

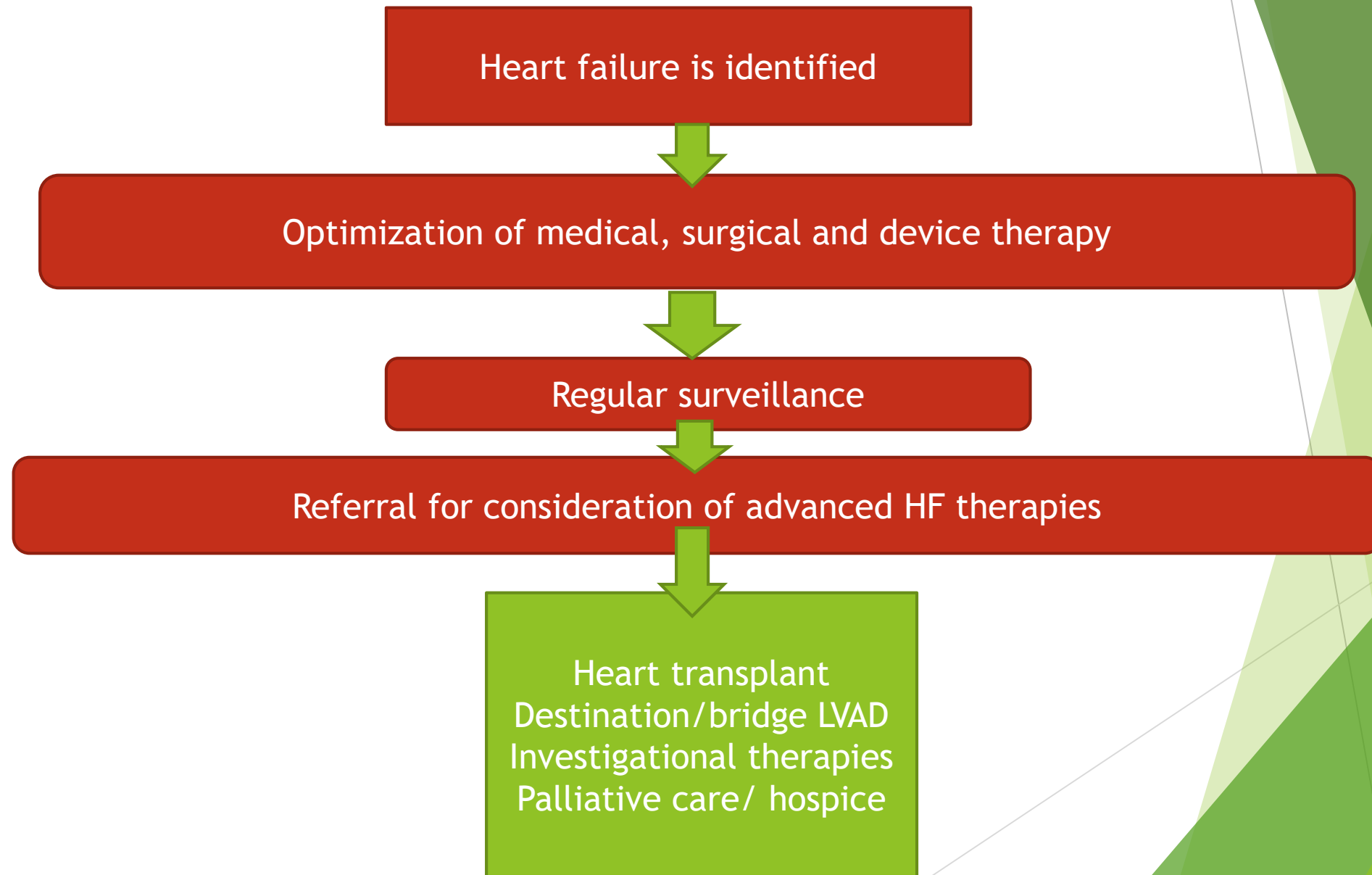
Advanced heart failure therapies for end stage heart failure

Section 3

- ▶ Presence of progressive and/or persistent severe signs and symptoms of heart failure despite *optimized medical, surgical and device therapy*. Generally accompanied by frequent hospitalization, severely limited exertion tolerance, poor quality of life and associated to high morbidity and mortality. The progressive decline should be primarily driven by the heart failure syndrome.

