



THE UNIVERSITY OF KANSAS HEALTH SYSTEM

# Guideline Directed Therapies: Bridging Acute and Chronic Heart Failure Care Using Technology

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# Tips for GDMT, Shared Care & Technology

1. Define the mission
2. Outline best therapies
3. Begin with home
4. Standardize the process
5. Get a map
6. Add the technology (business strategy)
7. Workflow the technology (business pilot)
8. Reflect, Revise, Repeat

# Chicago to Kansas City: A KU New Start: 2015





# Start With Why: The Mission

## Mission:

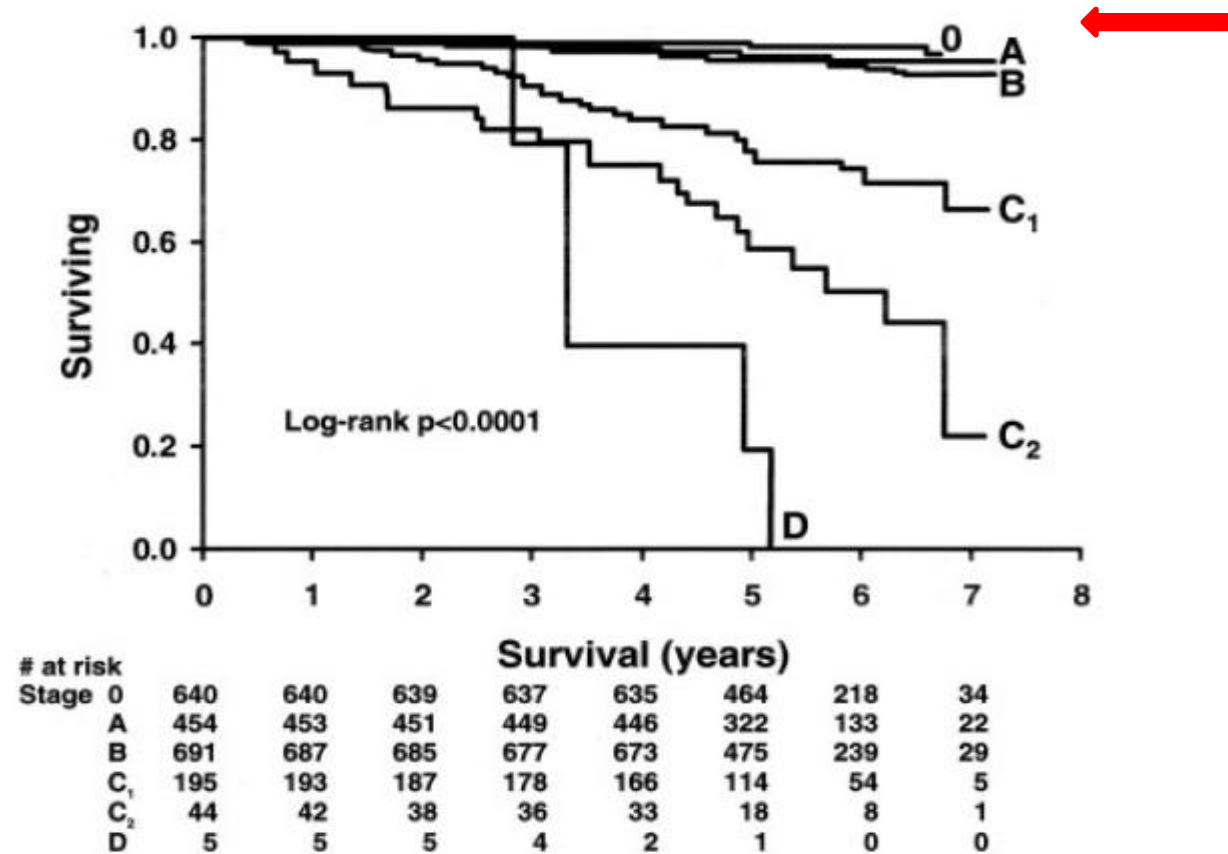
To see every patient in Kansas and Kansas City have access to the best heart failure therapies available anywhere in the world.

## Vision:

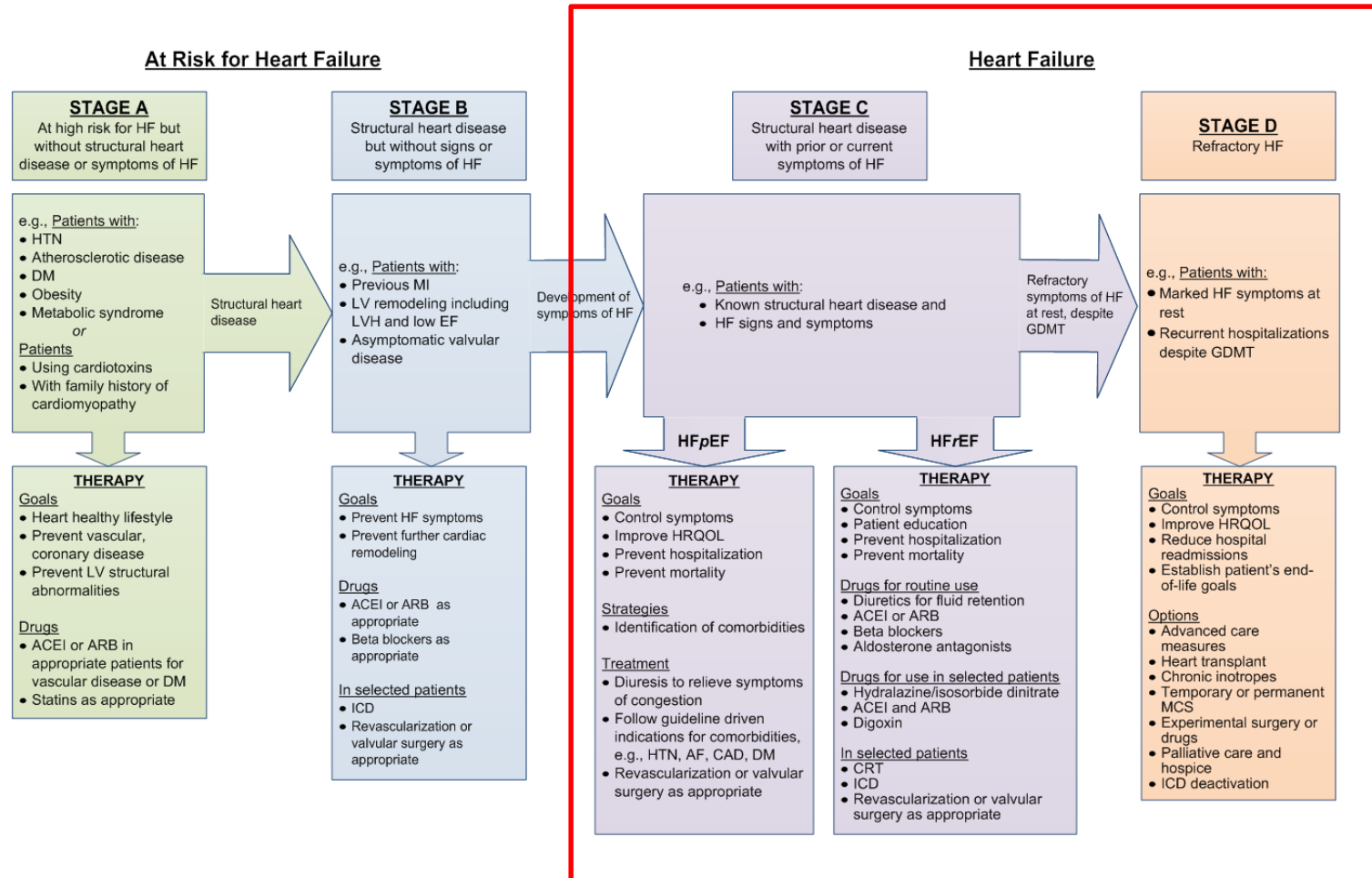
To lead the nation in caring, healing, innovating, and teaching.



