The Healthcare Crisis of Advanced Heart Failure

3rd European Training Symposium for Heart Failure Cardiologists and Cardiac Surgeons
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Disclosures: None

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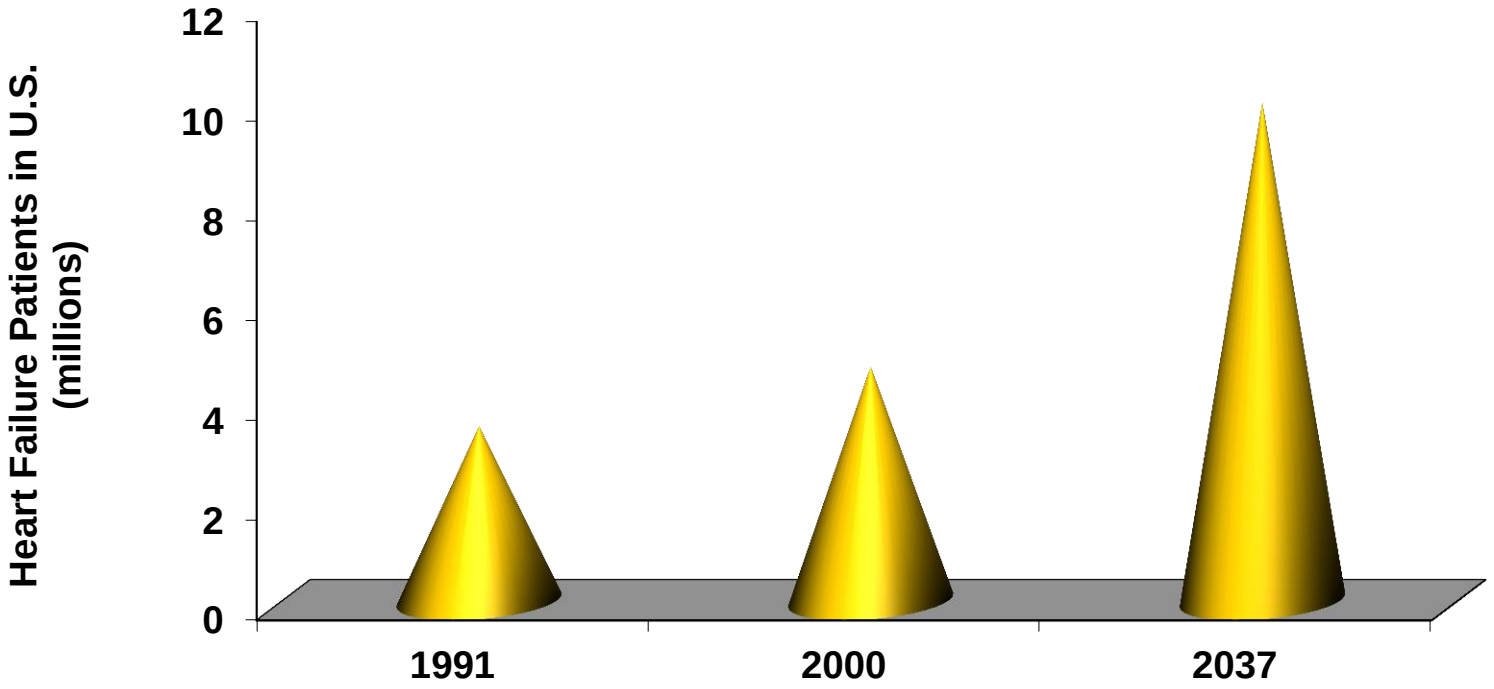
The Epidemiology of Heart Failure in the United States



J Am Geriatr Soc 45: 968-974

American Heart Association. 2001 Heart and Stroke Statistical Update

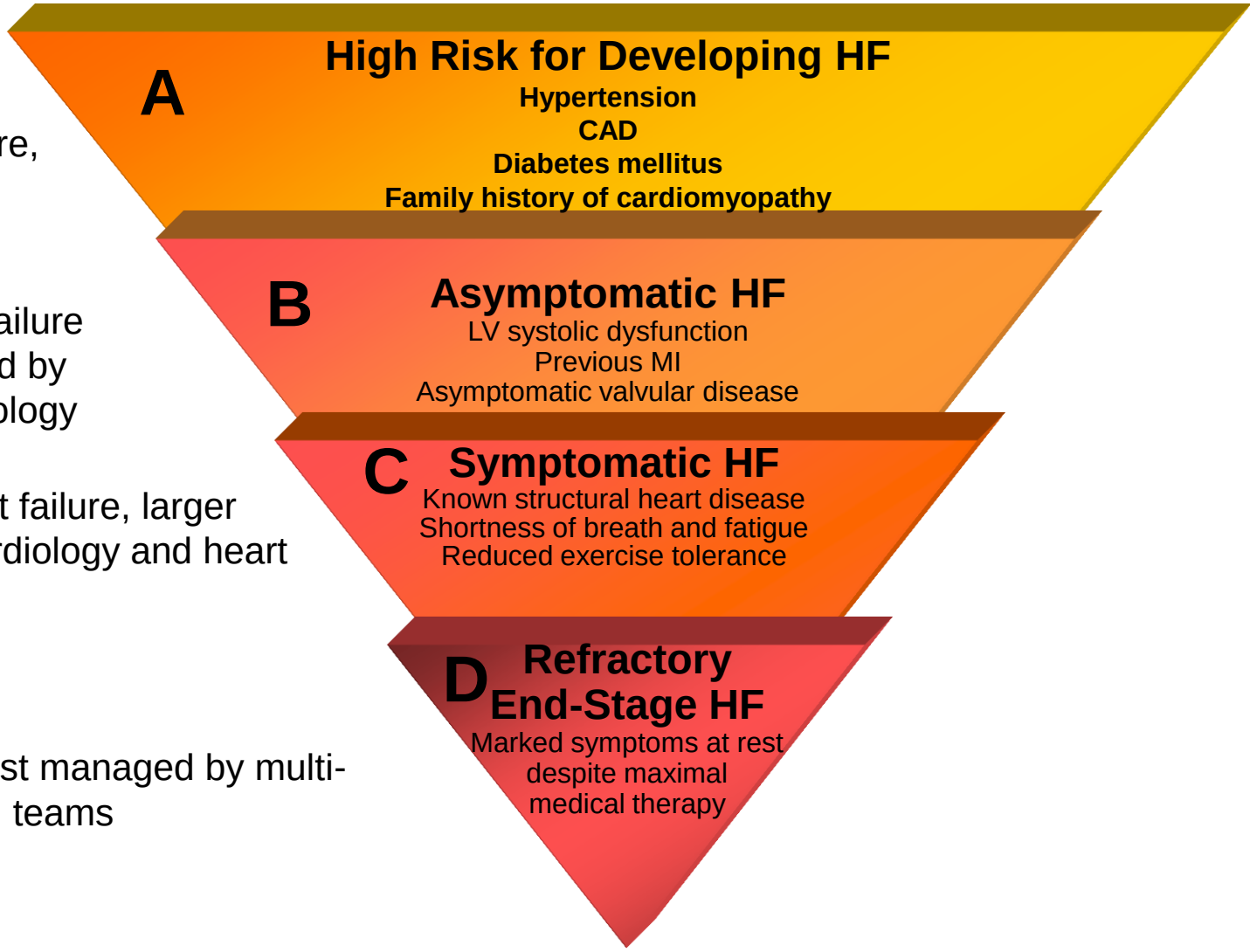
Defining the Heart Failure Population

Large population, managed by primary care, great opportunity

35% of systolic heart failure population, co-managed by primary care and cardiology

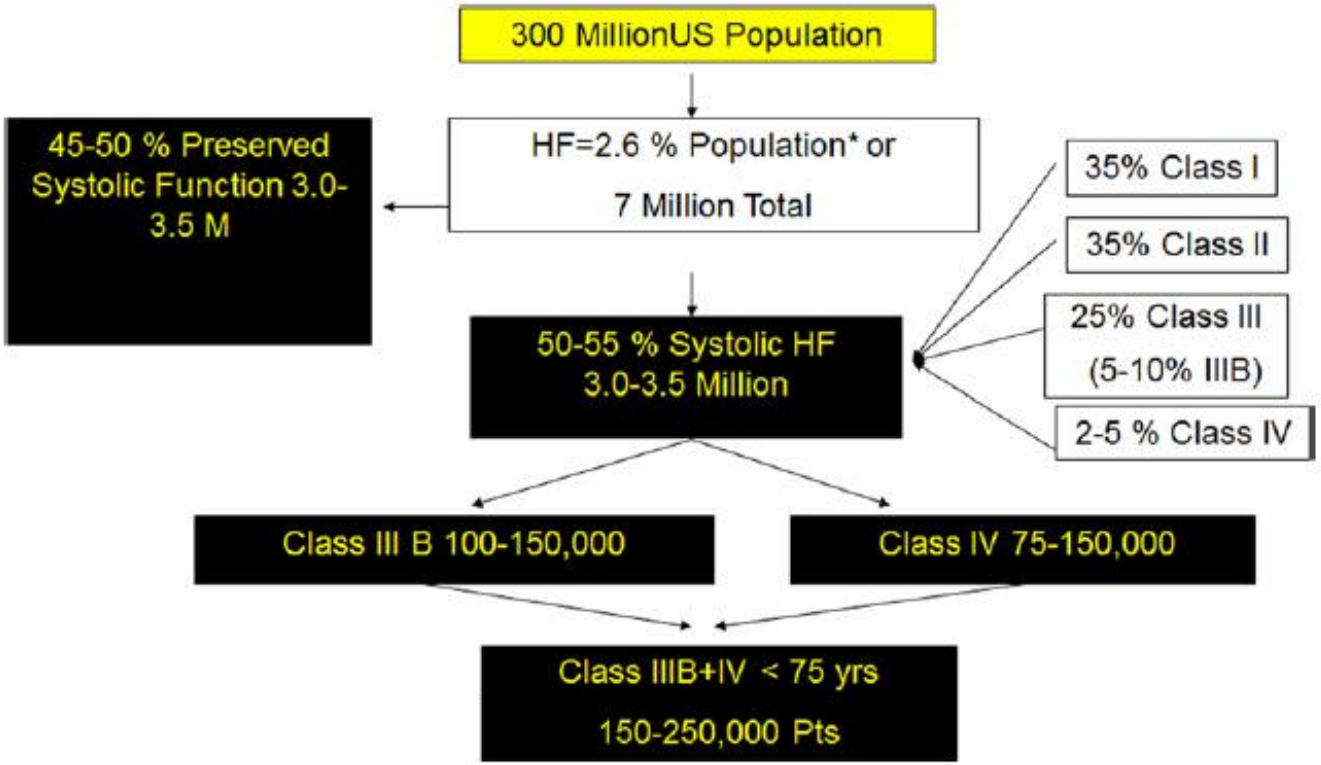
50-60% of systolic heart failure, larger portion managed by cardiology and heart failure specialists

