



Heart disease in America: Opportunities & Need for a Continuum of Care Focus on Heart Failure

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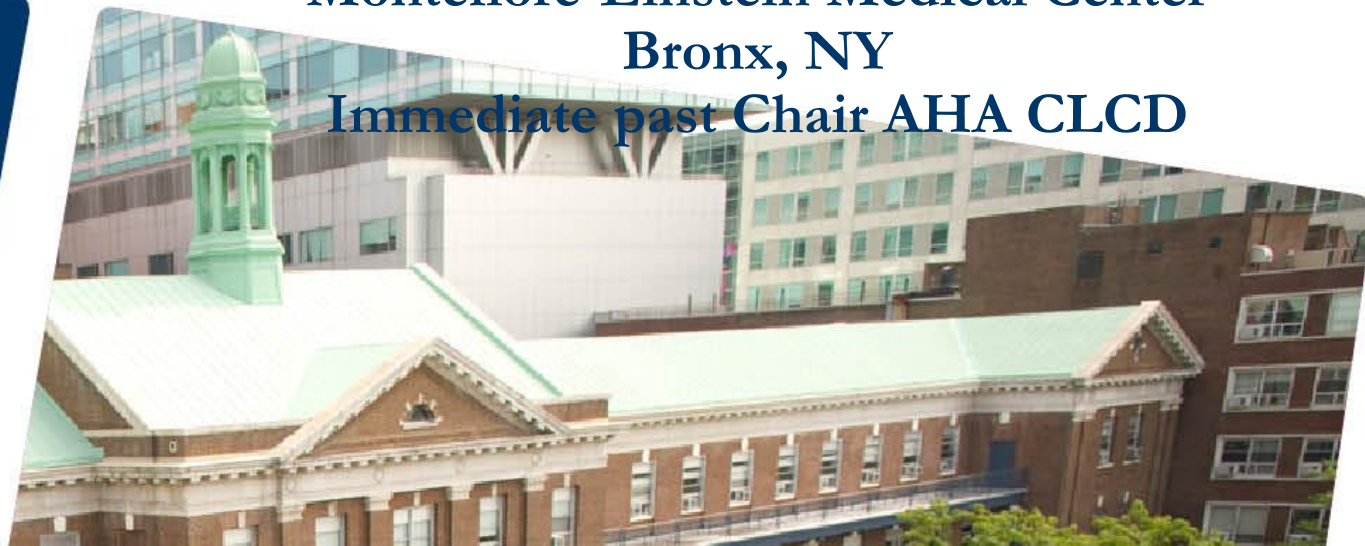
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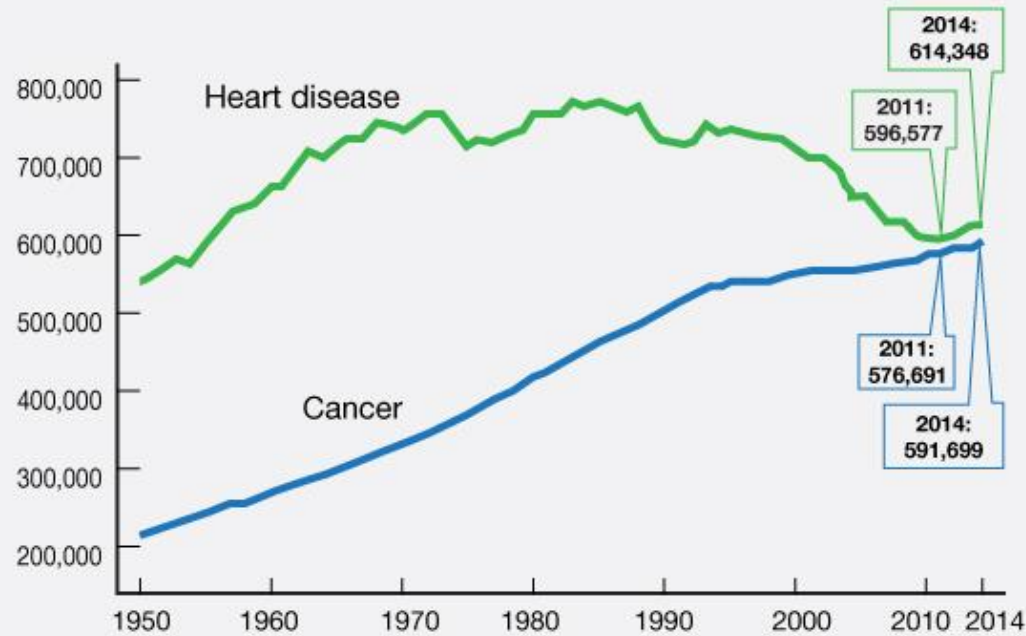


We must fundamentally
change the ways in
which we deliver care.

TOP TWO KILLERS

By AMERICAN HEART ASSOCIATION NEWS

The total number of Americans dying from heart disease rose in recent years following decades in decline. Cancer deaths have nearly tripled since 1950 and continue to climb.