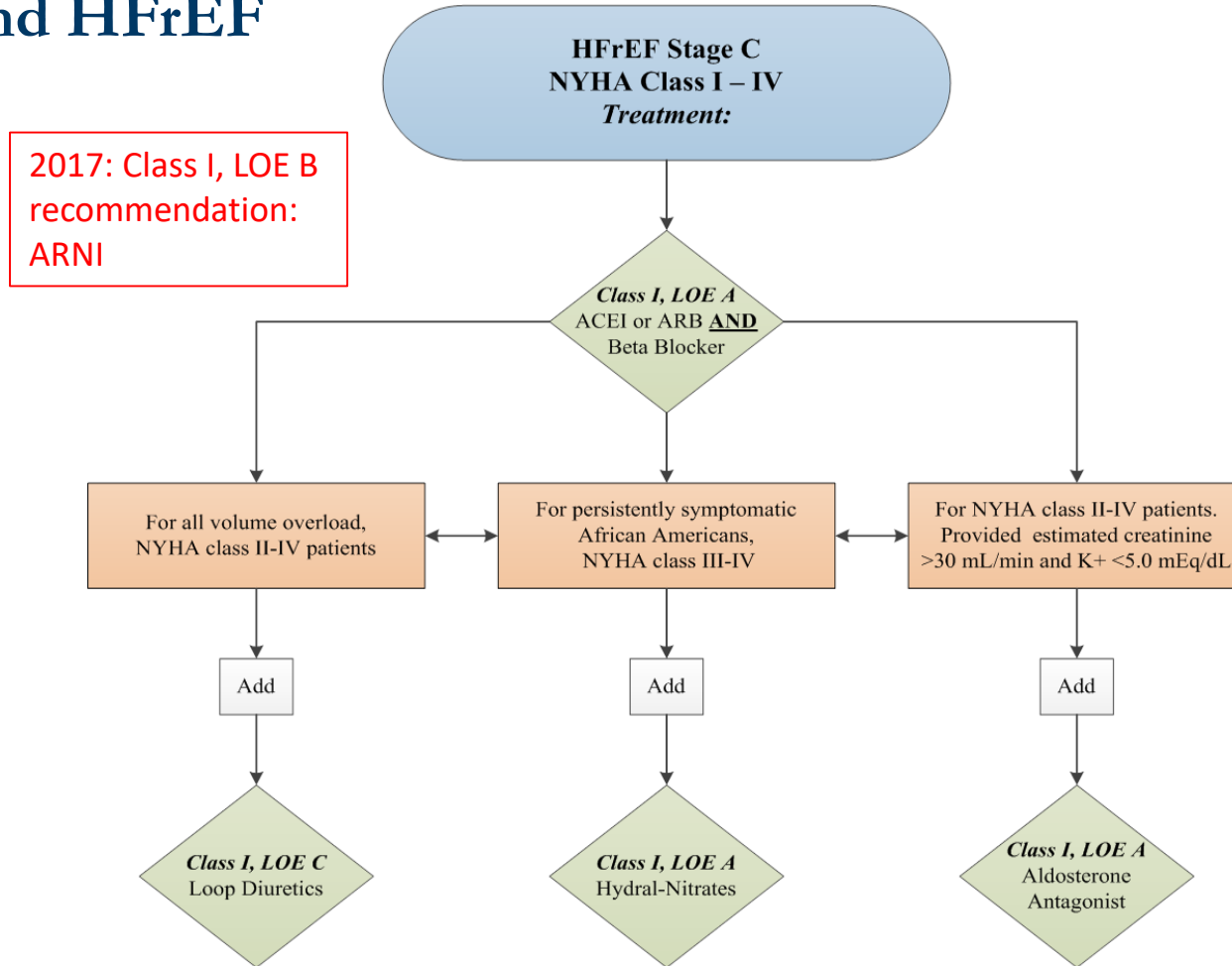
# Lets Begin By Remembering the Epidemic



# HF STAGES AND TREATMENTS



# PHARMACOLOGIC TREATMENT FOR STAGE C and HFrEF



## MAGNITUDE OF BENEFIT OF PHARMACOLOGIC THERAPY FOR STAGE C HFrEF

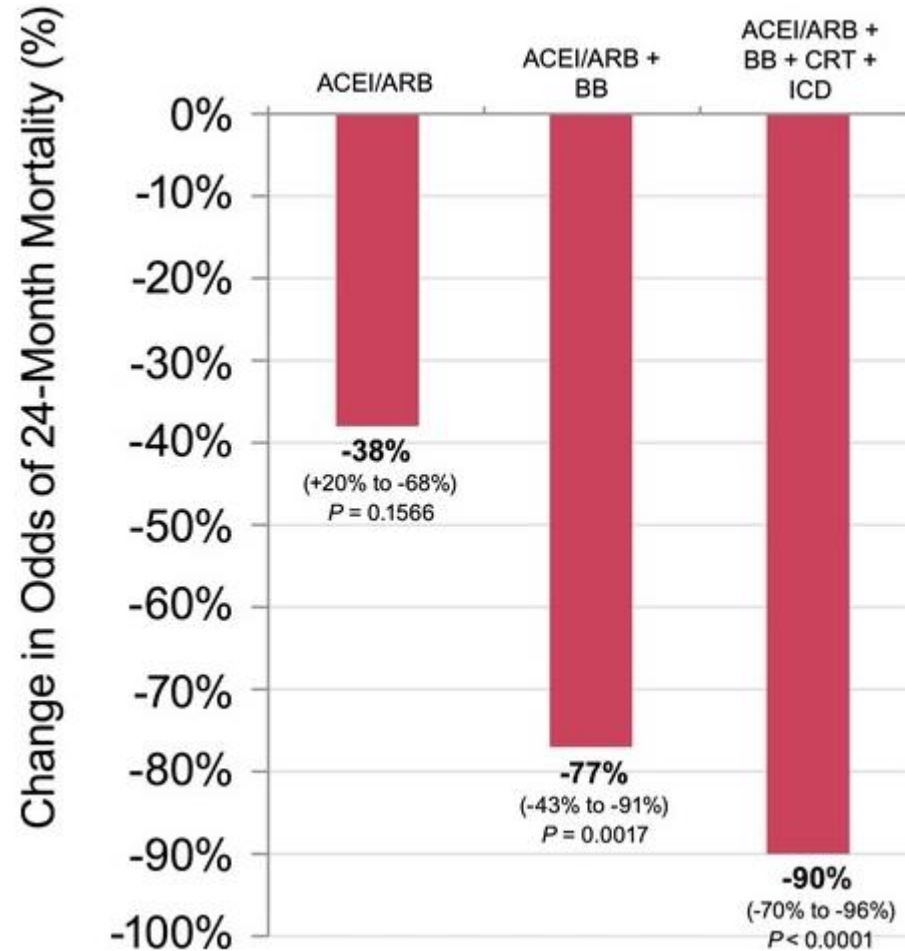
**Table 13. Medical Therapy for Stage C HFrEF: Magnitude of Benefit Demonstrated in RCTs**

GDMT	RR Reduction in Mortality (%)	NNT for Mortality Reduction (Standardized to 36 mo)	RR Reduction in HF Hospitalizations (%)
ACE inhibitor or ARB	17	26	31
Beta blocker	34	9	41
Aldosterone antagonist	30	6	35
Hydralazine/nitrate	43	7	33