HFSA Statement, 2016

Clinical approach



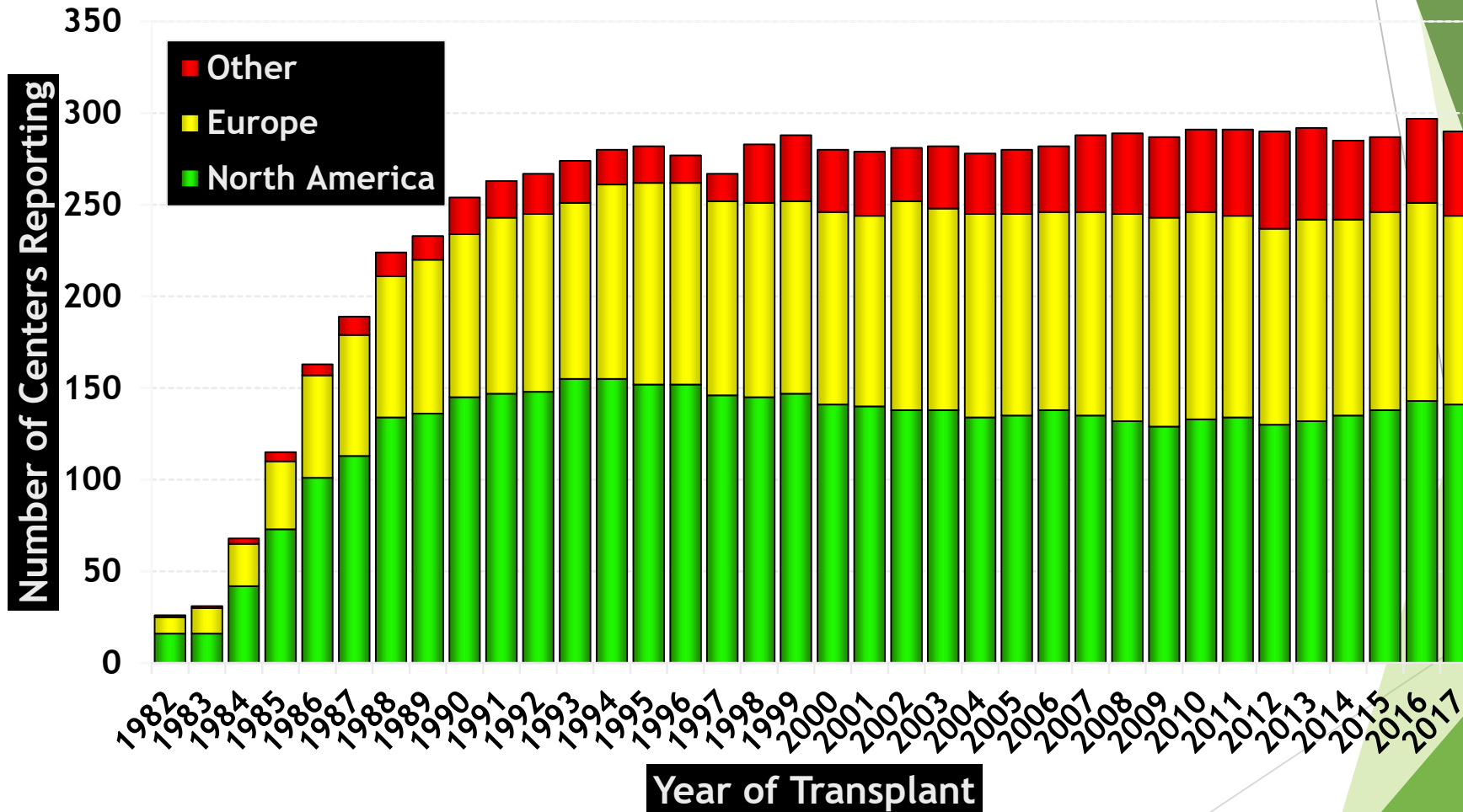
Stage D Heart Failure

- ▶ NYHA III to IV
- ▶ Walk <300 meters
- ▶ 2 hospital admits
- ▶ EF <30%
- ▶ Low CI, high PCWP
- ▶ Cardiac cachexia
- ▶ Intolerance to ACE/ARB/BB
- ▶ Diuretic resistance
- ▶ Cardiorenal syndrome type 2
- ▶ SBP <90mmHg
- ▶ Sodium <133mEq/L