Source: Centers for Disease Control and Prevention

Published Aug. 24, 2016

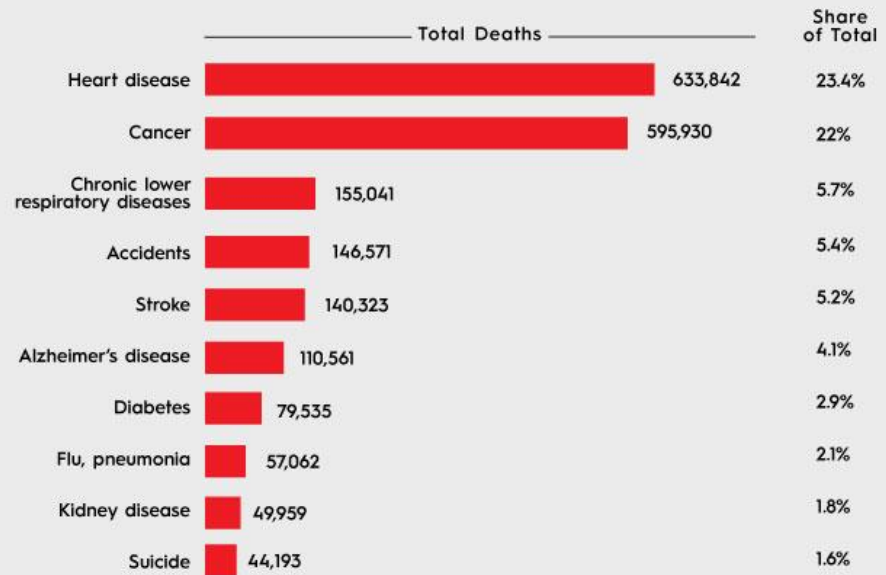
The Facts:



Leading Causes of Death

By AMERICAN HEART ASSOCIATION NEWS

Heart disease continues to kill more Americans than any other cause, followed by stroke at No. 5, according to 2015 federal data.



Source: Centers for Disease Control and Prevention

Published Dec. 8, 2016

About 630,000 Americans die from heart disease per year--1 in every 4 deaths.