Fonarow GC et al. Am Heart J. 2011  
Yancy CW et al. Circulation 2013



## CUMULATIVE INCREMENTAL REDUCTION IN ODDS OF DEATH AT 24 MONTHS

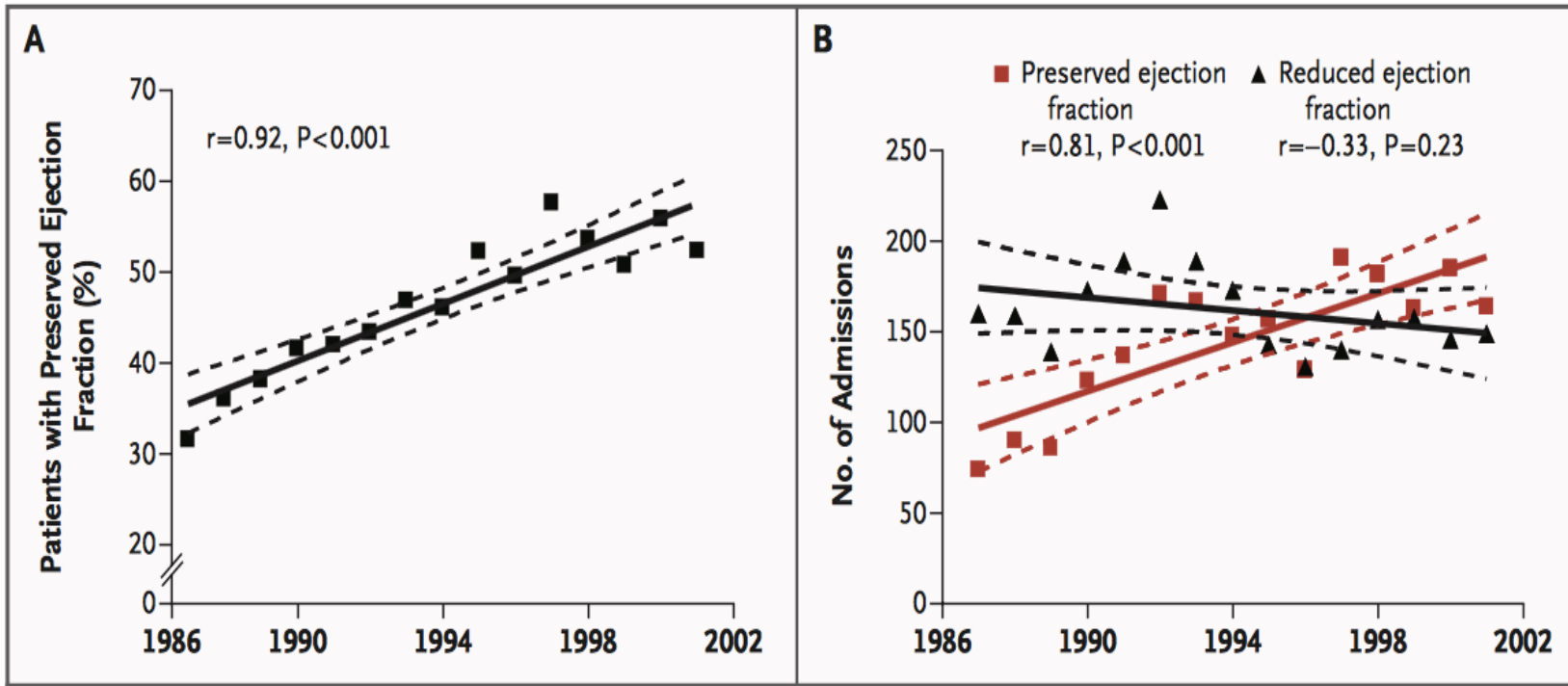


## Potential Impact of Optimal Implementation of Evidence-Based HFrEF Therapies on Mortality in the US

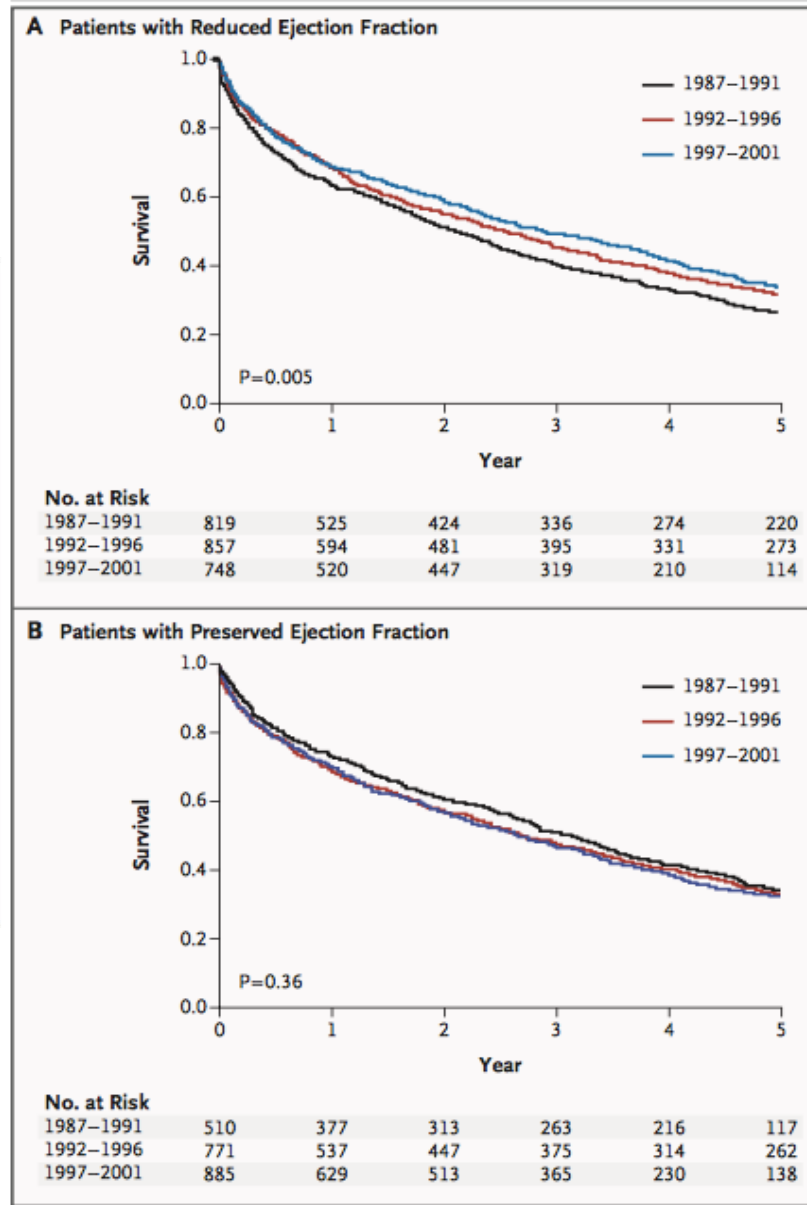
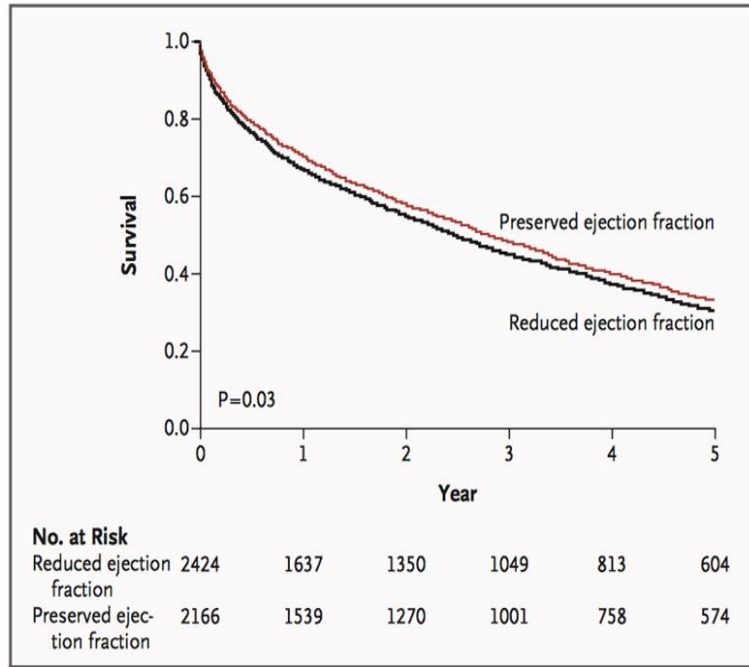
Guideline Recommended Therapy	HF Patient Population Eligible for Treatment, n*	Current HF Population Eligible and Untreated, n (%)	Potential Lives Saved per Year	Potential Lives Saved per Year (Sensitivity Range*)
ACEI/ARB	2,459,644	501,767 (20.4)	6516	(3336-11,260)
ARNI (replacing ACEI/ARB)	2,287,296	2,287,296 (100)	28,484	(18,230-41,017)
Beta-blocker	2,512,560	361,809 (14.4)	12,922	(6616-22,329)
Aldosterone Antagonist	603,014	385,326 (63.9)	21,407	(10,960-36,991)
Hydralazine/Nitrate	150,754	139,749 (92.7)	6655	(3407-11,500)
CRT	326,151	199,604 (61.2)	8317	(4258-14,372)
ICD	1,725,732	852,512 (49.4)	12,179	(6236-21,045)
Total	-	-	96,480	(53,013-158,514)

Updated from Fonarow GC, et al. Am Heart J 2011;161:1024-1030. and Fonarow GC et al. JAMA Cardiology 2016;1(6)714-717.