- ▶ Frequent ICD shocks

Heart transplant overview

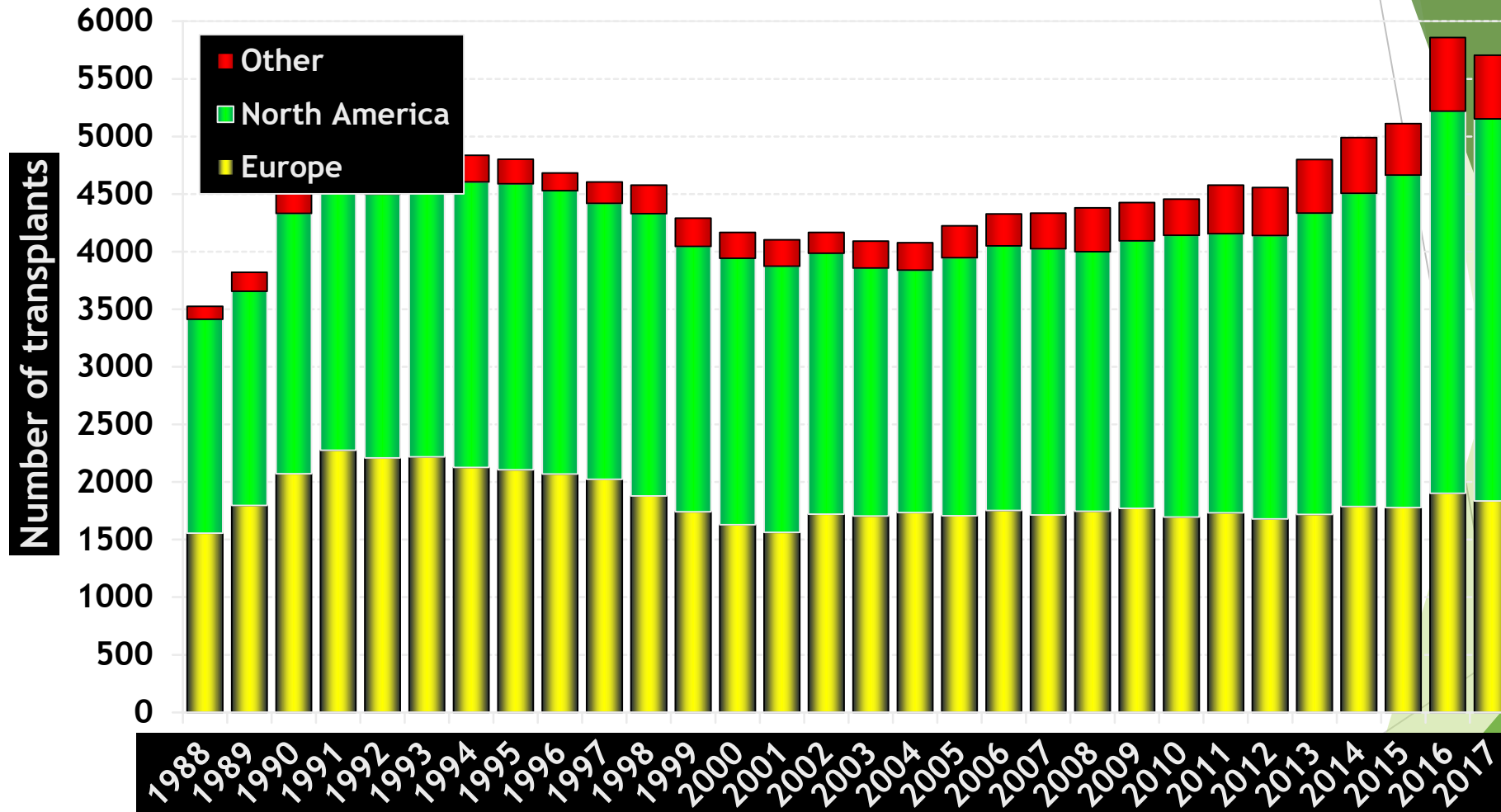
- ▶ From 1987 to 2012, of 40,253 listed, 26,943 received HT
- ▶ Mortality was higher in African Americans
- ▶ HT was more cost effective than LVADs due to readmissions and complications but mortality is increasing and at 2 years survival is similar with new technology.