5-10% of population; best managed by multi-disciplinary, specialized teams



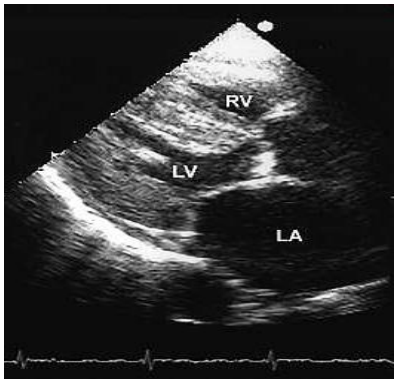
J Am Coll Cardiol 2001;38:2101–2113

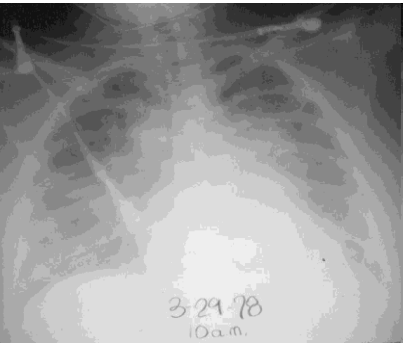
Estimating the Size of the Advanced Heart Failure Population

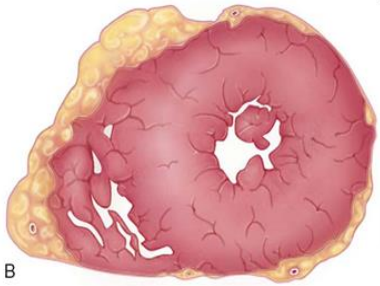


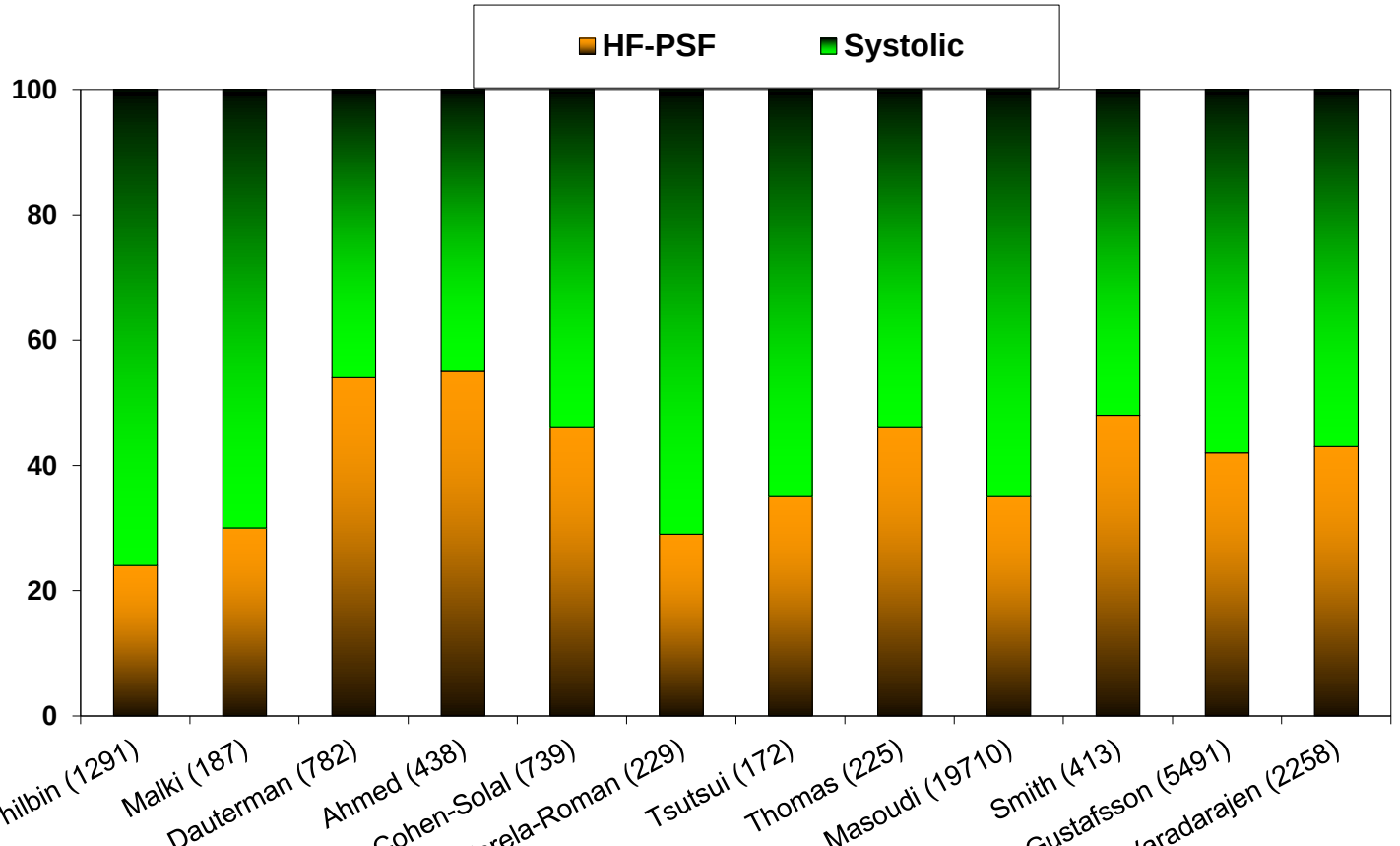
J Am Coll Cardiol 2013;61:1209-21

Prevalence of HF-PEF in Hospitalized Patients









An Evidence-based List of Medications that Favorably Impact HFpEF

Recent Clinical Trials in HFpEF

RELAX: Impact of Sildenafil on Exercise Performance

Table 3. Primary, Secondary, and Safety End Points

	Placebo		Sildenafil		
	No. of Patients	Variable	No. of Patients	Variable	*P* Value
Primary end point					
Change in peak oxygen consumption at 24 wk, median (IQR), mL/kg/min	94	−0.20 (−0.70 to 1.00)	91	−0.2 (−1.70 to 1.11)	.90
Secondary end points					
Clinical rank score, mean[a]	94	95.8	95	94.2	.85
Change in 6-minute walk distance at 24 wk, median (IQR), m	95	15.0 (−26.0 to 45.0)	90	5.0 (−37.0 to 55.0)	.92
Change in peak oxygen consumption at 12 wk, median (IQR), mL/kg/min	96	0.03 (−1.10 to 0.67)	97	0.01 (−1.35 to 1.25)	.98
Change in 6-minute walk distance at 12 wk, median (IQR), m	96	18.0 (−14.5 to 48.0)	99	10.0 (−25.0 to 36.0)	.13
Components of clinical rank score at 24 wk					
Death, No. (%)[b]	103	0	113	3 (3)	.25
Hospitalization for cardiovascular or renal cause, No. (%)	103	13 (13)	113	15 (13)	.89
Change in MLHFQ, median (IQR)	91	−8 (−21 to 5)	91	−8 (−19 to 0)	.44
Safety end points, No. (%)					
Adverse events	103	78 (76)	113	90 (80)	.49
Serious adverse events	103	16 (16)	113	25 (22)	.22

JAMA 2013: 309:1268-77

Recent Clinical Trials in HFpEF

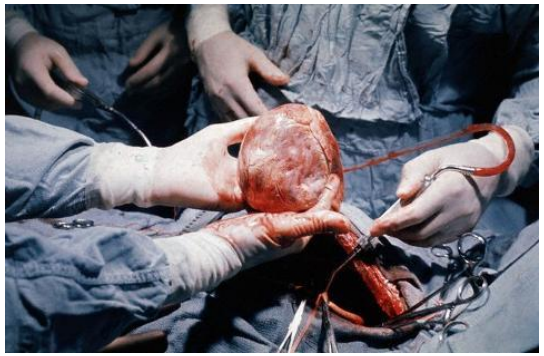
NEAT HFpEF: Impact of Nitrates on Activity

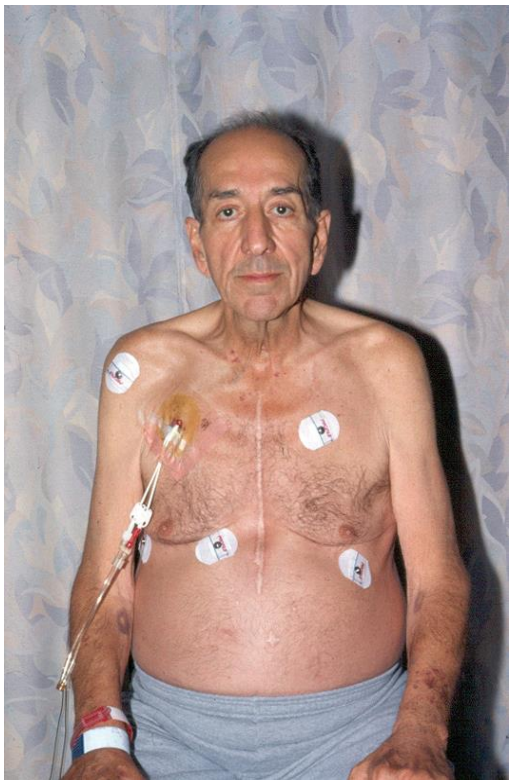
Table 2. Efficacy and Safety End Points.