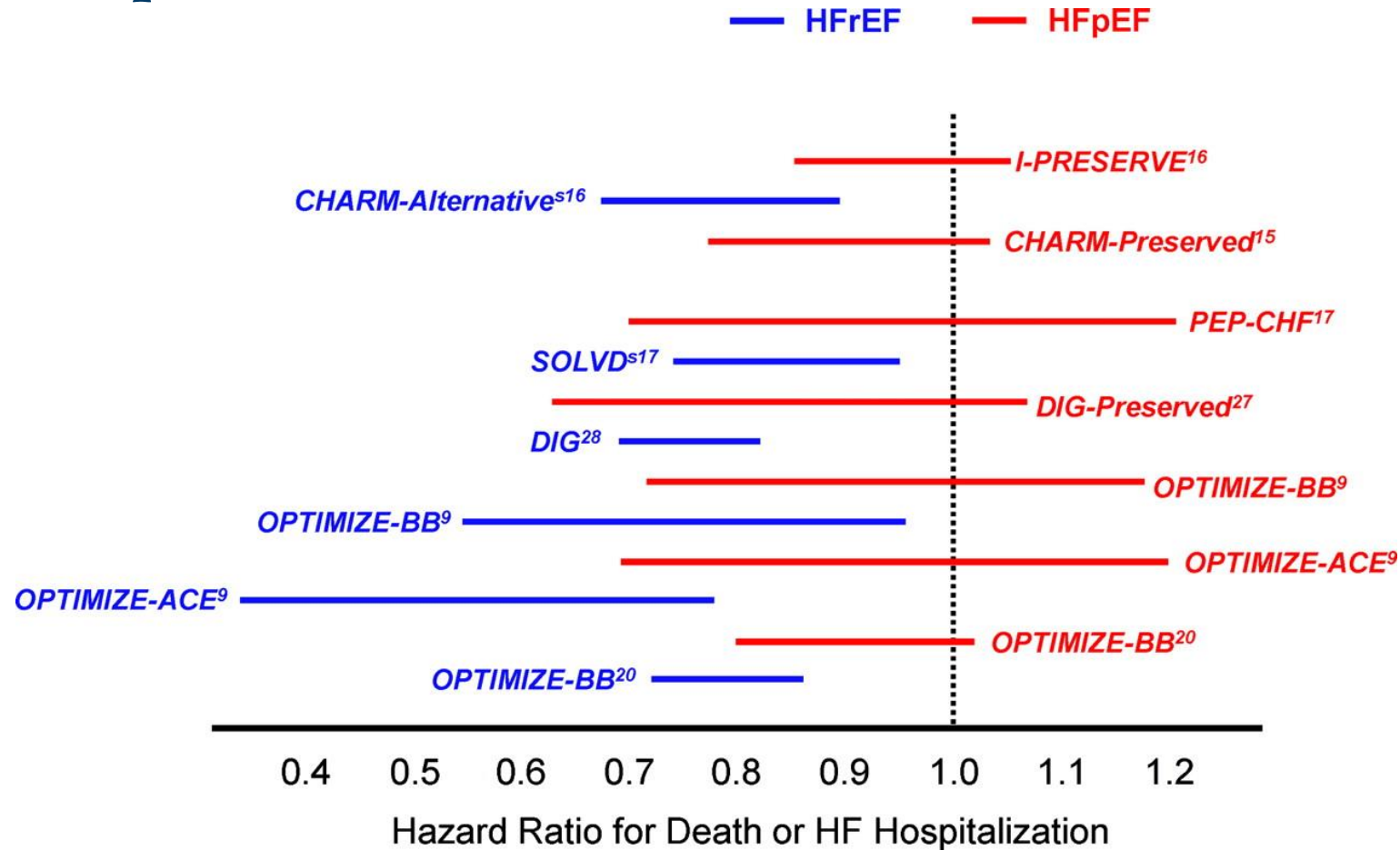
# HFpEF TRENDS



# HFpEF TRENDS



# RESPONSE TO TREATMENT HF<sub>r</sub>EF AND HF<sub>p</sub>EF



## Wireless pulmonary artery haemodynamic monitoring in chronic heart failure: a randomised controlled trial

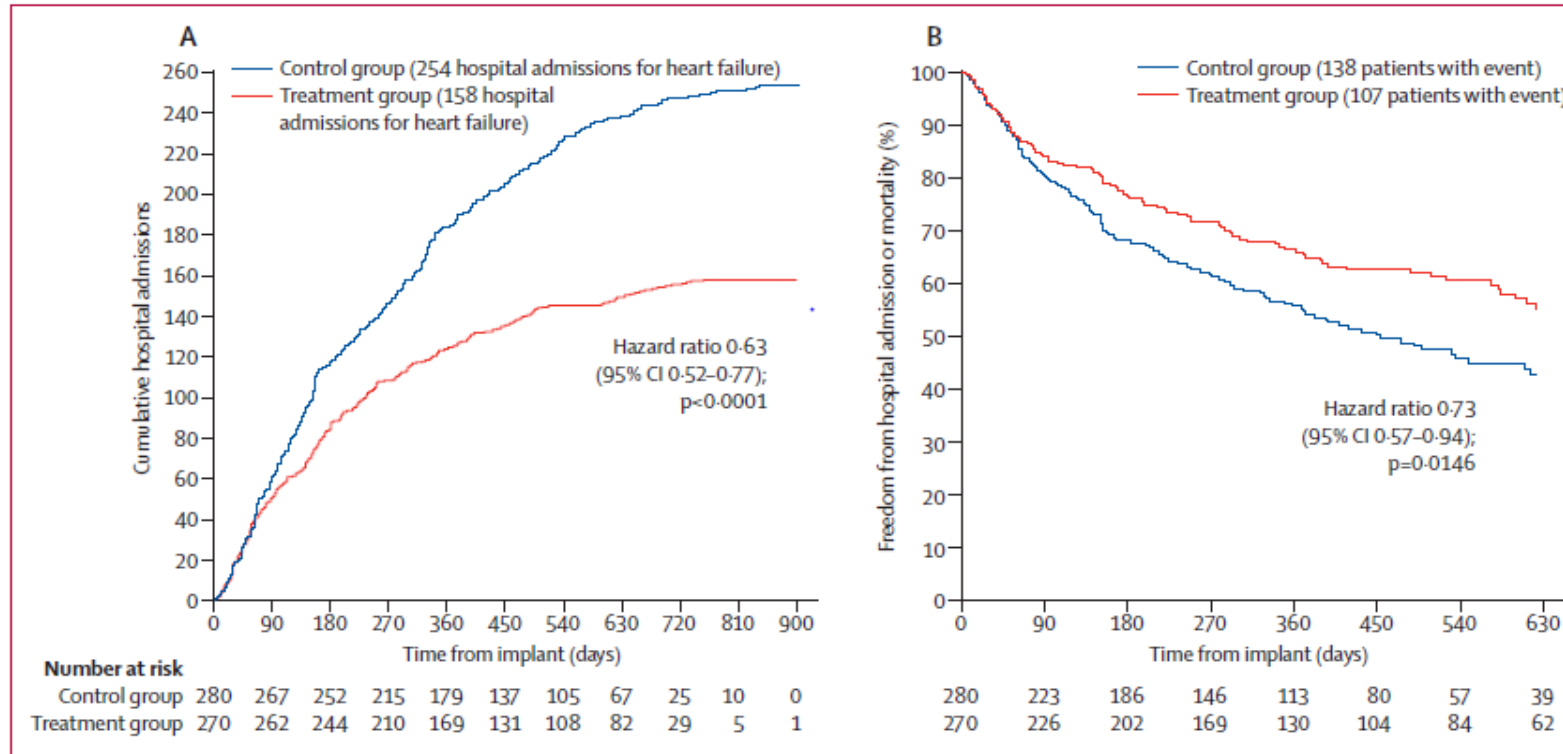
*William T Abraham, Philip B Adamson, Robert C Bourge, Mark F Aaron, Maria Rosa Costanzo, Lynne W Stevenson, Warren Strickland, Suresh Neelagaru, Nirav Raval, Steven Krueger, Stanislav Weiner, David Shavelle, Bradley Jeffries, Jay S Yadav, for the CHAMPION Trial Study Group\**

### Inclusion Criteria:

- NYHA III symptoms for at least 3 months
- Irrespective of LVEF
- HF hospitalization in last 12 months
- Reduced EF patients had to be on stable medical therapy

