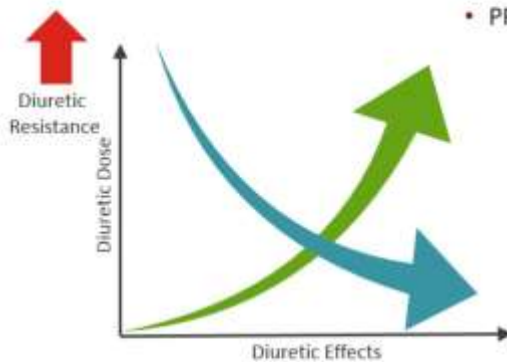
Table 7.3 Doses of diuretics commonly used in patients with heart failure

Diuretics	Initial dose (mg)	Usual daily dose (mg)		
Loop diuretics*				
Furosemide	20–40	40–240		
Bumetanide	0.5–1.0	1–5		
Torsemide	5–10	10–20		
Thiazides^b				
Bendroflumethiazide	2.5	2.5–10		
Hydrochlorothiazide	25	12.5–100		
Metolazone	2.5	2.5–10		
Indapamide ^c	2.5	2.5–5		
Potassium-sparing diuretics^d				
	+ACE-I/ ARB	-ACE-I/ ARB	+ACE-I/ ARB	-ACE-I/ ARB
Spironolactone/ eplerenone	12.5–25	50	50	100– 200
Amiloride	2.5	5	5–10	10–20
Triamterene	25	50	100	200

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)

Resistance to Diuretic Therapy !!



• PRACTICAL ADVICES:

- Continuous infusion of loop diuretics
- Repeated IV-boluses of loop diuretics
- Substitution of equipotent doses of, eg, furosemide vs bumetanide
- Combination of loop diuretics and thiazides
- Use of "super-thiazide" metolazone

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 3, 2011 VOL. 364 NO. 9

Diuretic Strategies in Patients with Acute Decompensated Heart Failure

G. Michael Felker, M.D., M.H.S., Kerry L. Lee, Ph.D., David A. Bull, M.D., Margaret M. Redfield, M.D., Lynne W. Stevenson, M.D., Steven H. Goldsmith, M.D., Martin M. J. Wynter, M.D., Anita Deswal, M.D., M.P.H., Jean L. Rouleau, M.D., Elizabeth O. Ofili, M.D., M.P.H., Kevin J. Anstrom, Ph.D., Adrian F. Hernandez, M.D., Steven E. McNulty, M.S., Eric J. Velazquez, M.D., Abdallah G. Kfoury, M.D., Heng H. Chen, M.B., B.Ch., Michael M. Greenz, M.D., Marc J. Semigran, M.D., Bradley A. Earl, M.D., Alex M. Mascetti, M.D., Eugene Braunholtz, M.D., and Christopher A. O'Connor, M.D., for the NHLD Heart Failure Clinical Research Network*

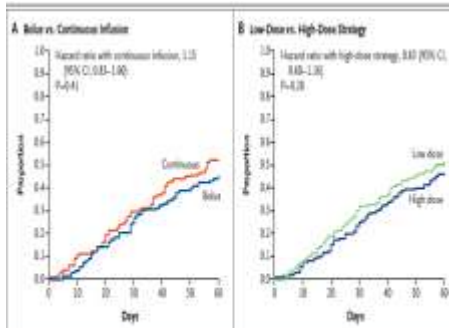


Figure 1. Kaplan-Meier Curves for the Clinical Composite End Point of Death, Rehospitalization, or Emergency Department Visit.