TTX REGISTRY DATABASE: Number of Centers Reporting Heart Transplants



Adult and Pediatric Heart Transplants

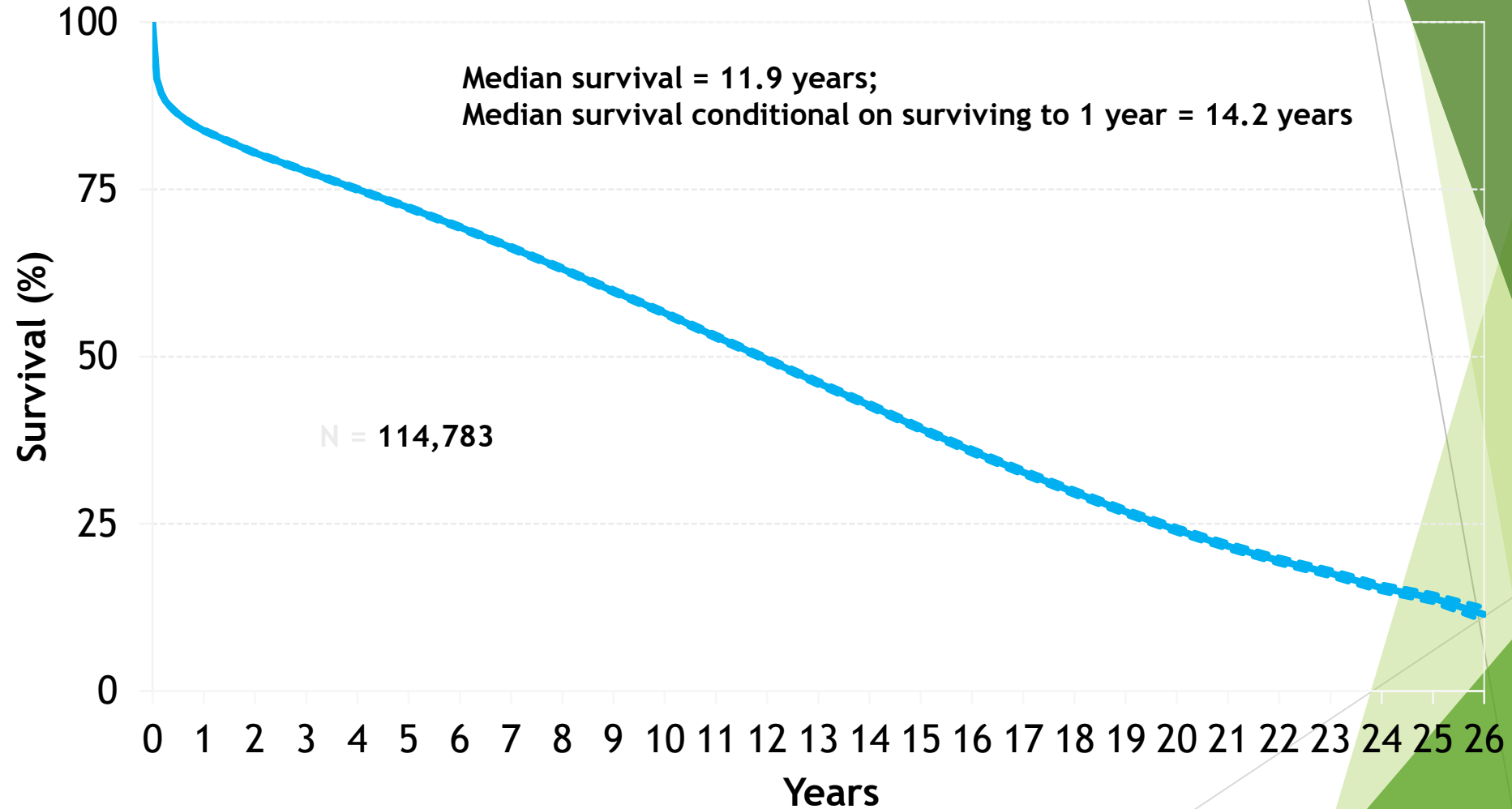
Number of Transplants by Year and Location