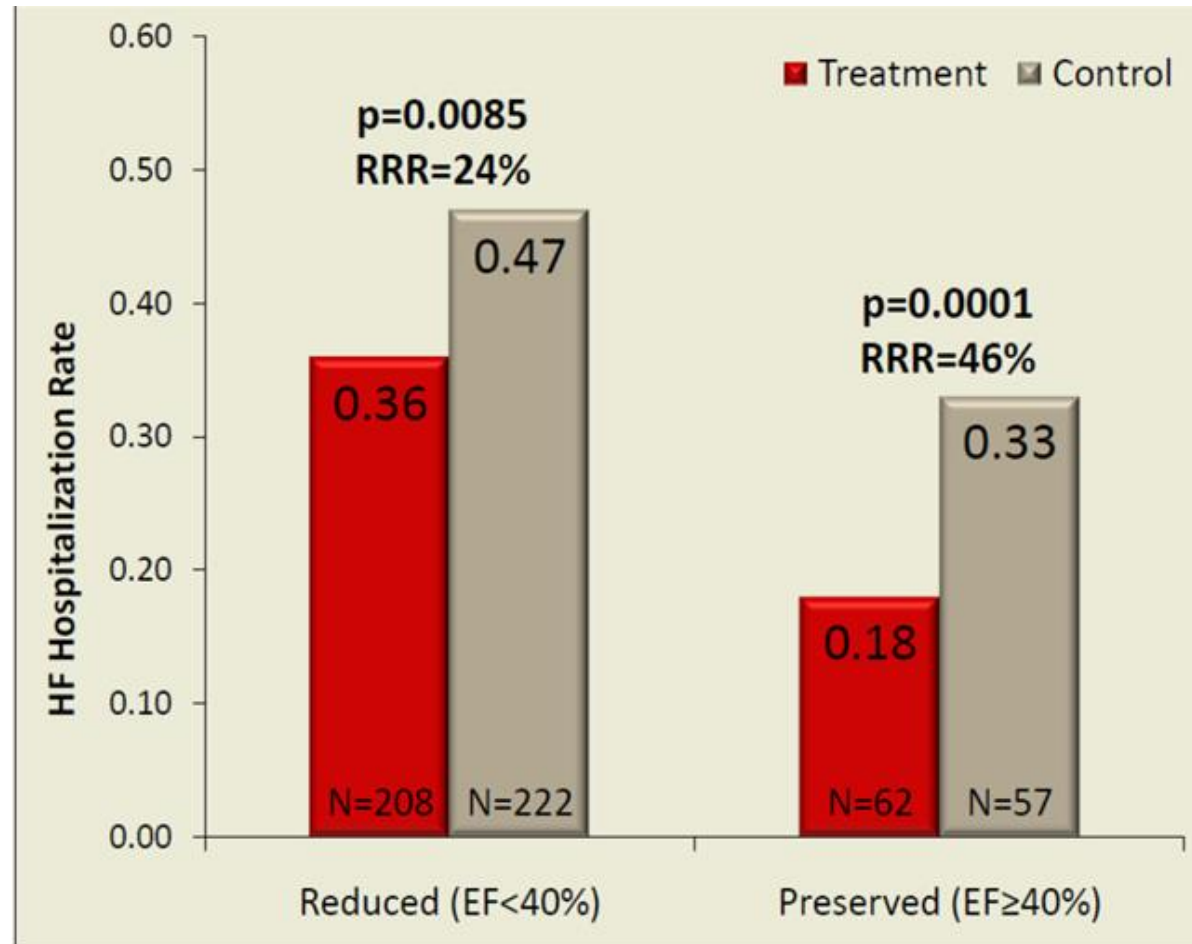


## RESULTS OF CHAMPION TRIAL



- Treatment group had 3X's the changes to medical regimen vs. control group
- LOS for HF related hospitalizations was shorter in treatment group
- 37% reduction in overall HF related hospitalizations!
- NNT to prevent one HF related hospitalization = 4

## PRE-SPECIFIED SUB-GROUP ANALYSIS: Rate of HF hospitalizations by baseline EF





# Begin with Home



1. We will design & implement a progression of care tool with the intention of standardizing care of heart failure patients that will result in decreased avoidable readmissions, & optimizing length of stay and decreasing costs.

2. Scope/Boundaries: All healthcare providers who care for heart failure patients.

3. Users: All healthcare providers — nurses, physicians, housestaff, ancillary staff

Approvers: Dr. Sauer  
Resources: Sub-teams, Kelsey Soltes (IT)  
Members: Stacy Watter (Leader)  
Dr. Tehira Zufer (FM)  
Ezrina Ardasenov (IM)  
UNIT 46 Dr. Bhakti Patel  
UNIT 46 & Representative  
CVP Representative  
CNS

# Standardize The Process

**THE UNIVERSITY OF KANSAS HOSPITAL**  
**DRAFT**  
**Management of Heart Failure Patients in the Emergency Department**

**Applied Location(s):**  
 TUKHMC\_IND

Approved By: \_\_\_\_\_  
 Signature Title: \_\_\_\_\_  
 2<sup>nd</sup> Signature Title: \_\_\_\_\_

**SCOPE**  
 This guideline describes the recommended management and physician service decisions for heart failure patients presenting to and being admitted through the Emergency Department (ED).

**BACKGROUND**  
 Heart failure is the leading cause of hospitalizations among adults > 65 year of age in the United States. Of the 5.7 million Americans living with heart failure, about 10% have advanced stage heart failure. In chronic heart failure, repeated hospitalizations are a strong prognostic predictor for increased mortality. Because of this, the establishment of the admission pathway to appropriate level of care is essential.

**DEFINITIONS**  
 When used in this Guideline these terms have the following meaning:

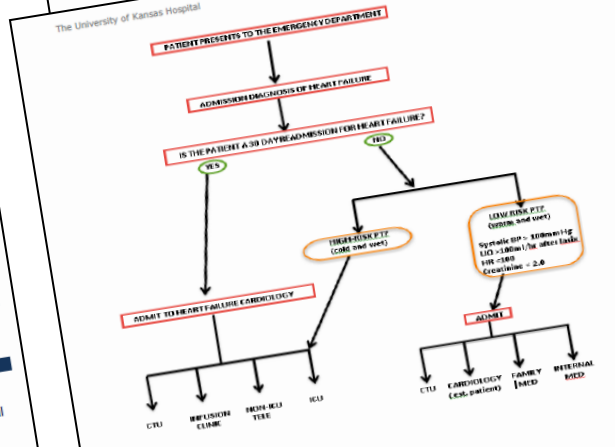
- Heart Failure (HF)—a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood.
- Clinical Throughput Unit (CTU)—a monitored, observational stay unit (2 midnights) that is staffed by ED physicians and nurses
- Low-Risk (warm and wet)—describes the Stage C, HF patient (see diagram) who has been admitted to the hospital in the past 30 days and displays compensated clinical manifestations of HF without hypoperfusion.
- High-Risk (cold and wet)—describes the Stage C, HF patient (see diagram) who no longer has hospitalized in the past 30 days and/or displays clinical manifestations of heart failure and hypoperfusion.
- Advanced Heart Failure—describes the Stage D, HF (see diagram) patient who no longer has improvement of condition with conventional therapies and symptom management strategies. These patients have Assistive Device (VAD) and/or a heart transplant.

**CLINICAL MANAGEMENT**

- Patient presents to the ED with complaints of signs/symptoms of HF and/or past medical history of HF.
  - Vital signs assessment and cardiac monitoring per ED standard related to patient acuity.
  - Volume status assessment to include weight as compared to baseline, JVD, orthopnea, pulmonary rales, S3 gallop, and presence of peripheral edema.

Page 1 of 5  
 NOTE: The University of Kansas Hospital guidelines are maintained electronically and are subject to change. Printed copies may not reflect the current official policy.

- The University of Kansas Hospital
- Initial diagnostic testing to include (but not limited to):
    - 12 lead EKG
    - Labs: CBC, Chem 12, BNP, Troponin
    - CXR
    - Bedside ultrasound
  - Give initial diuretic dose IV equal to patient's home oral dose. If the patient does not respond to initial diuretic dose within 2 hours, give additional IV dose equal to double the patient's home oral dose.
  - Consider use of inotropic or vasodilating medications if indicated by patient condition
  - Provide supportive therapy such as oxygen and fluid restriction



- SPECIAL CONSIDERATIONS**
- If the patient presents to the ED in Stage D/Advanced Heart Failure, cardiogenic shock, and/or is in the work-up phase for LVAD implantation or Heart Transplant, the Heart Failure Cardiology team should be notified as soon as possible in the ED patient work-up. These patients should be admitted to the nursing units of CVP or CICU depending on the level of care necessary.
  - If the patient presents to the ED and has an LVAD, page the VAD response team by calling x5656. If LVAD was implanted at this hospital and requires admission, the CTS service should be contacted and the patient should be admitted to CTP or CTSICU depending on the level of care necessary. The Heart Failure Cardiology team will be consulted.
  - If the patient presents to the ED and has an LVAD that was implanted at another facility, page the VAD response team by calling x5656 and they will assist in care and coordination of admission to the implanting facility.
- Page 3 of 5  
 Insert Policy Name Here