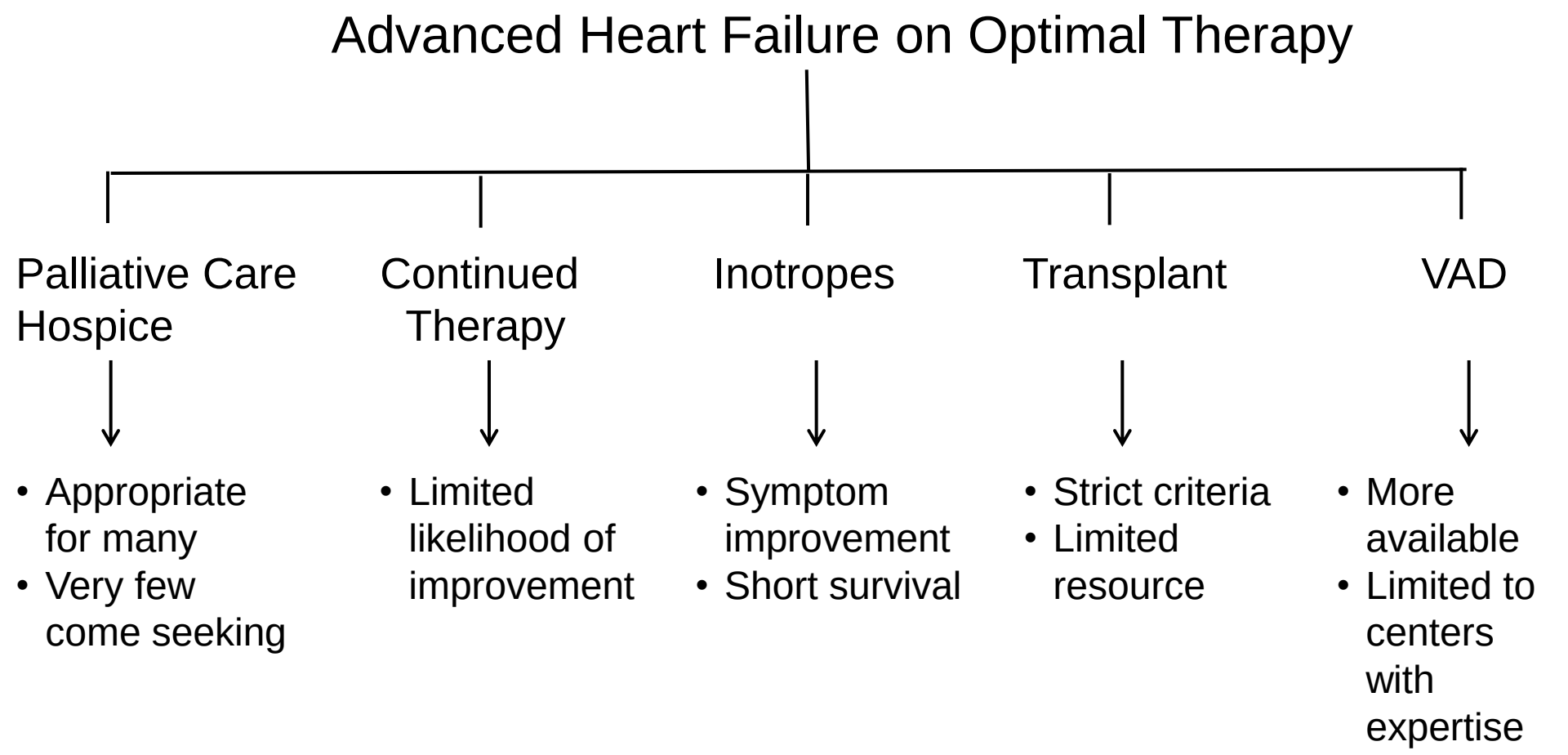
End Point	Placebo (N=110)	Isosorbide Mononitrate (N=110)	Treatment Difference*	P Value
		mean (95% CI)		
Efficacy				
Activity as assessed on accelerometry				
Daily arbitrary accelerometer units during 120-mg phase: primary end point	9303 (8884–9723)	8922 (8500–9345)	−381 (−780 to 17)	0.06
No. of hours of activity per day	9.31 (9.05–9.56)	9.01 (8.75–9.27)	−0.30 (−0.55 to −0.05)	0.02
Daily arbitrary accelerometer units for all treatment doses	9623 (9271–9976)	9185 (8822–9547)	−439 (−792 to −86)	0.02
Six-minute walk test				
Distance — m	321 (307–336)	322 (307–336)	0.57 (−9.63 to 10.78)	0.91
Borg dyspnea score†	3.97 (3.59–4.34)	3.89 (3.52–4.26)	−0.07 (−0.50 to 0.36)	0.74
Quality of life				
Overall score on Kansas City Cardiomyopathy Questionnaire	61.6 (58.9–64.4)	59.7 (57.0–62.5)	−1.91 (−4.55 to 0.74)	0.16
Total score on Minnesota Living with Heart Failure Questionnaire	35.4 (31.6–39.2)	37.0 (33.3–40.6)	1.62 (−1.98 to 5.23)	0.37
NT-proBNP — pg/ml	497 (422–572)	550 (475–625)	53 (−33 to 138)	0.22
Blood pressure — mm Hg				
Systolic	129 (125–132)	125 (122–128)	−3.7 (−7.2 to −0.3)	0.04
Diastolic	70 (69–72)	69 (67–71)	−1.6 (−3.5 to 0.3)	0.10
Mean arterial blood pressure — mm Hg	90 (88–92)	88 (86–90)	−2.3 (−4.4 to −0.2)	0.03

N Engl J Med 2015;373:2314-24

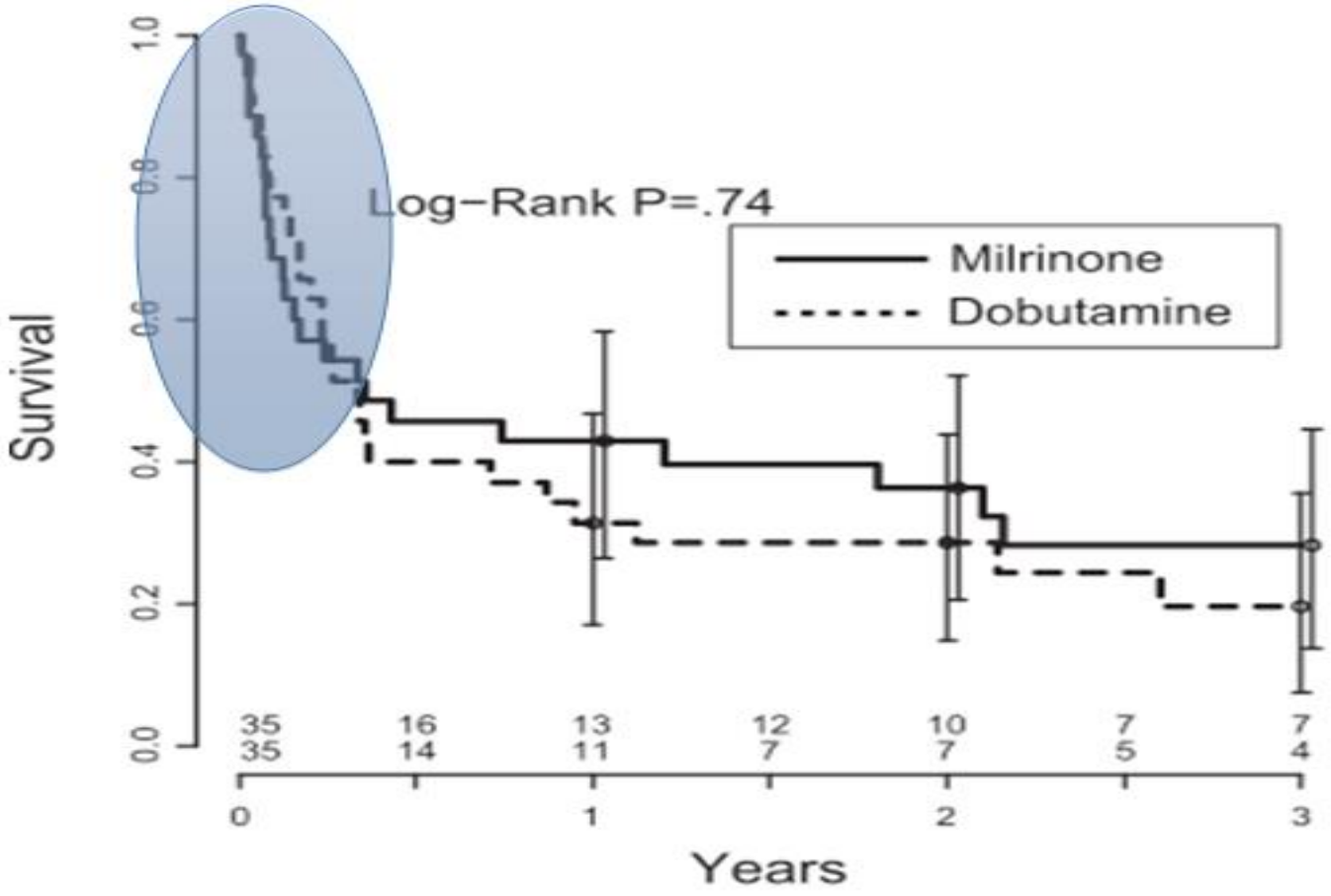
Advanced Heart Failure: Therapeutic Options



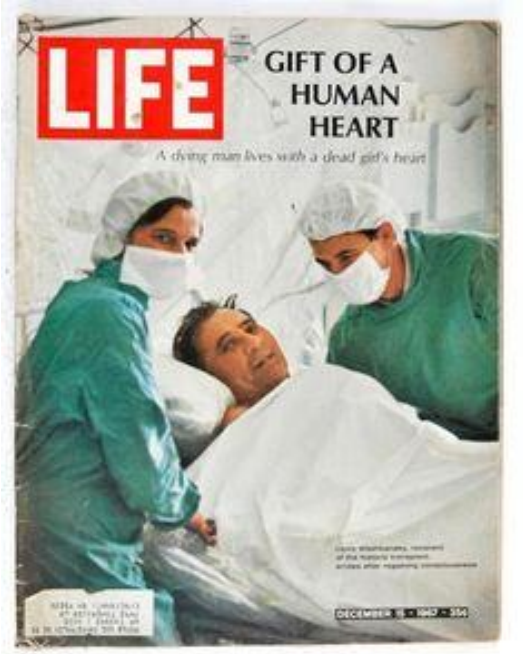



Advanced Heart Failure on Optimal Therapy
Palliative Care Hospice
Continued Therapy
Inotropes
Transplant
VAD
• Appropriate for many
• Very few come seeking
• Limited likelihood of improvement
• Symptom improvement
• Short survival
• Strict criteria
• Limited resource
• More available
• Limited to centers with expertise