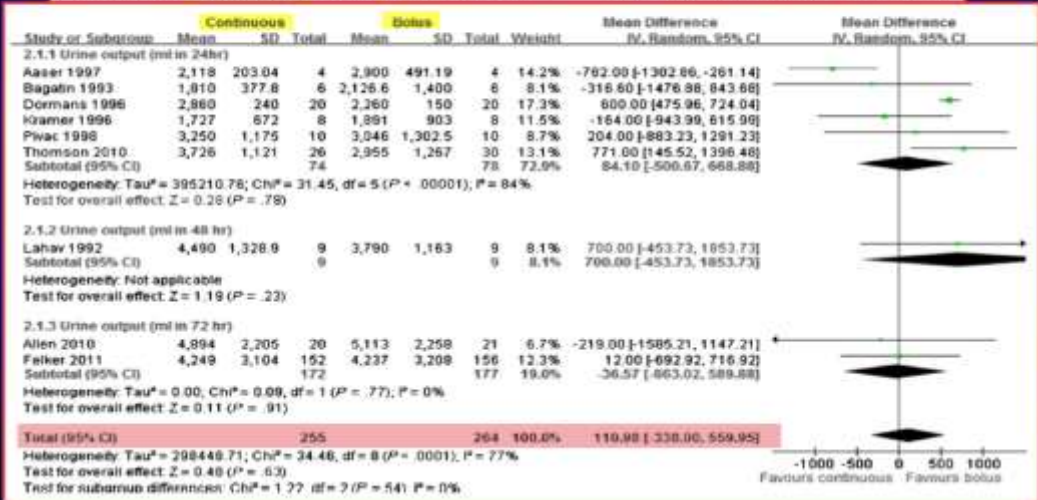
CONCLUSIONS

Among patients with acute decompensated heart failure, there were no significant differences in patients' global assessment of symptoms or in the change in renal function when diuretic therapy was administered by bolus as compared with continuous infusion or at a high dose as compared with a low dose. (Funded by the National Heart, Lung, and Blood Institute; ClinicalTrials.gov number, NCT00577135.)

Loop diuretic strategies in patients with acute decompensated heart failure: A meta-analysis of randomized controlled trials

Mei-Yi Wu, MD^a, Nen-Chung Chang, MD, PhD^b, Chien-Ling Su, RT, MSc^{c,d}, Yung-Ho Hsu, MD^e, Tzen-Wen Chen, MD, PhD^e, Yuh-Feng Lin, MD, PhD^{a,c}, Chih-Hsiung Wu, MD, PhD^f, Ka-Wai Tam, MD, MSc^{f,g,h,i,j}

Journal of Critical Care 29 (2014) 2-9



Combination decongestion therapy in hospitalized heart failure: loop diuretics, mineralocorticoid receptor antagonists and vasopressin antagonists

Expert Review of Cardiovascular Therapy, 2015; 13(7), 709-

Muthiah Vaduganathan, Robert J Mentz, Stephen J Greene, Michele Senni, Naoki Sato, Savina Nodari, Javed Butler & Mihai Gheorghiade

Decongestion strategy	Strengths	Limitations
Loop diuretics	<ul style="list-style-type: none"> <u>Ease of clinical use</u> Non-invasive strategy Operator experience is robust <u>Early dyspnea relief</u> 	<ul style="list-style-type: none"> Diuretic resistance <u>Neurohormonal activation</u> Electrolyte disturbances Association with worsening renal function May not achieve complete decongestion when used alone
Mineralocorticoid receptor antagonists	<ul style="list-style-type: none"> <u>Augmented natriuresis</u> May spare loop diuretic requirement Specific role in right-sided congestion due to reduced hepatic clearance of aldosterone[†] 	<ul style="list-style-type: none"> Hyperkalemia <u>Limited provider experience with high doses</u> Empiric data regarding inpatient use is lacking
Vasopressin antagonists	<ul style="list-style-type: none"> Early and sustained dyspnea relief Reduction in body weight and clinical congestion Augmented aquaresis <u>Improves hyponatremia</u> May spare loop diuretic requirement Low risk of worsening renal function or hemodynamic instability 	<ul style="list-style-type: none"> Benefits appear to be greatest in those with <u>hyponatremia</u> <u>Cost consideration</u> Non-natriuretic effects

Loop diuretics versus ultrafiltration in heart failure

Loop diuretics	Ultrafiltration
Increase ipotonic urine	Removal of isotonic plasma water: larger natriuresis
Variable and unpredictable response	Predictable and adjustable response: better congestion relief / risks of excessive fluid loss ?
Neurohormonal activation	No neurohormonal activation unless intravascular volume depletion
Development of diuretic resistance	Restoration of diuretic response
Electrolyte abnormalities	No changes in serum K ⁺ or Mg ⁺
Intravenous treatment	Possible need of central catheter, vascular access complications, anticoagulation