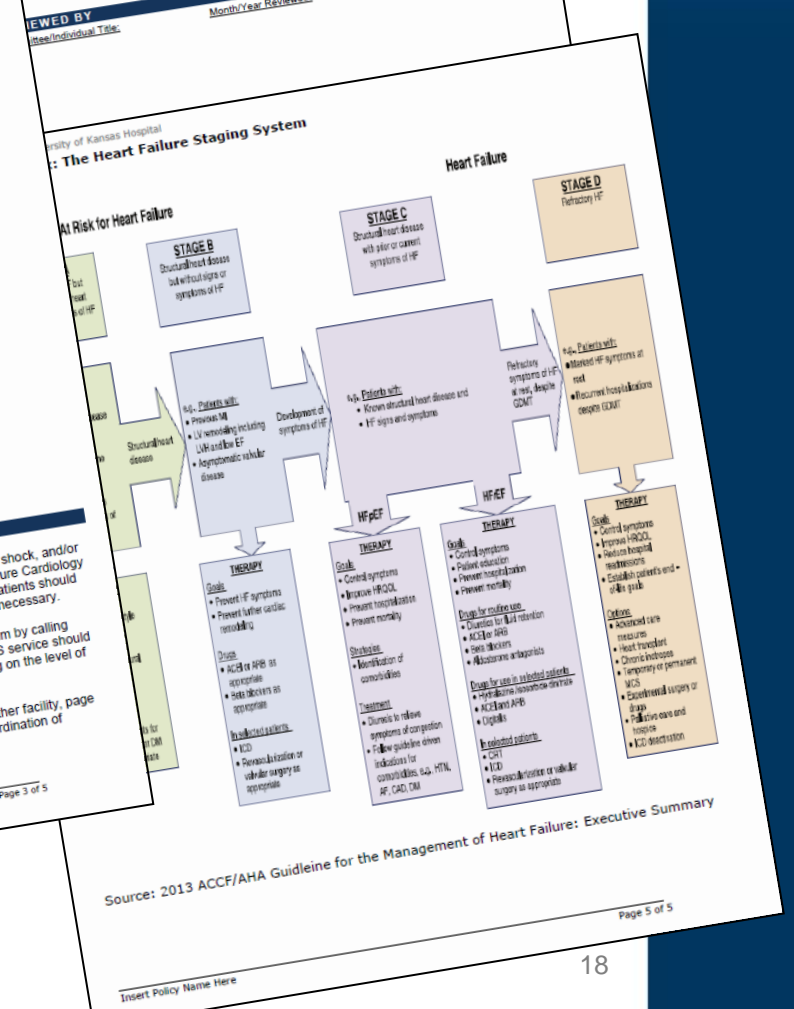
The University of Kansas Hospital

**STATEMENT OF PROFESSIONAL JUDGEMENT**  
 Patient care guidelines are evidence-based and designed to assist clinicians and patients in making decisions about care for specific clinical circumstances. These guidelines should not be considered inclusive of all appropriate methods of care and are not meant to be a substitute for professional judgment when assessment and treating patients. The ultimate judgment regarding care of a particular patient must be made by the clinician in light of the individual circumstances presented by the patient and the resources of the hospital.

**REFERENCES**  
 Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masouli FA, McBride PE, McMurray JJV, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang WHW, Tsai EJ, Wilkoff BL. 2013 ACCF/AHA guideline for the management of heart failure: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol 2013;62:1495-1539.

**SUPPORTING DOCUMENTS**  
 Supporting Document:

Reviewed By: \_\_\_\_\_  
 Date/Individual Title: \_\_\_\_\_  
 Month/Year Reviewed: \_\_\_\_\_



# Faculty Stakeholders



# Staff Stakeholders



# Niche Content Expert Stakeholders

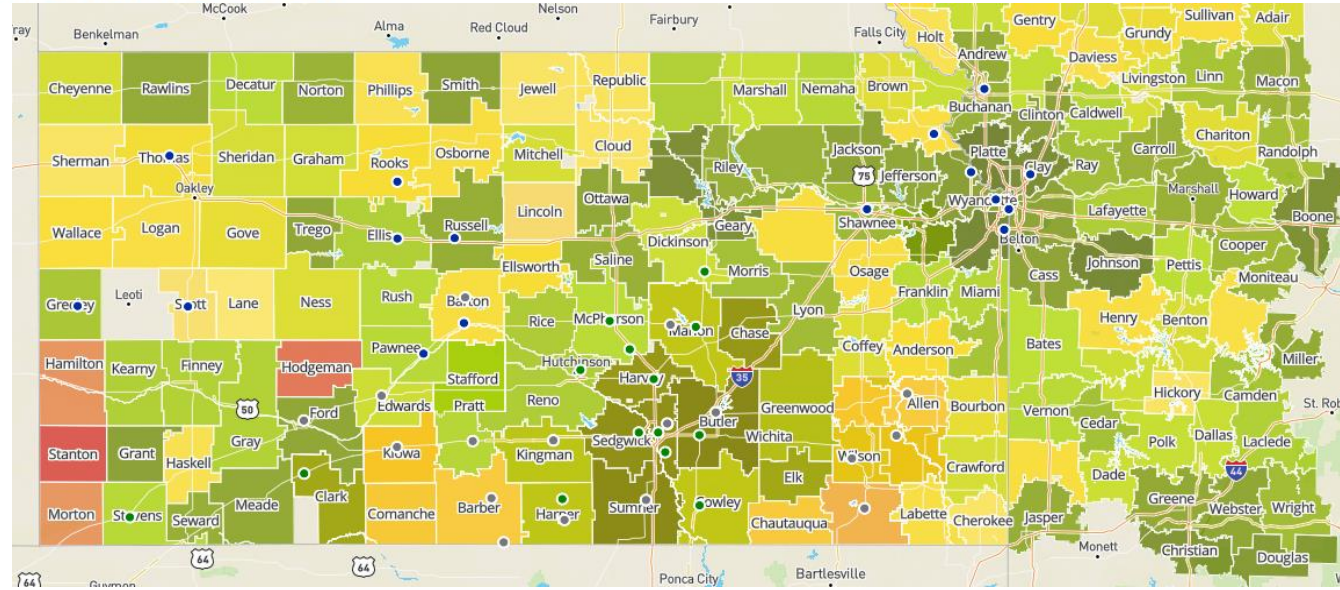


## Wins Propel Momentum: “If You Build It...”

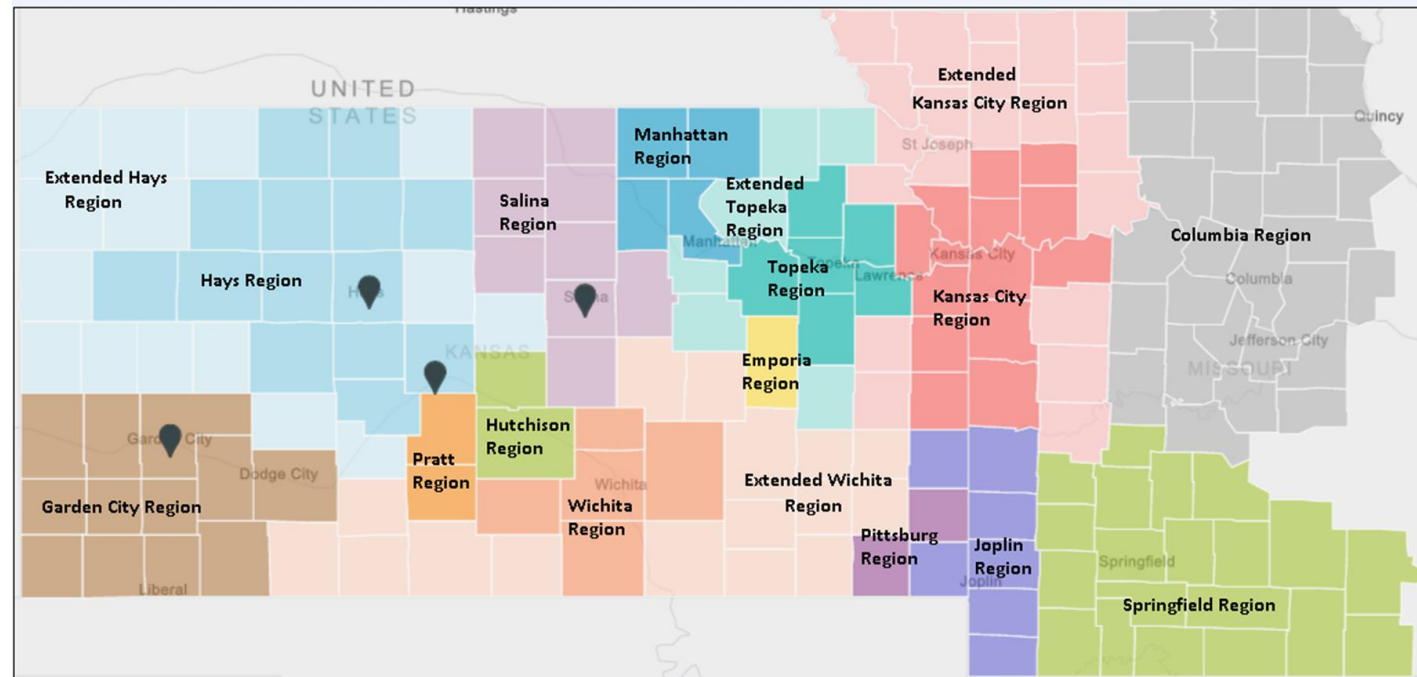
- First LVAD implant 2015
- TJC Certification 2016
- 100% VAD survival 2016
- UNOS Listing Initiation 2016
- 100% HTX survival 10 cases 2017
- CMS Certification 2017
- Vizient HF mortality index < 0.5 2016-19
- Lowest LVAD Implant LOS 2017-19
- 100% HTX Survival SRTR 2016-19
- COE payer contracts 2019