Prognosis on Chronic Inotrope Infusions

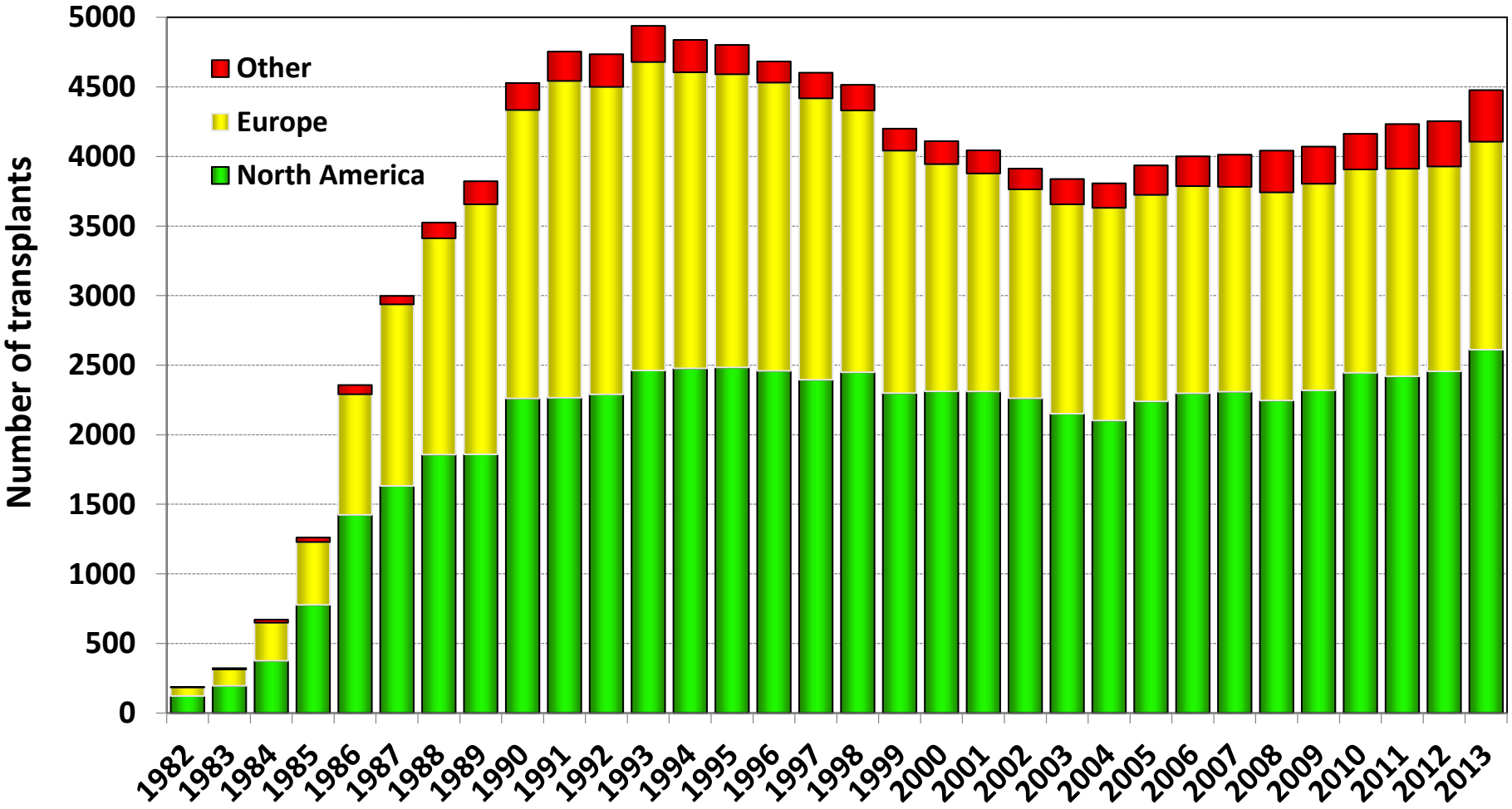


Gorodeski EZ et al. *Circulation:Heart Failure, 2009.*


LIFE
GIFT OF A HUMAN HEART
A dying man lives with a dead girl's heart

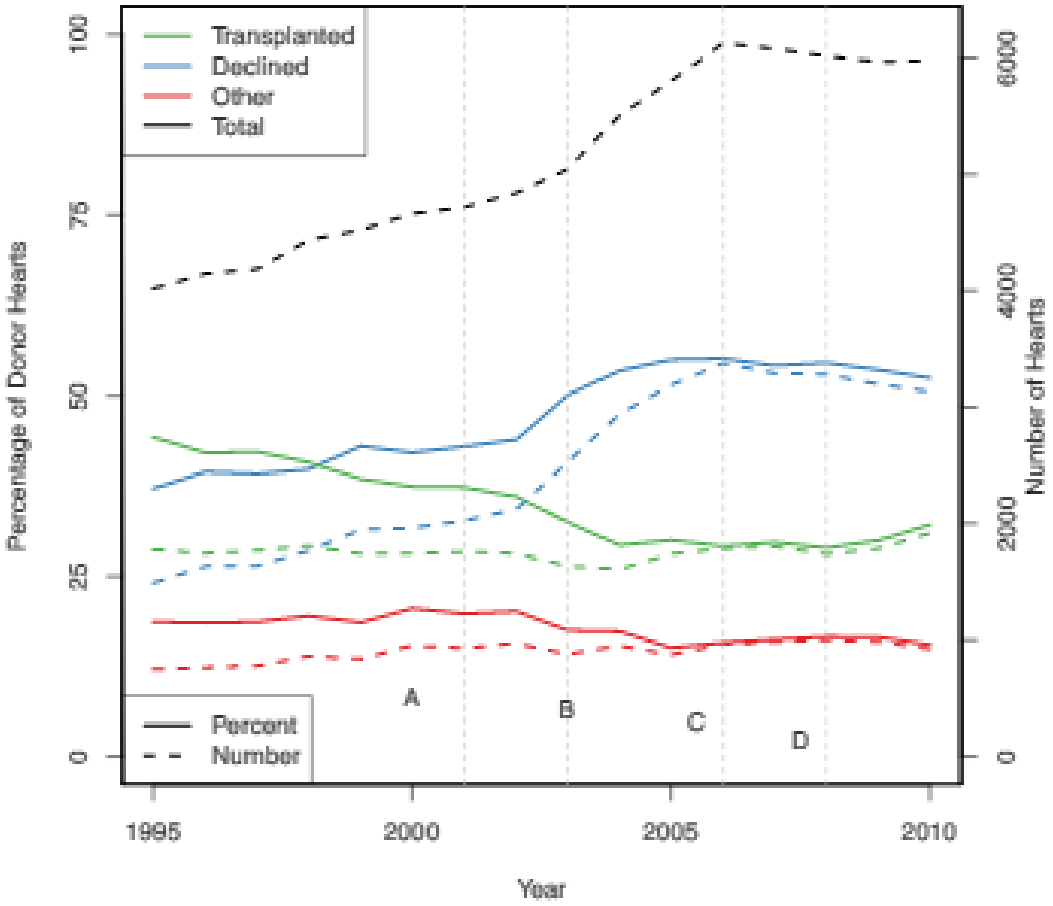

The Cape Argus
CITY LATE
Patient's condition 'first class', Groote Schuur doctors say
CRISIS AFTER 7 DAYS
MAN WITH A NEW HEART
Three years' work on 'op'
Louw tells of key factor in heart transplant
Woman had no chance of survival
They will miss Denise...
And a surgeon took the pictures, too!
Her kidney helps a boy (10)
HEAD OF TEAM
CHURCHMEN APPROVE
LOOK MA! NO PINS...
Snap Nappi