NOTE: This figure includes only the heart transplants that are reported to the ISHLT Transplant Registry. As such, the presented data may not mirror the changes in the number of heart transplants performed worldwide.

Adult and Pediatric Heart Transplants Kaplan-Meier Survival

(Transplants: January 1992 - June 2017)



Mechanical circulatory support

- ▶ Total artificial heart
- ▶ Left ventricular assist device
 - ▶ Destination therapy
 - ▶ Bridge to transplant
 - ▶ Bridge to recovery?

LVAD Criteria

- ▶ NYHA FC IV
- ▶ Failed to response to therapy for at least 6 weeks or have been IABP dependent for 7 days or inotrope dependent for 14 days
- ▶ LVEF <25%
- ▶ Peak $\dot{V}O_2$ <14 ml/kg/min
- ▶ Destination therapy or bridge to transplant

REMATCH (2001)

- ▶ 129 patients, 68 to LVAD and 61 to control.
- ▶ Randomized, non-blinded trial
- ▶ Compared HeartMate XVE to medical therapy in end stage HF.
- ▶ Mortality was 88.5% with medical therapy and 60% with LVAD
- ▶ Absolute risk reduction for death of 28.5% and NNT 4.
- ▶ Mean survival was 408 days in LVAD and 150 days in control group.