# Heat Map



# Hubs



# Community Partners: Heart Failure Care Clinics

## **KU Hospital: Main Campus (2 clinic sites) (began with 1 site '15)**

Overland Park (2016)

KC-Kansas State Ave (2016)

Liberty (2017)

Atchison (2018)

St. Joseph MO (2018)

Hays (including Hays TeleHealth) (2018)

Topeka KU-St. Francis Campus (2019)

Hays TeleHealth (2019)

Wichita (2019)

Wichita TeleHealth go live (2020)



# Incorporating Technology in Shared Care

- Mobile App (no additional hardware required)
- Wearables (Both HF and LVAD remote monitoring devices)
- Implantable devices (and ongoing studies)
- Telehealth (bridging gaps in physical space needs & travel limitations)

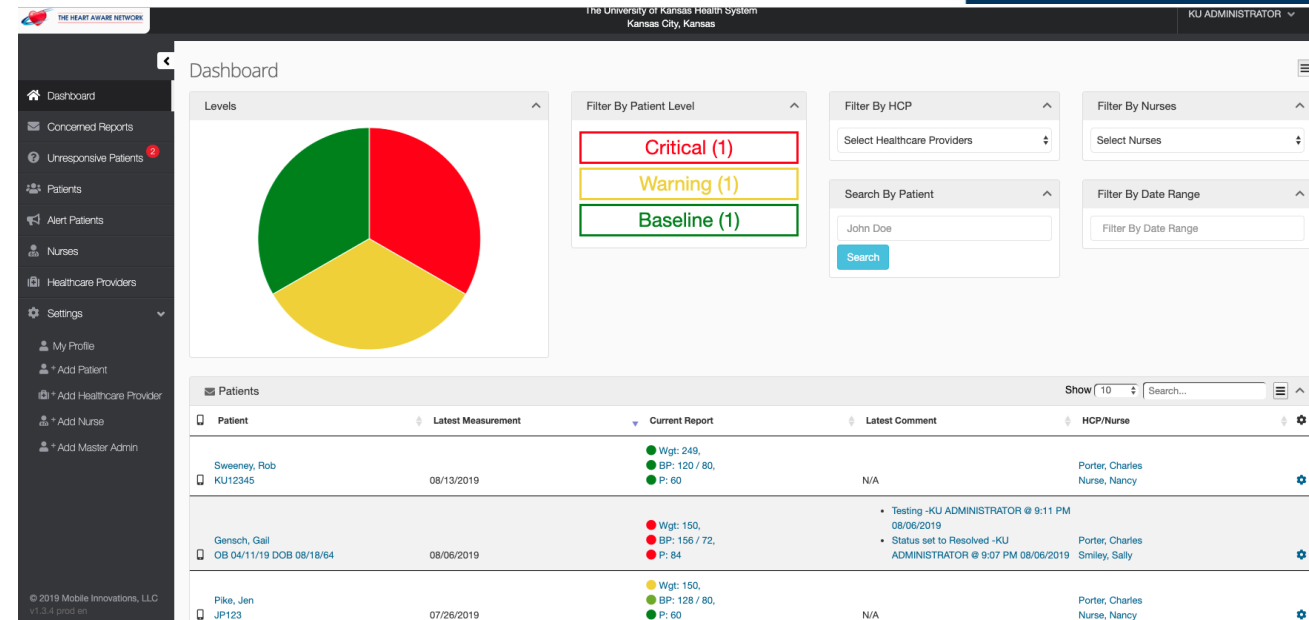
## Home Grown Mobile app and Online Dashboard Features & Functions

### Patient App

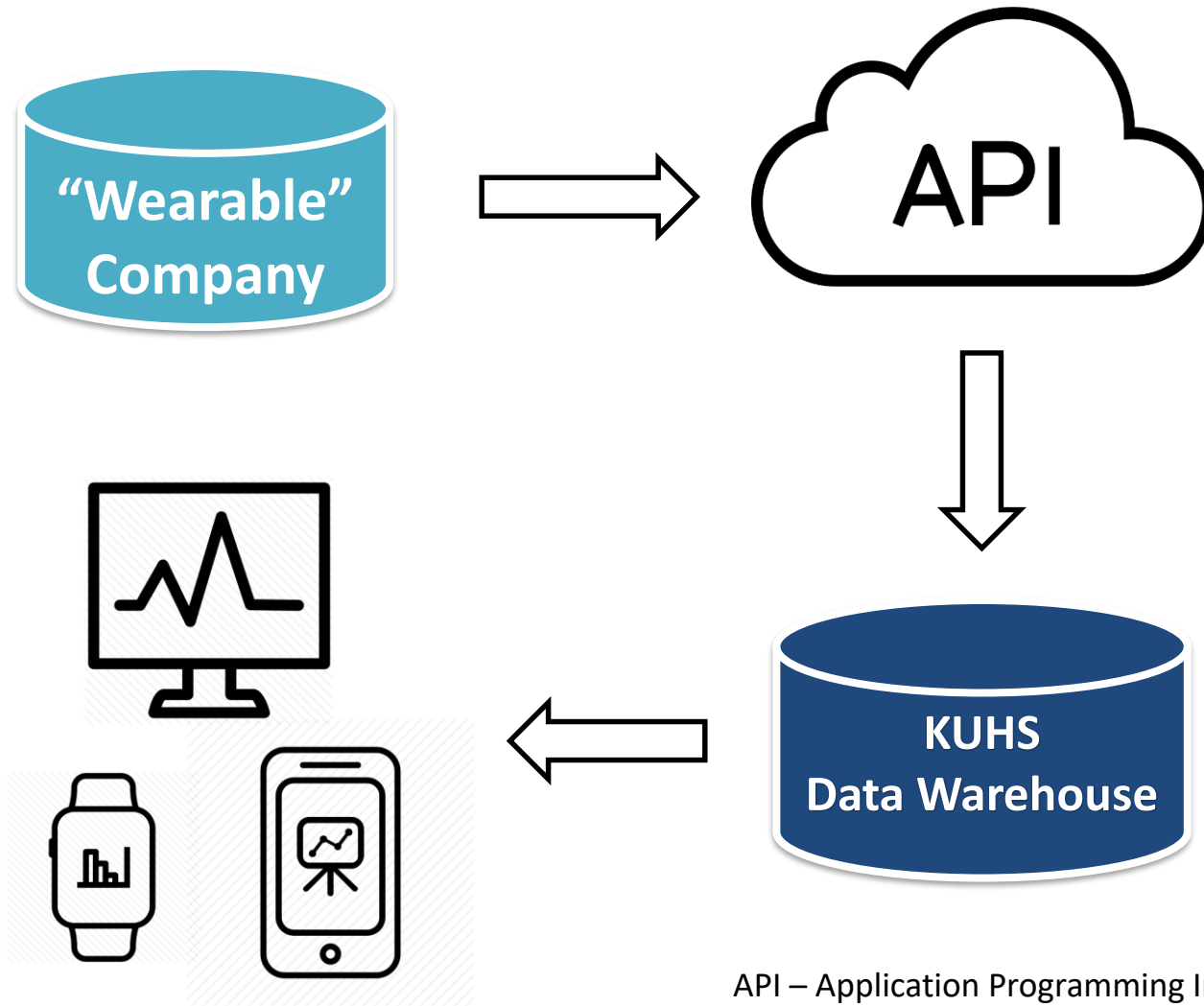
- Guides patients medical management through **color-code** gradient indications
- Tailored patient profiles
- Custom questions & vitals tracking provides immediate feedback on chronic conditions
- Medication and app input reminders promotes adherence for meds & daily measurements

### Provider Dashboard

- Spot trends in patient profiles through graphs
- Main dashboard triages patients according to their severity level
- Ability to enter comments and initiate chat function with patients