Adult and Pediatric Heart Transplants

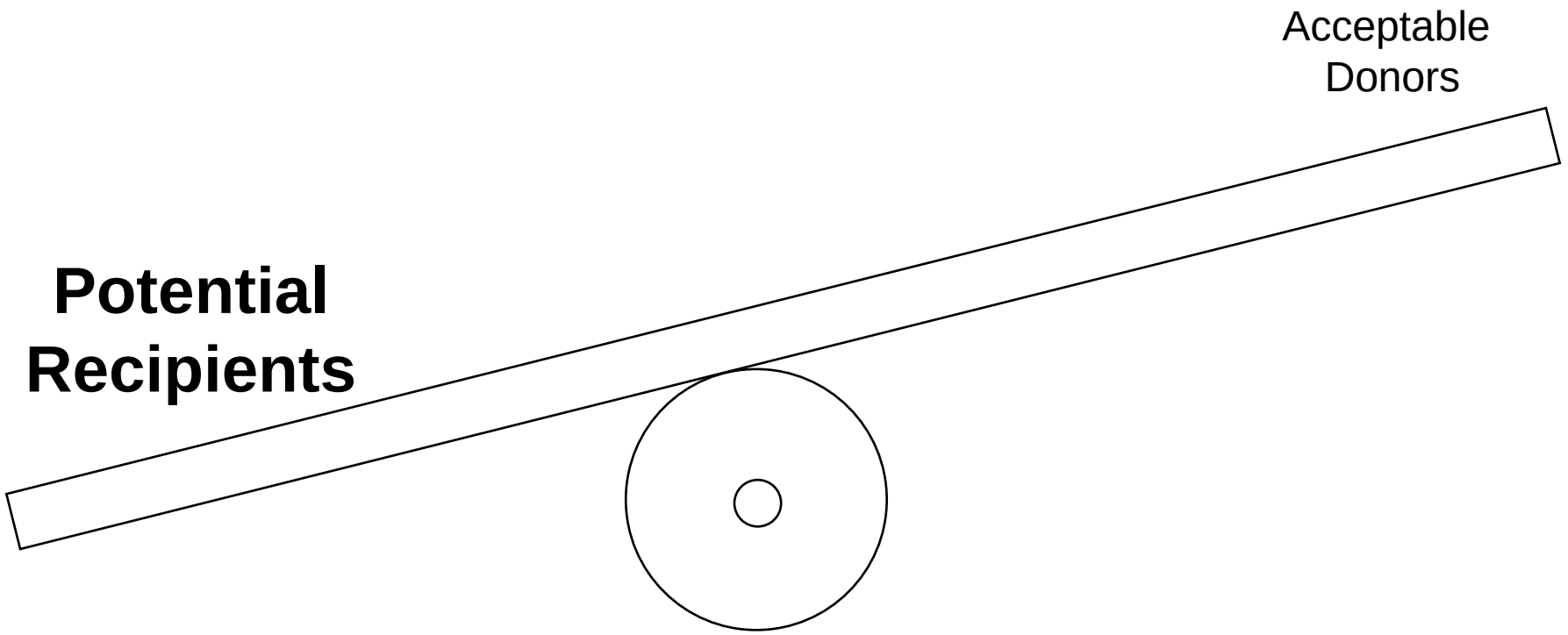


JHLT. 2015 Oct; 34(10): 1244-1254

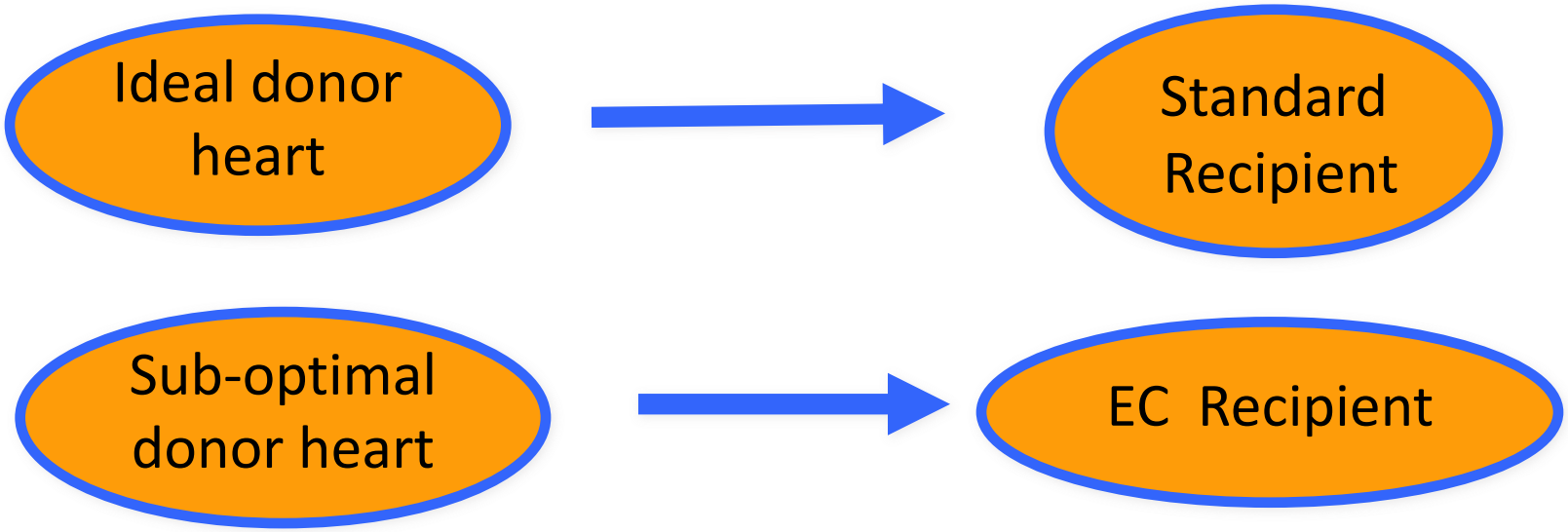
Donor Heart Utilization in the US



Am J Transplant 2015;15:642-49


Acceptable
Donors
Potential
Recipients

Extending the Potential of Cardiac Transplantation



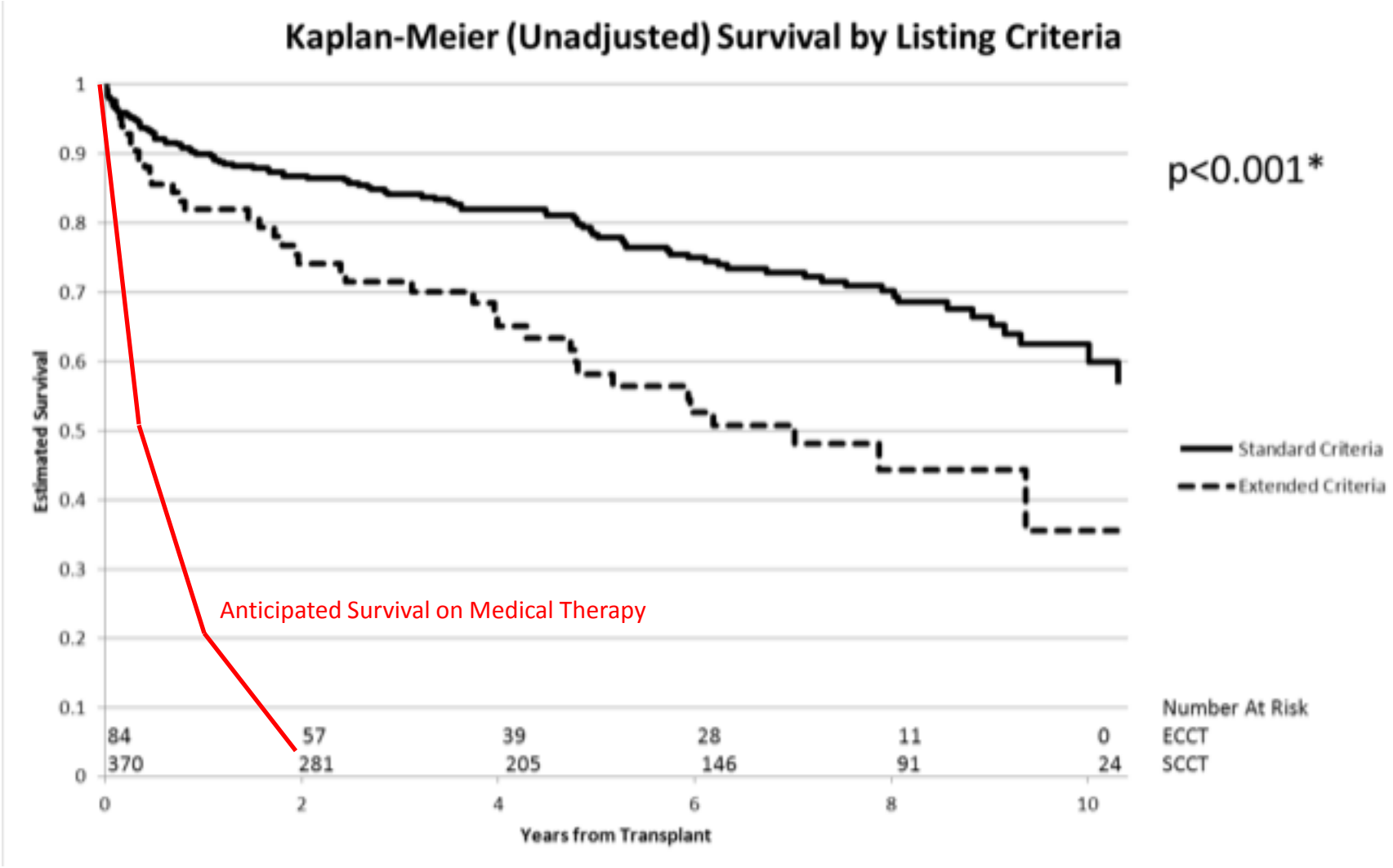
Extended criteria donor hearts

- CAD
- Impaired LV function
- Hypertrophy

Major recipient features

- Advanced age
- Diabetes
- Other organ dysfunction

Extended Criteria Transplantation Outcomes



Modified from Circ Heart Fail 2013; 6:1230-8

Evolving Strategies for Organ Preservation

- Extending travel distances
- DCD heart donation

Revising US Adult Heart Prioritization

Key Features

- Clustering based upon waitlist mortality or delisting for severity of illness
- Increased granularity to stratify the sickest candidate cohorts
- Definition and categorization of VAD complications

Status 1	Status 2	Status 3
• ECMO • Mechanical ventilation • Non-dischargeable VAD • VAD with intractable VT	• IABP • VT/VF • VAD malfunction/failure • Total artificial heart • Dischargeable BiVAD or RVAD • Acute circulatory support	• Dischargeable LVAD for up to 30 days • Multiple inotropes or single high-dose inotropes with continuous hemodynamic monitoring • MCS with other complications