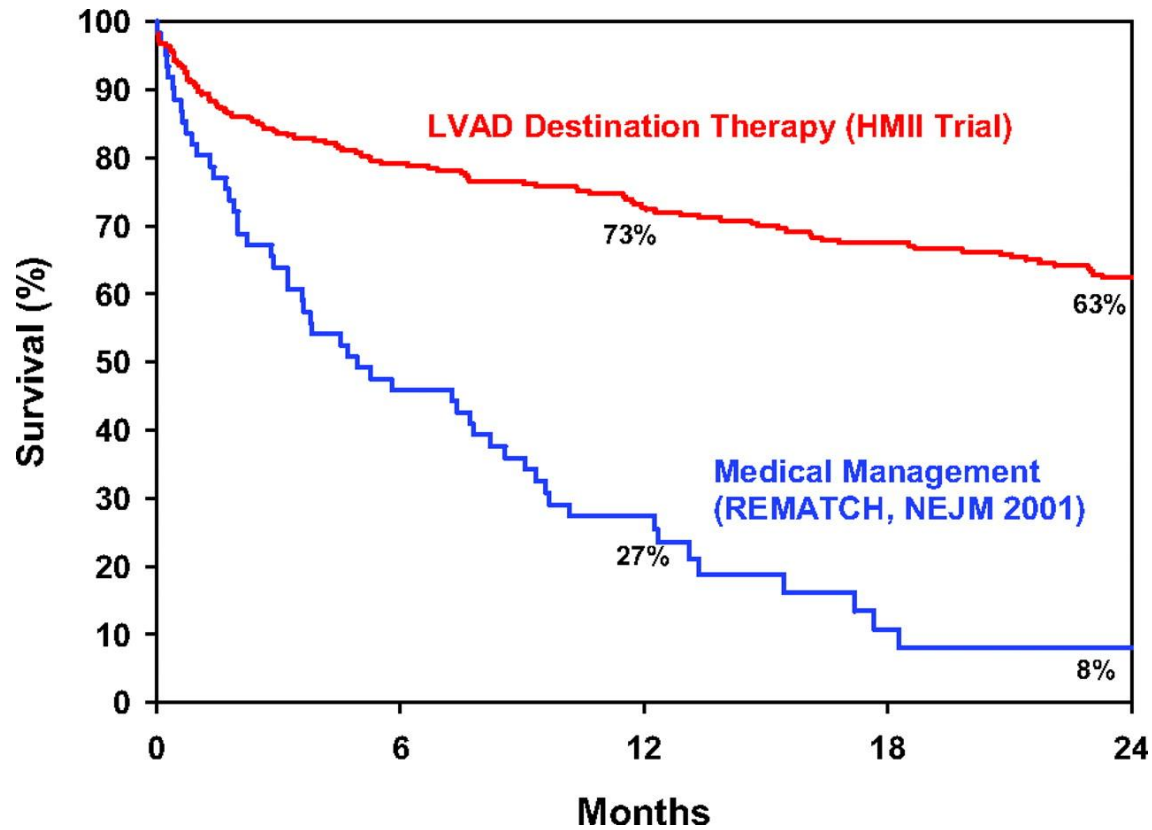
Rose EA. Long term mechanical left ventricular assistance for end stage heart failure. NEJM 2001 Nov15;345(20):1435-43

HeartMate II (2009)

- ▶ Randomized, non blinded trial in patients ineligible for cardiac transplantation treated with LVAD as DT.
- ▶ 200 patients, 134 with continuous flow LVAD (HeartMate II) and 66 with pulsatile flow LVAD (HeartMate XVE)
- ▶ Composite of survival at 2 years free of disabling stroke or reoperation to replace device was 46% vs 11%
- ▶ Quality of life score improved with both devices
- ▶ With this results HMII was approved for destination therapy.

Slaughter MS. Advanced heart failure treated with continuous-flow left ventricular assist device. NEJM 2009;361(23):2241-51

Survival of Stage D patients with LVAD (HM II 2009)