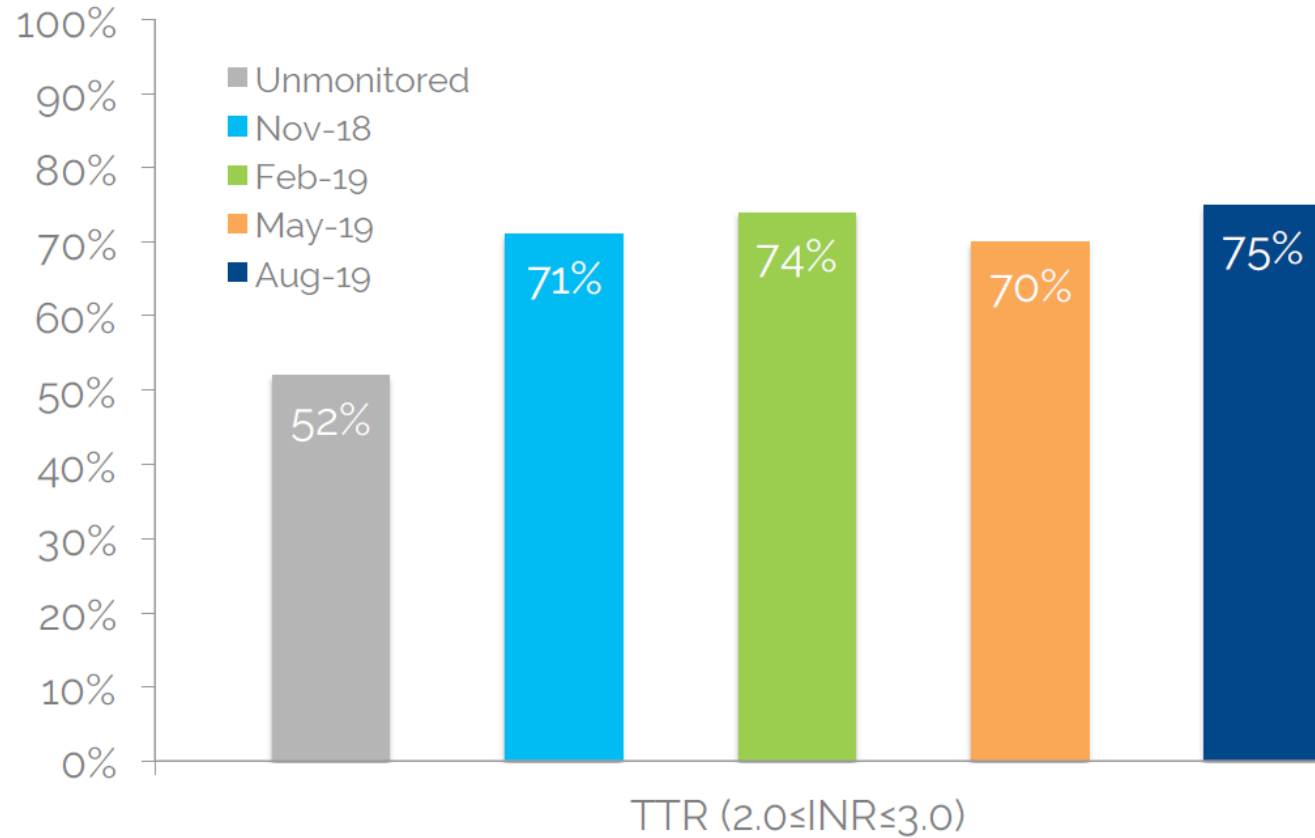
# Wearables & Machine Learning



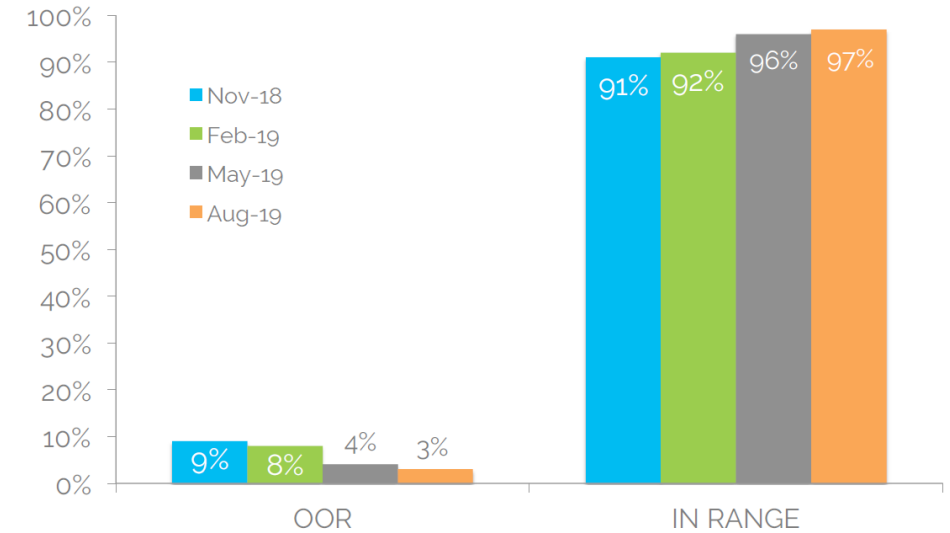
API – Application Programming Interface

# LVAD RM Program: INR and Doppler BP

## PT/INR CONTROL & COMPARISONS (N=261)



### CRITICAL OUT-OF-RANGE VALUES PT/INR ≤ 1.5 & ≥ 3.5



Source: Halder et al. Time in Therapeutic Range for Left Ventricular Assist Device Patients Anticoagulated With Warfarin: A Correlation to Clinical Outcomes. ASAIO J. 2017 Jan/Feb;63(1):37-40.

# Implantable Devices & Trials

Thu, Apr 25, 6:01 PM

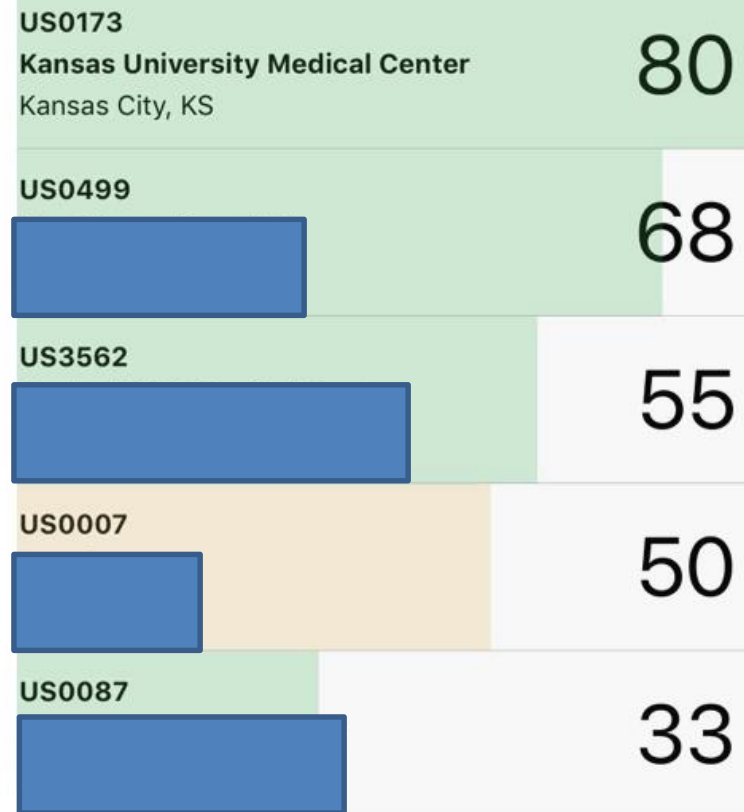


Mon, Aug 5, 2:24 PM

Alyssa Boyce-White



**907 total patients enrolled**



# TeleHealth & Remote Monitoring

## Monthly Hays Flight

- EP MD / APP
- HF : VAD : Transplant MD/APP
- Focus on new / complex pts

## Monthly TeleHealth

- Hays patients
- Surrounding region
- Focus on return visits
- Med titrations
- tie to remote PA pressure monitoring data
- tie to ICD/CRT device remote monitoring data



## What this is all about...

THIS SHALL BE A PLACE  
WHERE THE PEOPLE OF  
KANSAS  
AND AREAS  
SURROUNDING  
MAY ENJOY THE BEST  
MEDICAL CARE  
AVAILABLE ANYWHERE.

Simeon Bishop Bell, MD--1911

- **SRTR 100% heart transplant survival**
- **Heart Transplant and VAD metrics are in the top 10% nationally for**
  - **Survival**
  - **Cost Reduction**
  - **Length of Stay**
- **Lowest VAD implant hospitalization length of stay in the nation (Vizient 2017-2019)**

# Program Building = Team Building





# Tips for GDMT, Shared Care & Technology

1. Define the mission
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