Someone has a heart attack (MI) every 40 sec

The #1 killer for most racial/ethnic groups

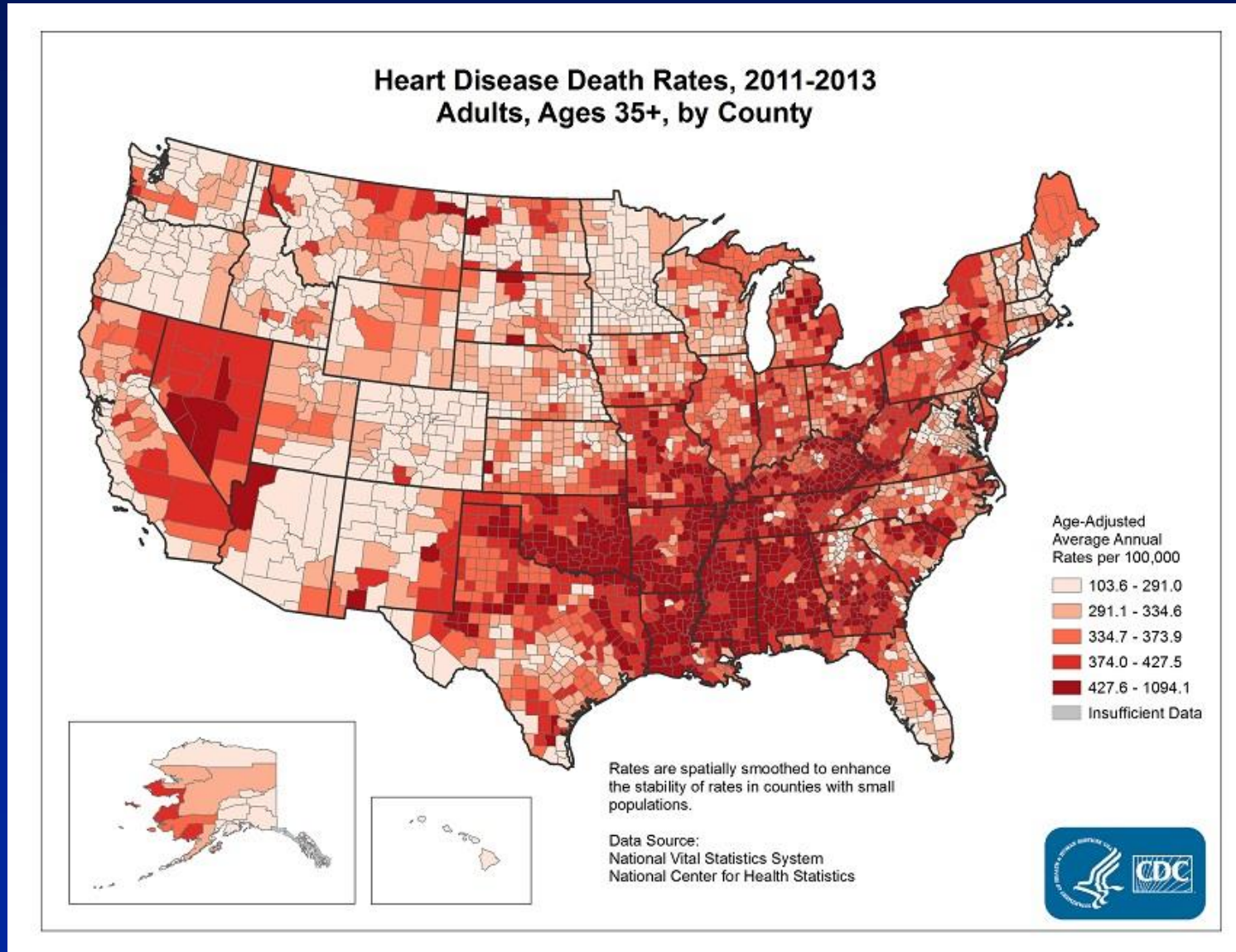
It costs the US ~ \$200 billion/yr

Includes the cost of health care services, medications and lost productivity

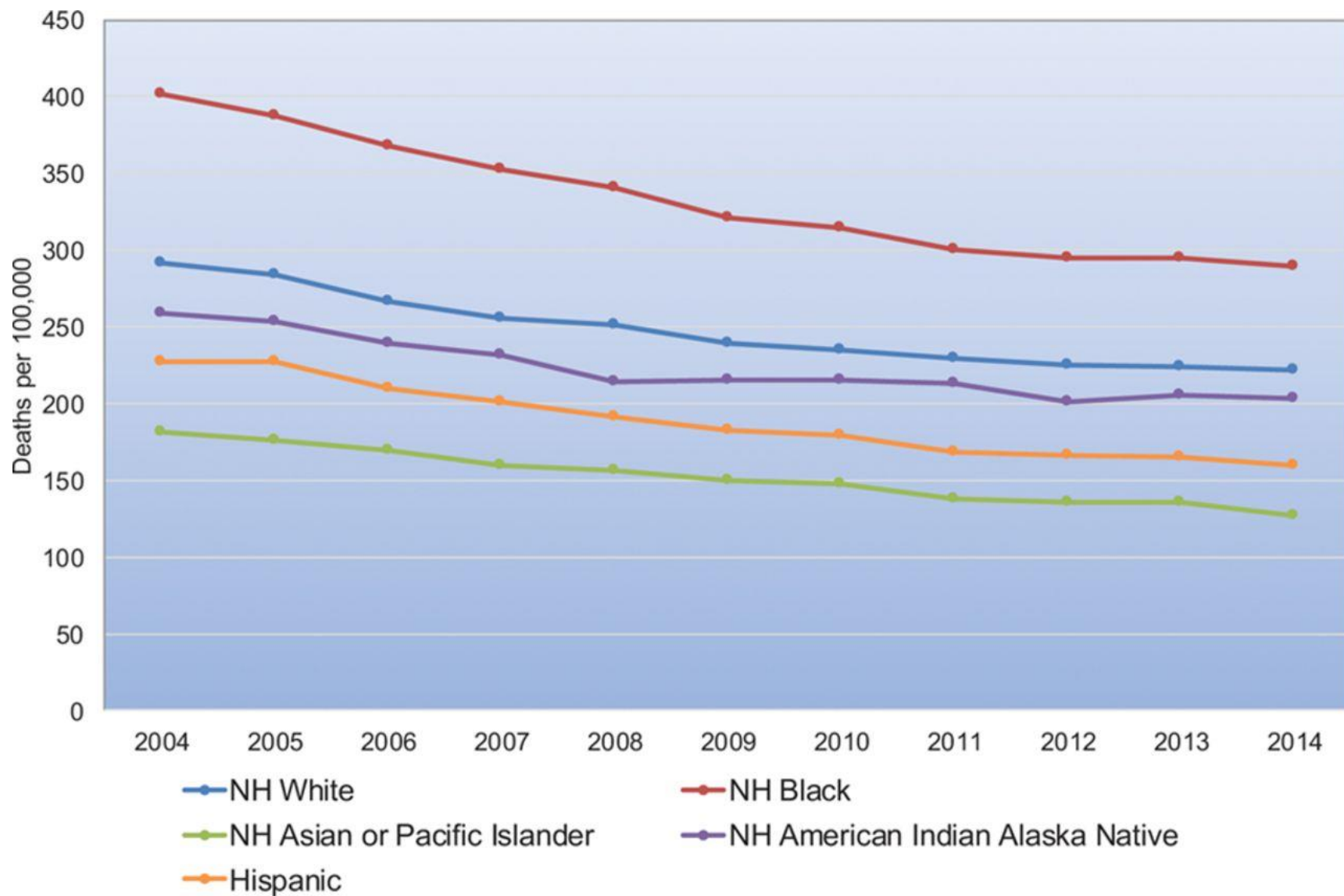
AHA Statistical Update

Heart Disease and Stroke Statistics—2017 Update: A Report From the AHA. *Circulation*. 2017;135:e146-e603