LVAD HM II

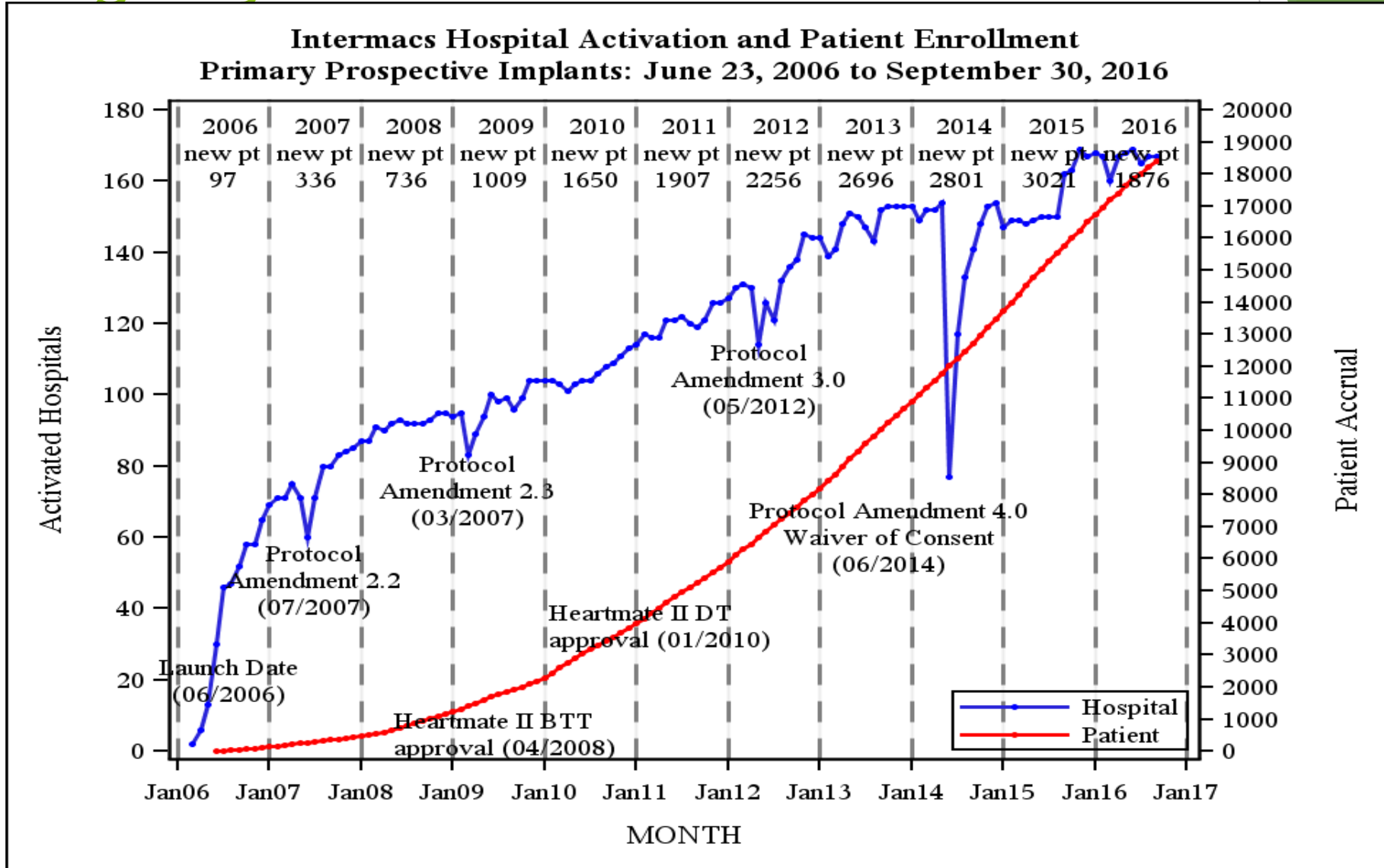
- ▶ Approved in 2008 for BTT
- ▶ Approved in 2010 for DT
- ▶ Inflow cannula to apex
- ▶ Outflow cannula to aorta
- ▶ Titanium Axial flow pump 3 inches
- ▶ Controller with display
- ▶ Batteries attached via a driveline



LVAD complications early and late

- ▶ Infection (28.2% to 31.4%)
 - ▶ Pulmonary
 - ▶ Bacteremia
 - ▶ Urinary tract (9% to 6%)
 - ▶ Drive line (3.3% to 14.4%)