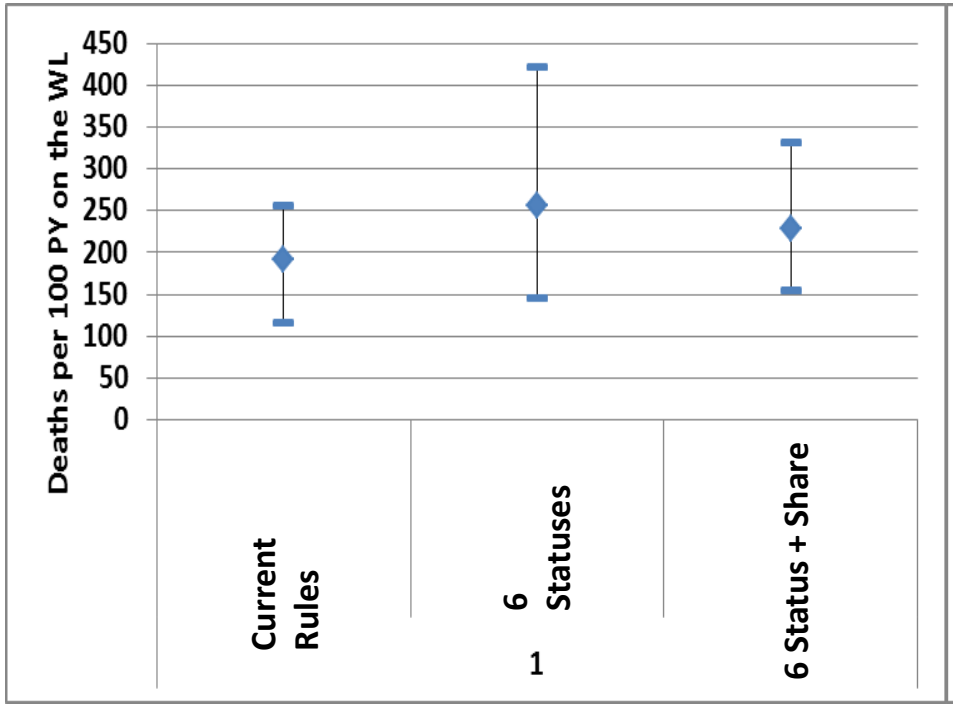
Status 4	Status 5	Status 6
• Congenital heart disease • Ischemic heart disease with intractable angina • Hypertrophic cardiomyopathy • Restrictive cardiomyopathy • Amyloidosis • Stable LVAD after 30 days • Inotropes without hemodynamic monitoring • Re-transplant	• Combined organ transplant candidates	• All remaining candidates

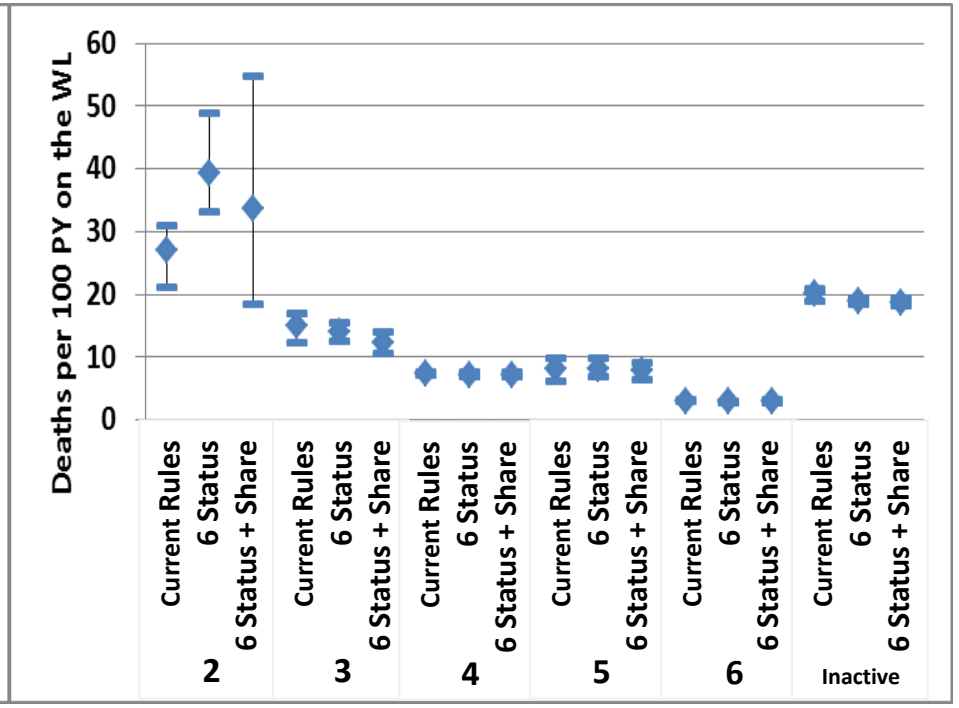
Proposed Broader Sharing Scheme

Key Feature: Broader sharing for highest priority candidates

Candidate tier/status	Location
Tier 1 adult + Status 1A ped	DSA + Zone A
Tier 1 adult + Status 1A ped	Zone B
Tier 2 adult	DSA + Zone A
Tier 2 adult	Zone B
Tier 3 adult + Status 1B ped	DSA
Tier 4 adult	DSA
Tier 3 adult + Status 1B ped	Zone A

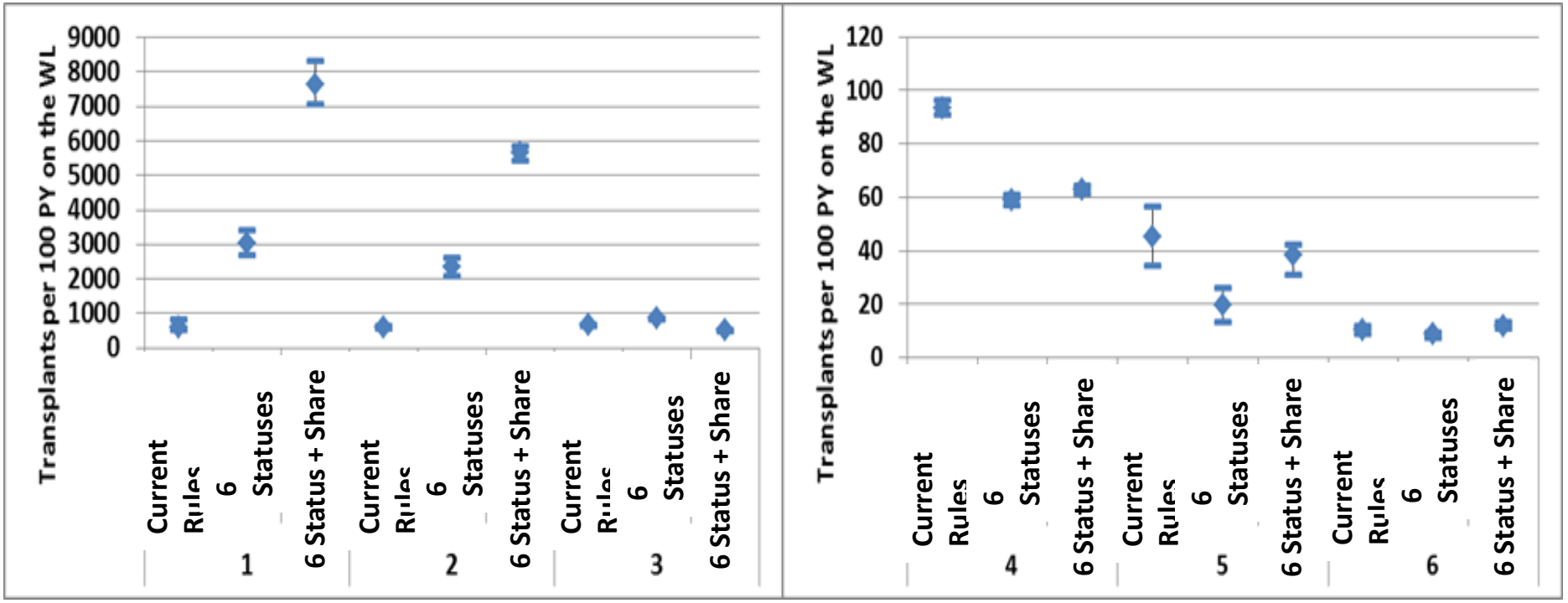
Proposed Changes to Heart Allocation: Wait List Mortality





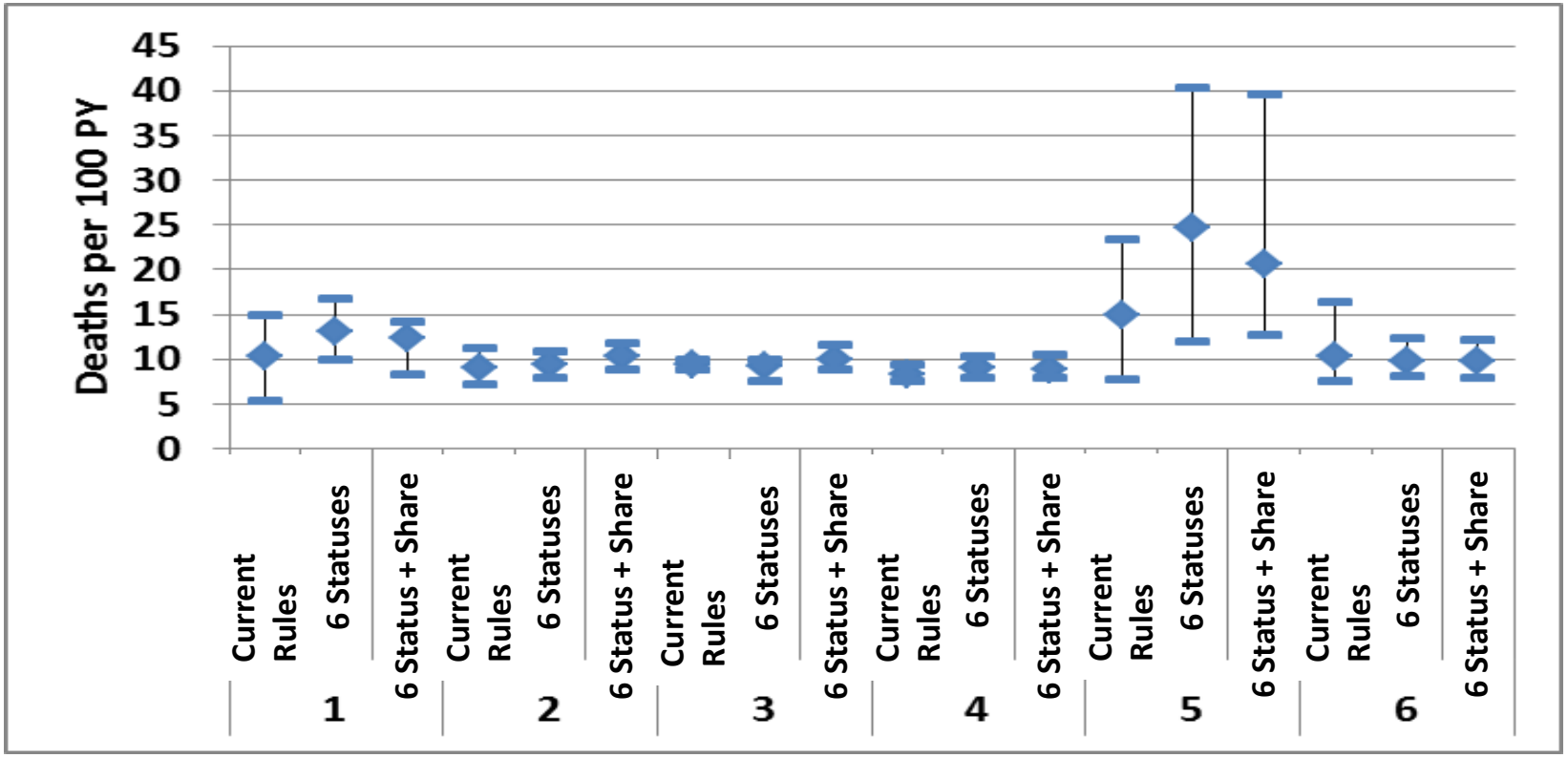
Simulation results show a range of outcomes across the ten runs, as well as a point estimate of the average across the runs. The ranges **do not** indicate confidence limits.