Heart Disease Mortality in the US by state

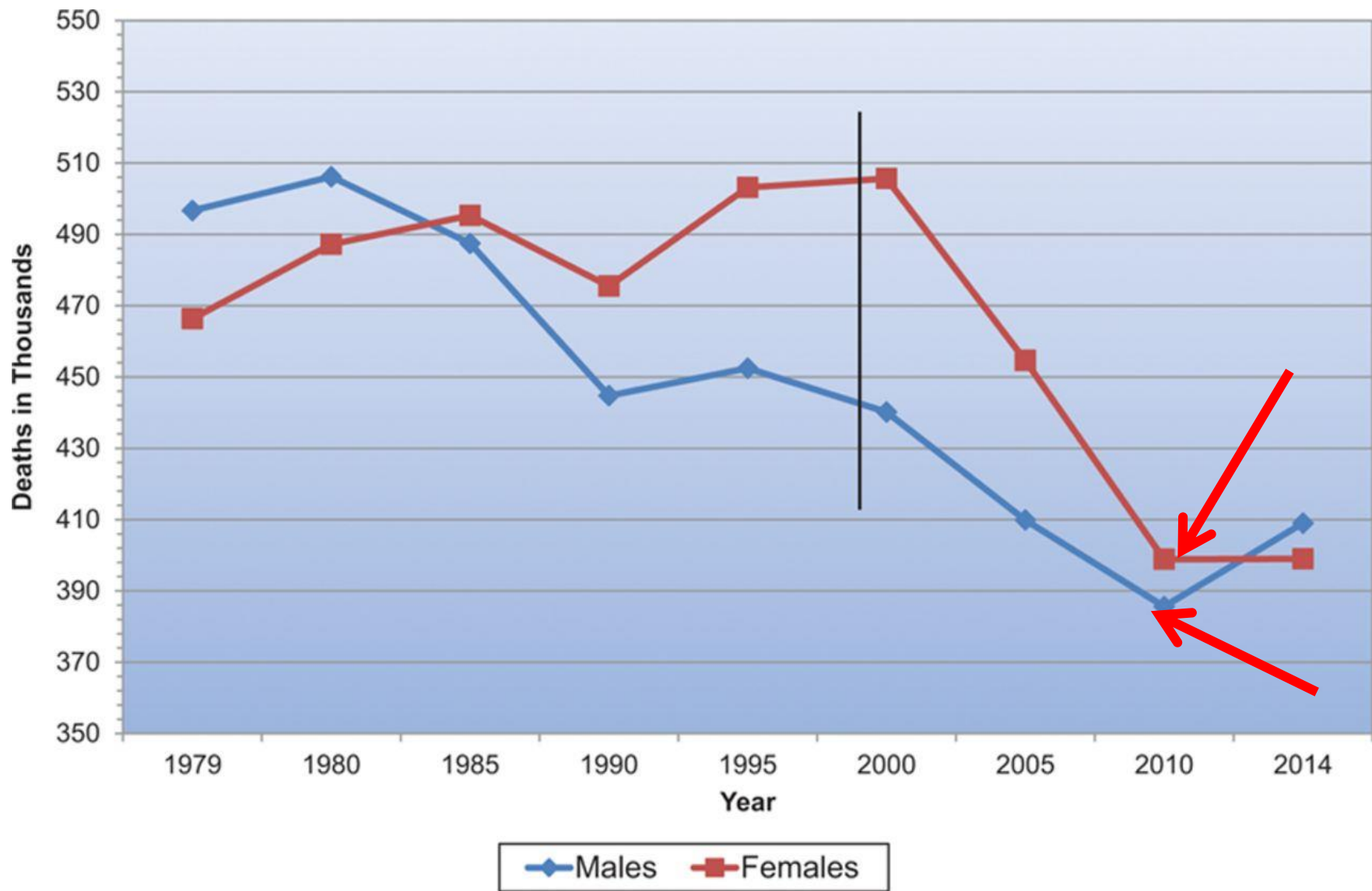


US age-standardized death rates* from cardiovascular disease by race/ethnicity, 2000 to 2014.



Emelia J. Benjamin et al. *Circulation*. 2017;135:e146-e603

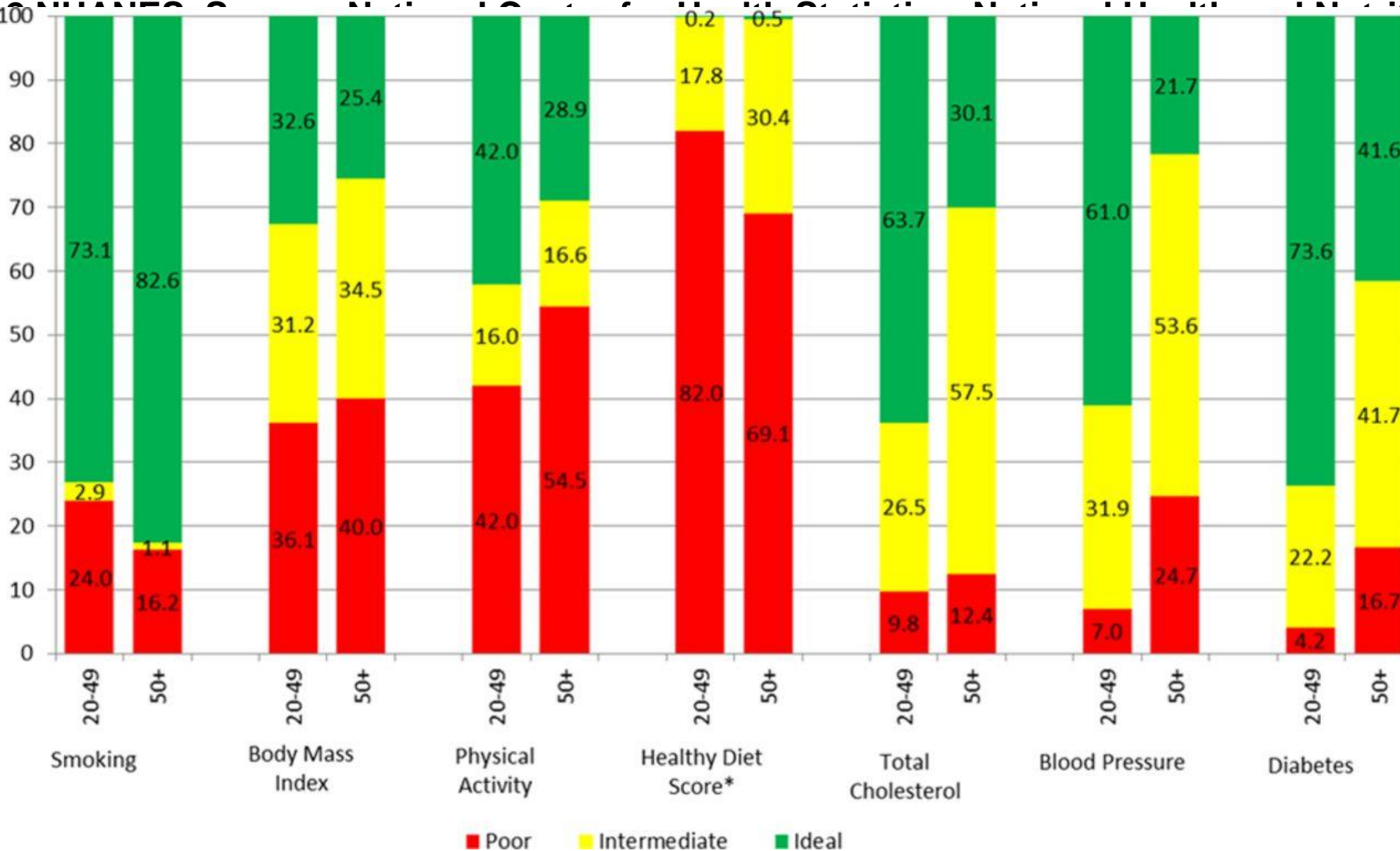
Cardiovascular disease (CVD) mortality trends for males and females (United States: 1979–2014).