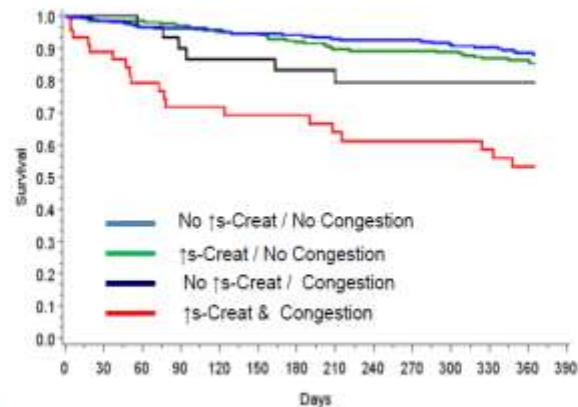
Recommendations regarding renal replacement therapy in patients with acute heart failure

Recommendations	Class ^a	Level ^b	Ref ^c
Ultrafiltration may be considered for patients with refractory congestion, who failed to respond to diuretic-based strategies.	IIb	B	578–580
Renal replacement therapy should be considered in patients with refractory volume overload and acute kidney injury.	IIa	C	

Indications :

- ✓ oliguria unresponsive to fluid resuscitation measures
- ✓ severe hyperkalaemia (K⁺ >6.5 mmol/L),
- ✓ severe acidaemia (pH < 7.2),
- ✓ serum urea level >25 mmol/L (150 mg/dL) and serum creatinine >300 mmol/L (>3.4 mg/dL)

Death or urgent Tx in patients subdivided on the basis of volume status and WRF



WRF/Cong	46	40	32	25	26	31	36	39	25	23	22	20
No WRF/Cong	21	33	29	27	28	31	24	22	20	16	13	11
WRF/No Cong	203	207	203	206	210	216	224	225	229	226	225	220
No WRF/No Cong	285	289	290	294	297	303	307	303	317	324	326	322

Metra et al. Circ Heart Fail, 2012; 5: 54

Predischarge BNP: Predictor of Postdischarge Events

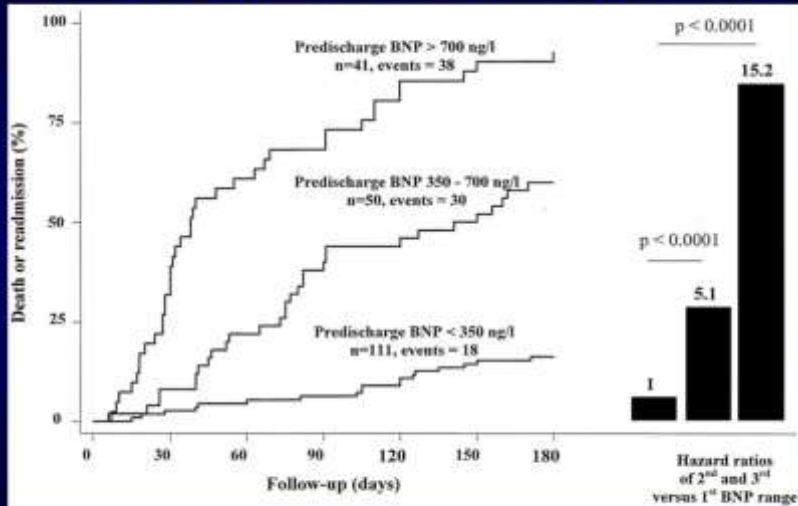


Figure from Logeart D, et al. *J Am Coll Cardiol*. 2004;43:635-41. Used with permission.

ESC Heart Failure Guidelines: take-home summary



„The best physician for a patient with HF would be one with **excellent training, extensive experience, and superb judgment** with regard to all aspects of the disease.

He or she **would not necessarily follow guidelines slavishly.**”

J.N. Cohn, *Circ Heart Fail* 2008;1:87-88

www.escardio.org/guidelines