LVAD registry to date

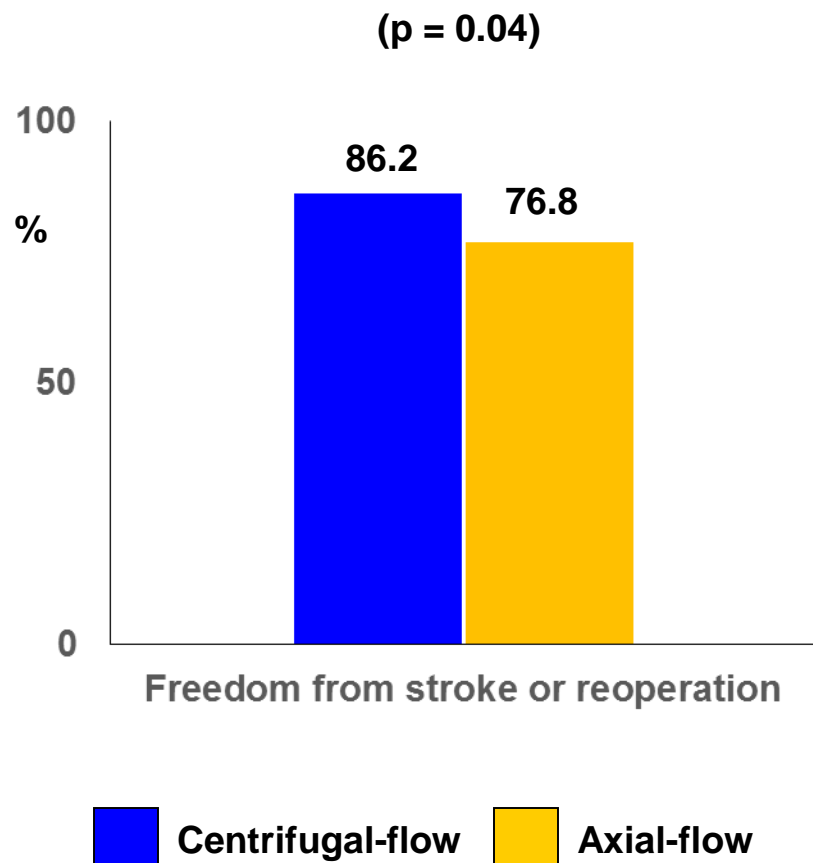


LVAD complications early, late, current

- ▶ Bleeding (29.6% to 23.5%)
- ▶ Cardiac arrhythmia (21.9% to 11.5%)
- ▶ Any CNS event (28% to 24%)
- ▶ RV failure (10% to 20%)
- ▶ Pump thrombosis (25% to 10.1%)

MOMENTUM 3

Trial design: Patients with advanced heart failure were randomized to a centrifugal-flow pump (n = 152) vs. an axial-flow pump (n = 142).



Results

- ▶ Freedom from disabling stroke or reoperation at 6 months: 86.2% vs. 76.8% (p < 0.001 for non inferiority; p = 0.04 for superiority)
- ▶ Pump thrombosis: 0% vs. 10.1%

FACTS

- Centrifugal-flow LVAD was associated with better outcomes due to a reduction in pump malfunction and pump thrombosis.
- 09/2017: FDA approved HM III for bridge to transplant
- 10/2018: FDA approval for destination therapy

Contraindications

- ▶ Expectancy <2 years of life from comorbidities
- ▶ Advanced cancer
- ▶ Medical non-adherence or active drug addiction
- ▶ Active infectious disease
- ▶ Inability to tolerate systemic anticoagulation
- ▶ Moderate to severe RV dysfunction

End of life alternatives

- ▶ Inotropes
- ▶ Palliative care
- ▶ Hospice

When to make a referral

- ▶ New onset HF for evaluation or second opinion regarding etiology
- ▶ Assistance with management, serious comorbidities
- ▶ Annual review for overview of disease and familiarity with potential therapies and trajectory of disease, planning
- ▶ Chronic HF with high risk features
 - ▶ 2 or more hospitalizations in a year
 - ▶ Intolerance to neurohormonal therapies
 - ▶ Rising biomarkers, poor hemodynamics, progressive remodeling
 - ▶ NYHA FC III-IV, SBP <90 mmHg, Cr >1.8, repetitive ICD shocks
 - ▶ Need for Inotrope

Sandra Rodriguez M.D.

Integrus Baptist Medical Center

Email: sandra.rodriquez@integrusok.com

Cell: (806) 392-1100

To make a referral: (405) 713-9911