Emelia J. Benjamin et al. *Circulation*. 2017;135:e146-e603



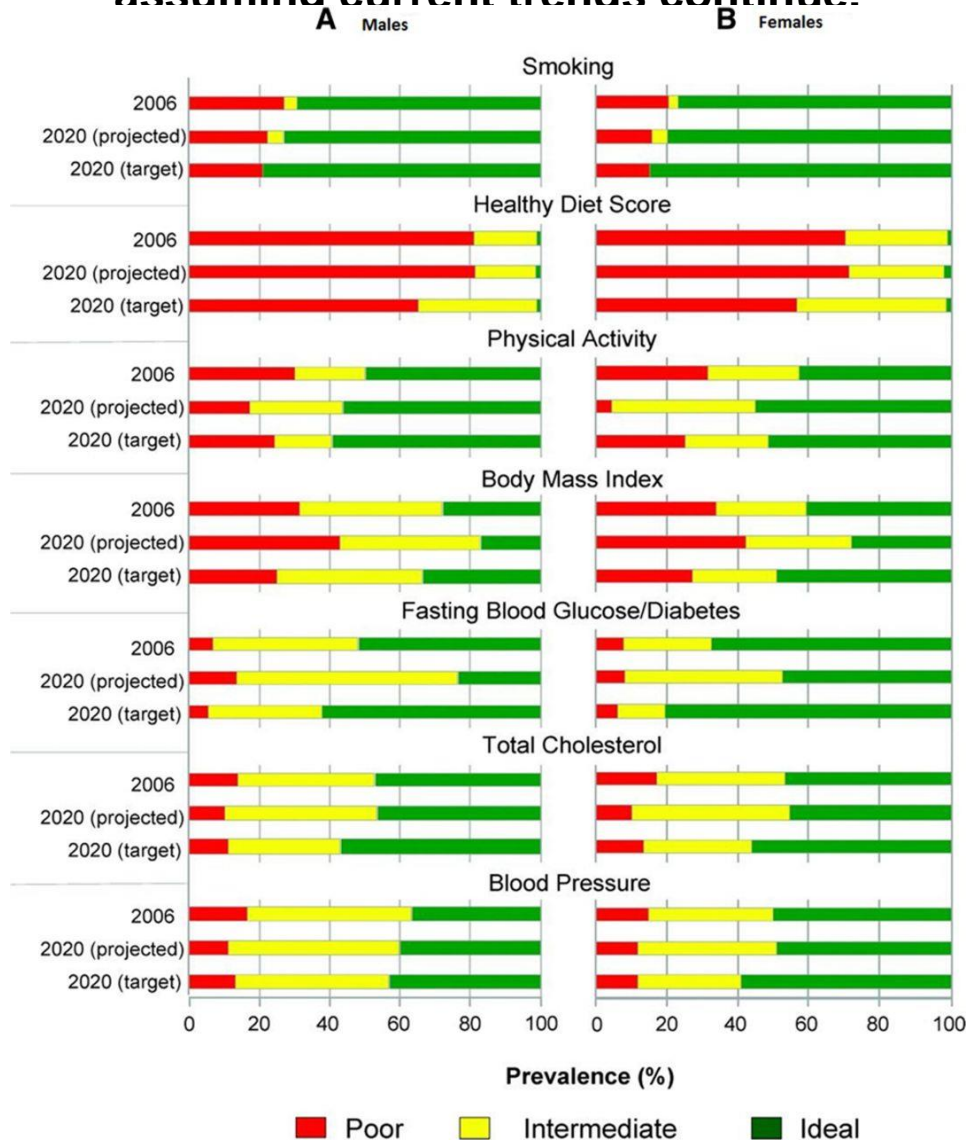
Prevalence (unadjusted) estimates of poor, intermediate, and ideal cardiovascular health for each of the 7 metrics of cardiovascular health in the American Heart Association 2020 goals, among US adults aged 20 to 49 and ≥50 years. *Healthy Diet Score reflects 2011 to 2016