Proposed Changes to Heart Allocation: Transplant Rates



Simulation results show a range of outcomes across the ten runs, as well as a point estimate of the average across the runs. The ranges **do not** indicate confidence limits.

Proposed Changes to Heart Allocation: 24-Month Mortality



Simulation results show a range of outcomes across the ten runs, as well as a point estimate of the average across the runs. The ranges **do not** indicate confidence limits.

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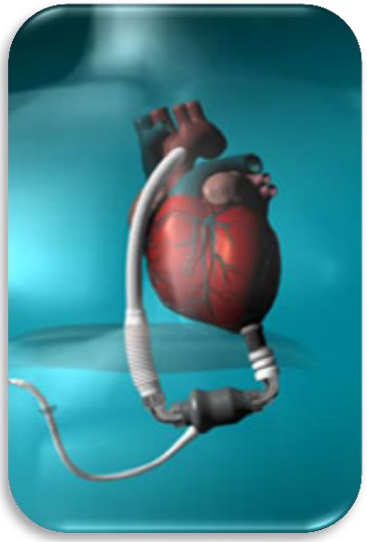
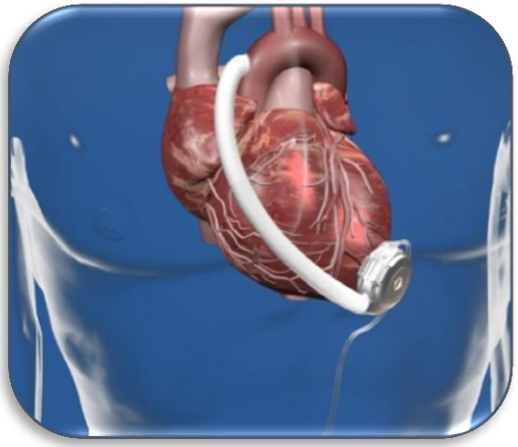
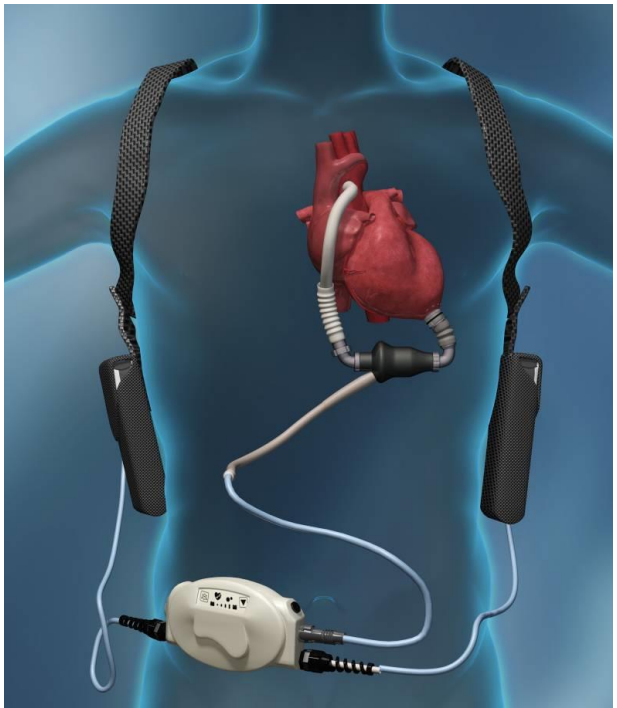
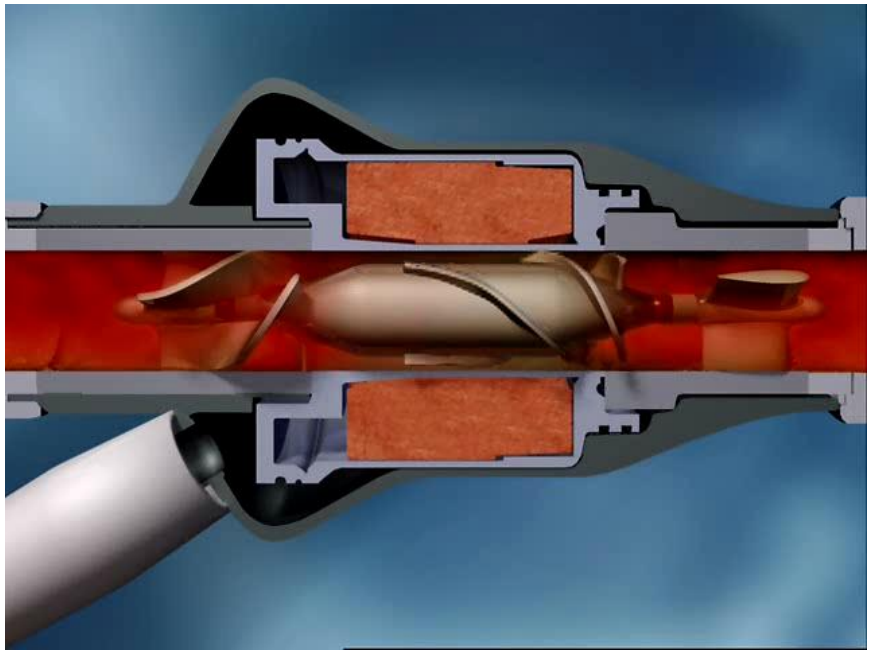