Emelia J. Benjamin et al. *Circulation*. 2017;135:e146-e603



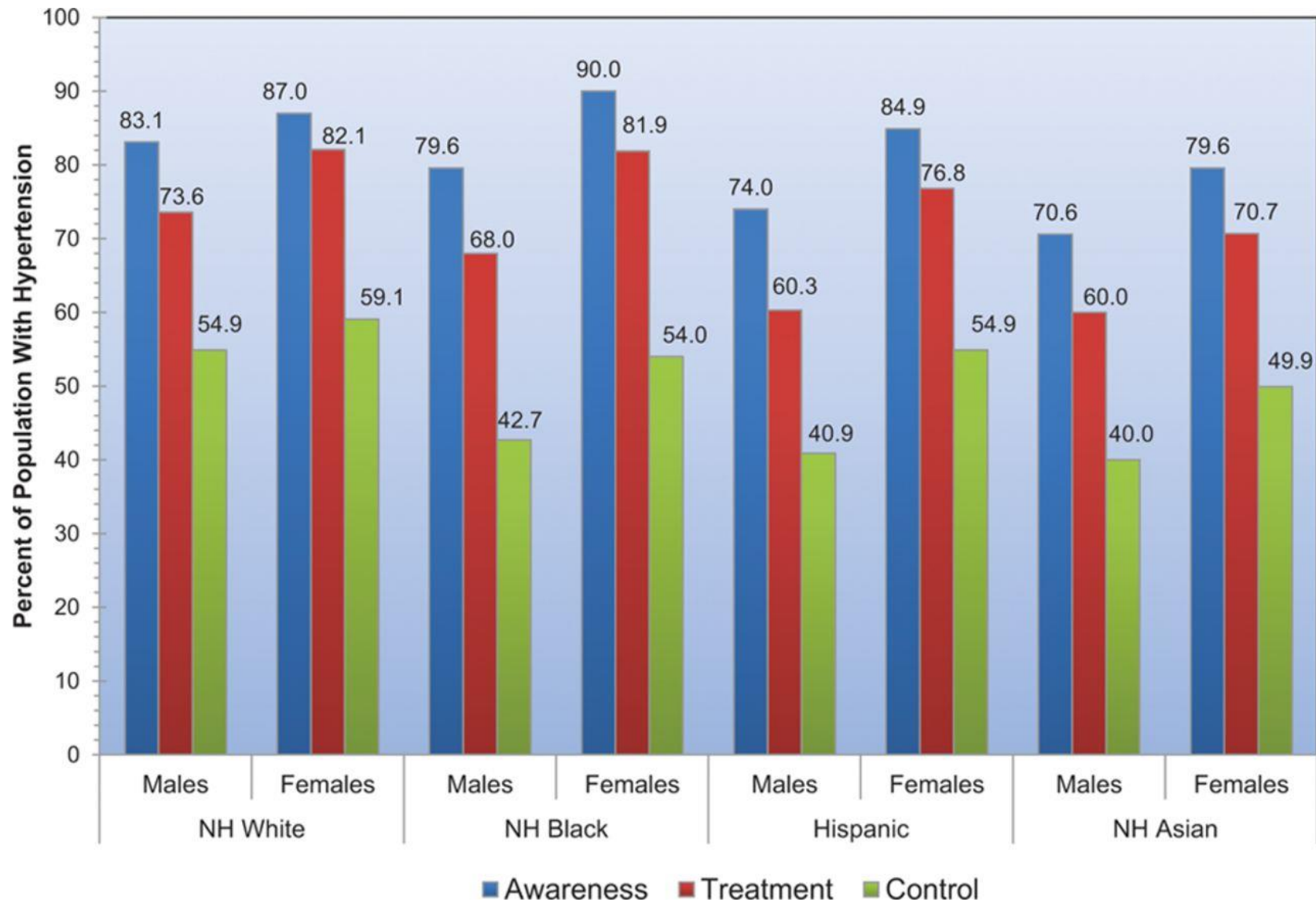
Prevalence of ideal, intermediate, and poor cardiovascular health metrics in 2006 (American Heart Association 2020 Impact Goals baseline year) and 2020 projections assuming current trends continue.



Emelia J. Benjamin et al. *Circulation*. 2017;135:e146-e603



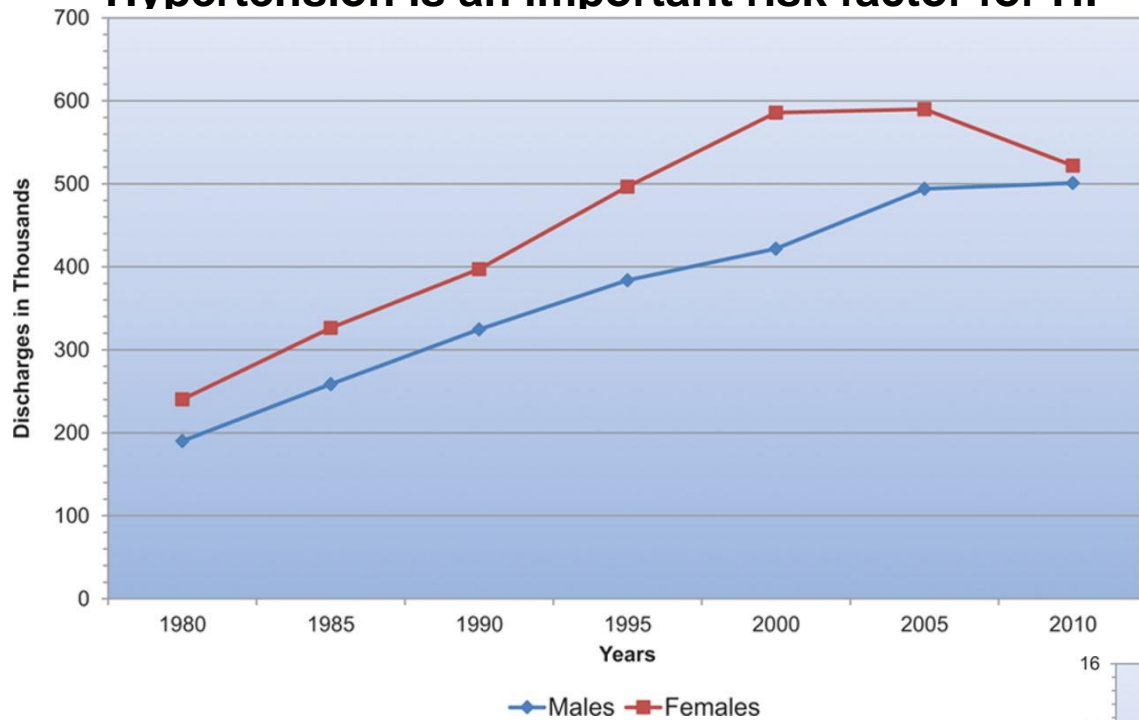
Extent of awareness, treatment, and control of high blood pressure by race/ethnicity and sex (NHANES 2011–2014).



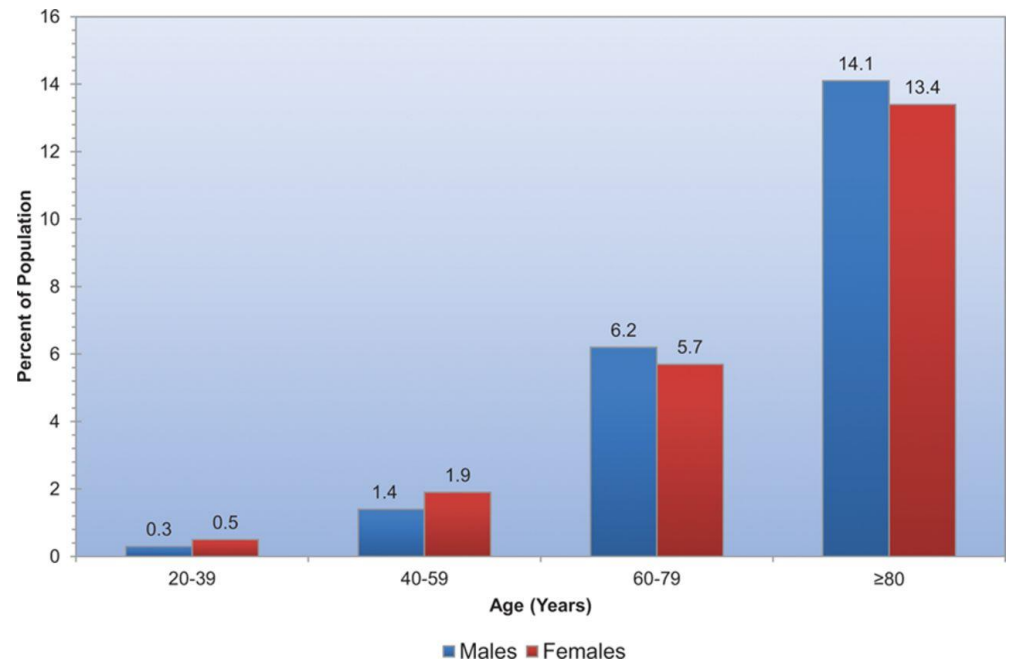
Emelia J. Benjamin et al. *Circulation*. 2017;135:e146-e603

Hospital discharges for heart failure by sex (United States: 1980–2010).

Hypertension is an important risk factor for HF



Prevalence of heart failure for adults ≥20 years by sex and age (NHANES: 2011–2014).



Emelia J. Benjamin et al. *Circulation*. 2017;135:e146-e603

The Facts:

- ❑ 2011 to 2014, ~ **6.5** million American adults ≥ 20 years of age had HF. An increase from an estimated **5.7** million 2009 to 2012
- ❑ 5 yr survival of HF after an MI improved in 2001 to 2010 versus 1990 to 2000, from **54% to 61%**.
- ❑ Of new HF hospitalizations, **53%** had HF with reduced ejection fraction and **47%** had preserved ejection fraction.
 - ❑ Black males - highest proportion of hospitalized HF with reduced ejection fraction (70%);
 - ❑ white females had the highest proportion of hospitalized HF with preserved ejection fraction (59%).
- ❑ Survival has improved between 1979 and 2000
- ❑ Mortality still high: **$\approx 50\%$** diagnosed with HF will die within **5 yrs**

Forecasting the Impact of Heart Failure in the United States

A Policy Statement From the American Heart Association

Paul A. Heidenreich, MD, MS, FAHA, Chair; Nancy M. Albert, PhD, RN, FAHA;
Larry A. Allen, MD, MHS; David A. Bluemke, MD, PhD, FAHA; Javed Butler, MD, MPH, FAHA;
Gregg C. Fonarow, MD, FAHA; John S. Ikonomidis, MD, PhD, FRCS(C), FAHA; Olga Khavjou, MA;
Marvin A. Konstam, MD; Thomas M. Maddox, MD, MSc; Graham Nichol, MD, MPH, FRCP(C), FAHA;
Michael Pham, MD, MPH; Ileana L. Piña, MD, MPH, FAHA; Justin G. Trogdon, PhD; on behalf
of the American Heart Association Advocacy Coordinating Committee, Council on Arteriosclerosis,
Thrombosis and Vascular Biology, Council on Cardiovascular Radiology and Intervention, Council on
Clinical Cardiology, Council on Epidemiology and Prevention, and Stroke Council