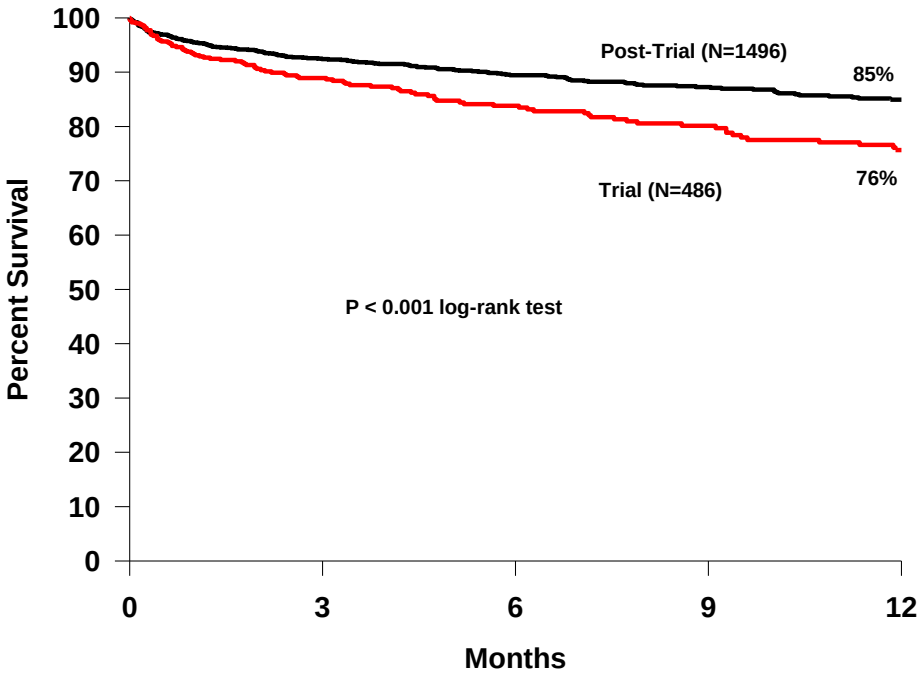
Durable MCS Devices



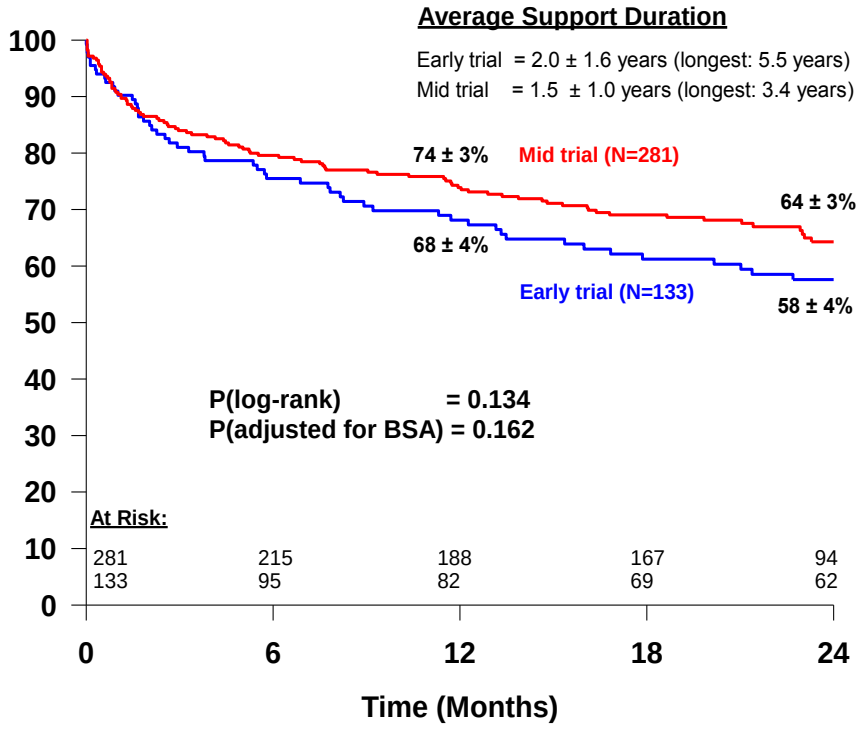




Contemporary LVAD Survival Outcomes

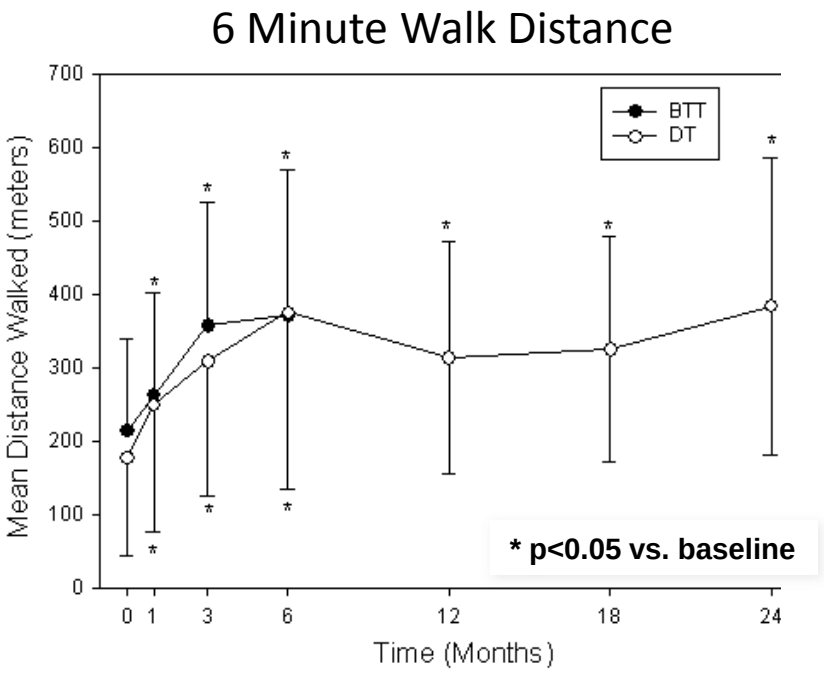


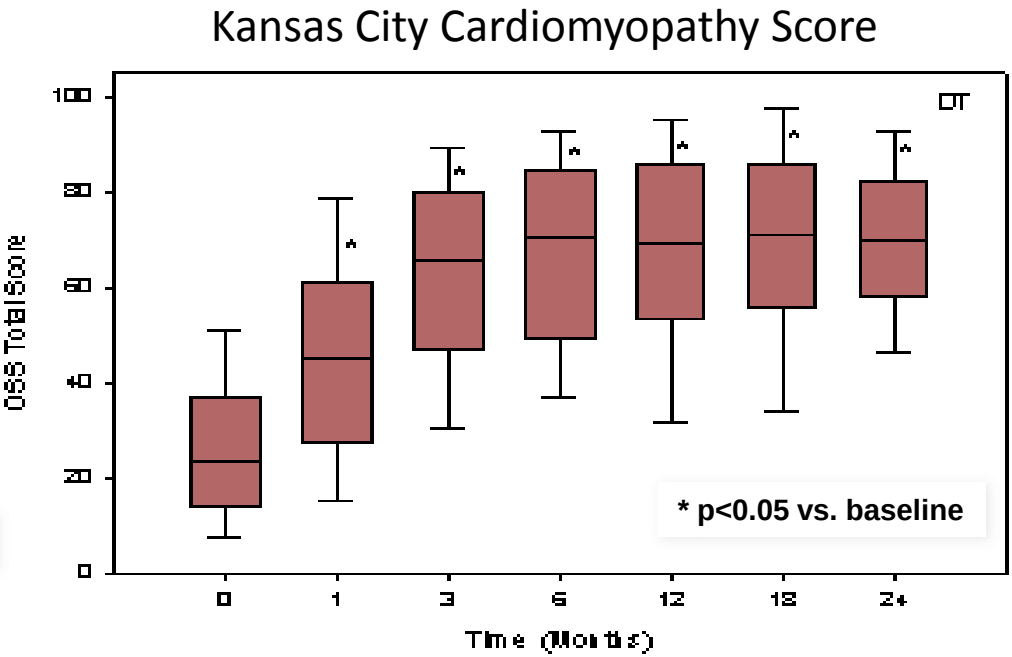
Ann Thorac Surg 2011; 92:1406-13



Circ Heart Failure 2012; 5:241-8

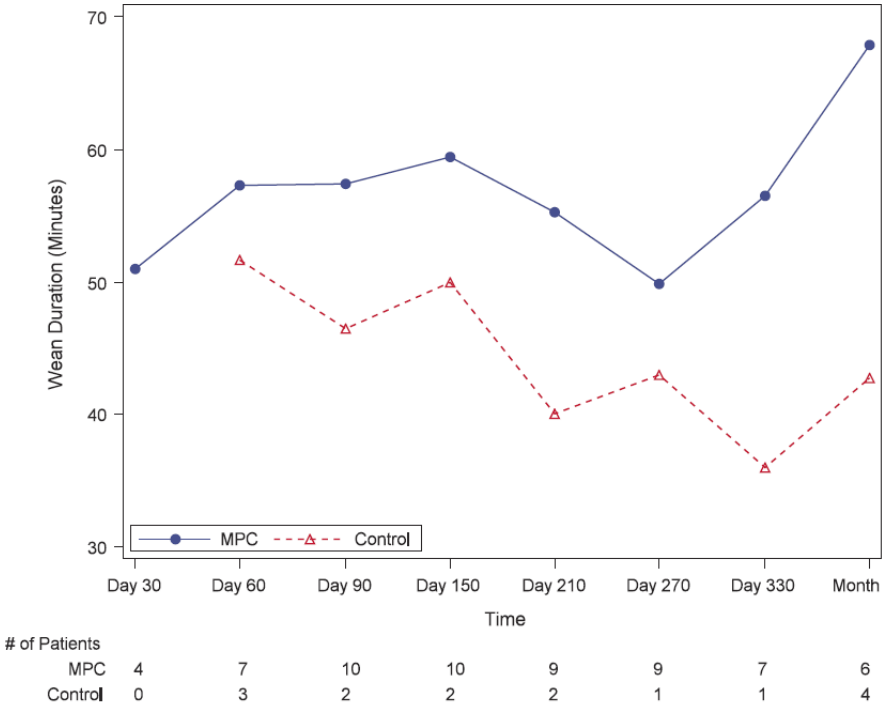
Patient Functionality and QoL



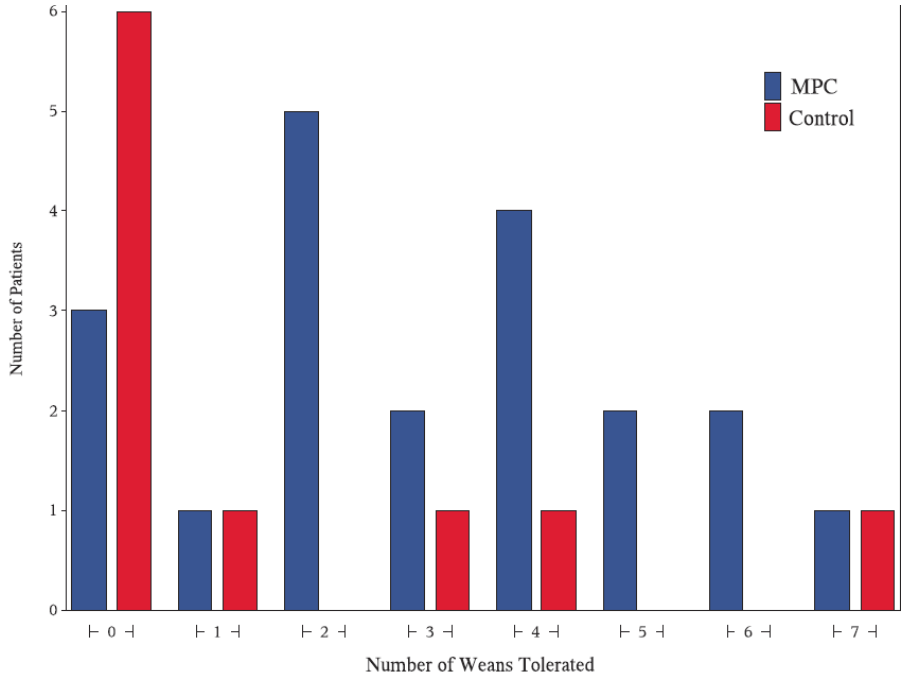


J Am Coll Cardiol 2010;55:1826-34

Facilitated Myocardial Recovery

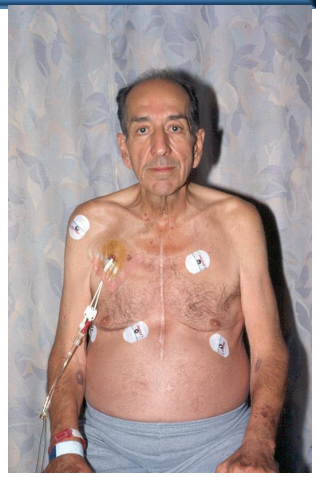


# of Patients								
MPC	4	7	10	10	9	9	7	6
Control	0	3	2	2	2	1	1	4



Circulation 2014;129:2287-96

PAL-HF
Palliative Care in Heart Failure



- NIH-funded (RO1), single-center trial
- Randomized, controlled clinical study
  - Usual care vs. UC + PAL-HF Intervention
- Enrollment: 150 patients over 3 years
- Co-Primary End-Point: Change in QoL measured by disease-specific KCCQ and FACIT-PAL

ClinicalTrials.gov: NCT01589601

The Palliative Care in Heart Failure Trial: Rationale and design

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Am Heart J 2014; 168:645-51

The Future of Heart Failure

- The number of patients with advanced heart failure will exceed the healthcare teams capable of management
- Advanced heart failure care will increasingly require teams of experts focused on innovation and understanding contemporary data
- Transplantation will not meet the population needs of heart failure patients
- MCS will be increasingly important
- Palliative care approaches will further develop with underlying evidence