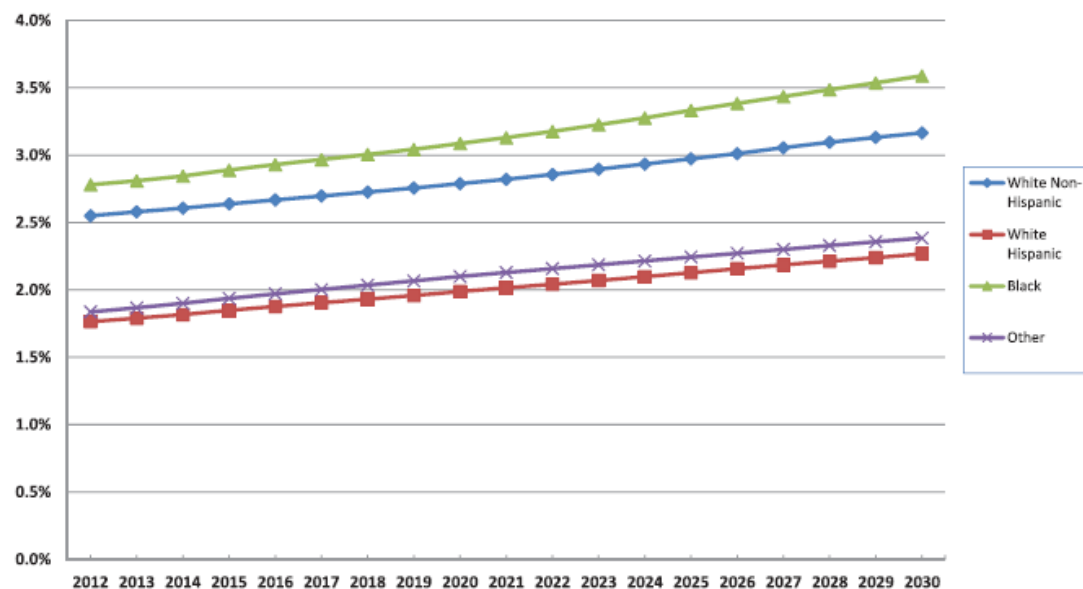
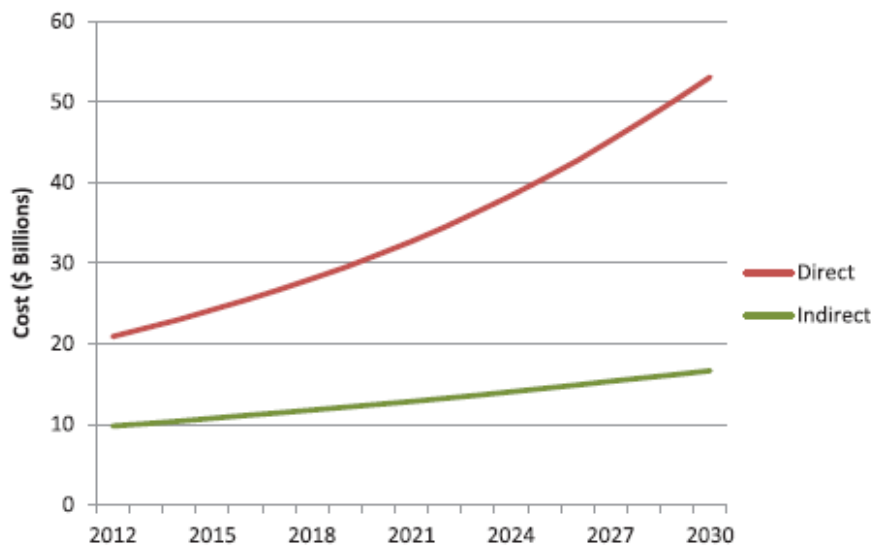


Figure 1. The projected increase in direct and indirect costs attributable to HF from 2012 to 2030 is displayed. Direct costs (cost of medical care) are expected to increase at a faster rate than indirect costs because of lost productivity and early mortality. HF indicates heart failure.

(Circ Heart Fail. 2013;6:00-00.)

- In 2012, total cost for HF was estimated to be **\$30.7 billion**.
- 68% was attributable to direct medical costs.¹⁵
- By 2030, the total cost of HF will increase **~127% to \$69.7 billion** from 2012. **\$244** for every US adult.¹⁵

THE LANDSCAPE OF HEART FAILURE



Complex

Hospitalizations are frequent

Costs are high

CMS rule penalties

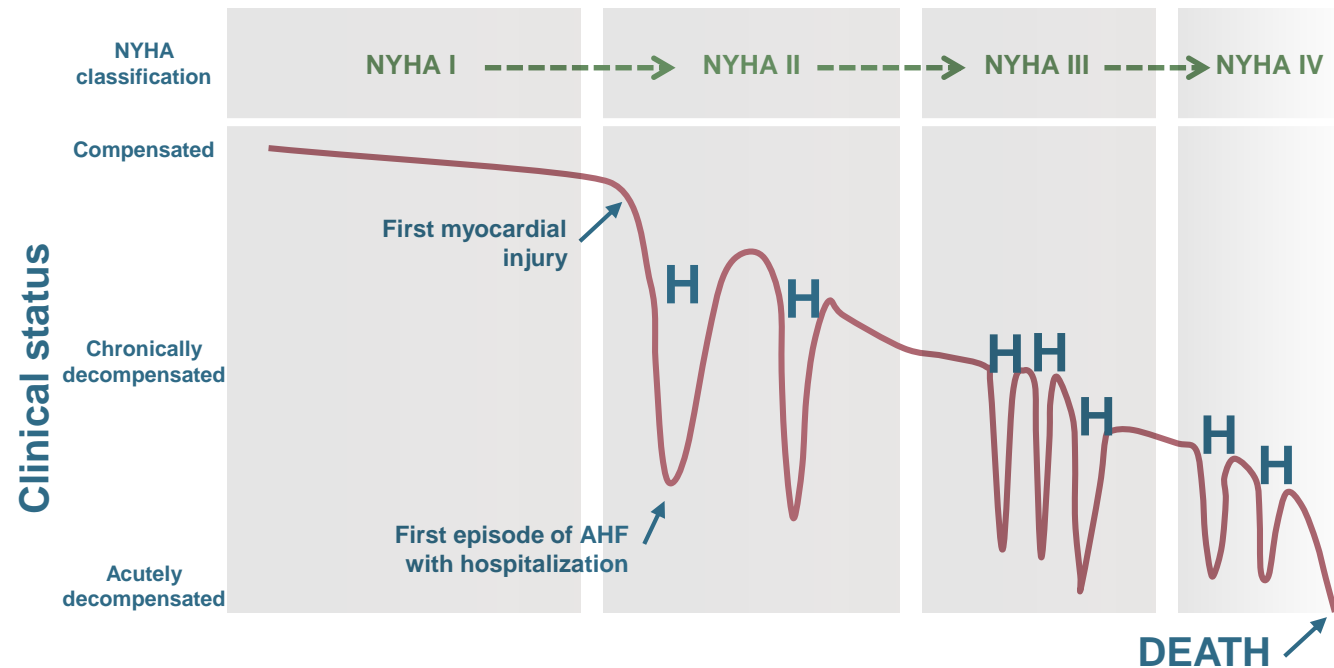
Patients are becoming more challenging

Team effort

AHF Recurs With Increasing Frequency and Contributes to Progression of Chronic HF

Relationship of AHF to chronic HF

Each AHF episode increases myocardial and other organ damage and rate of decline.



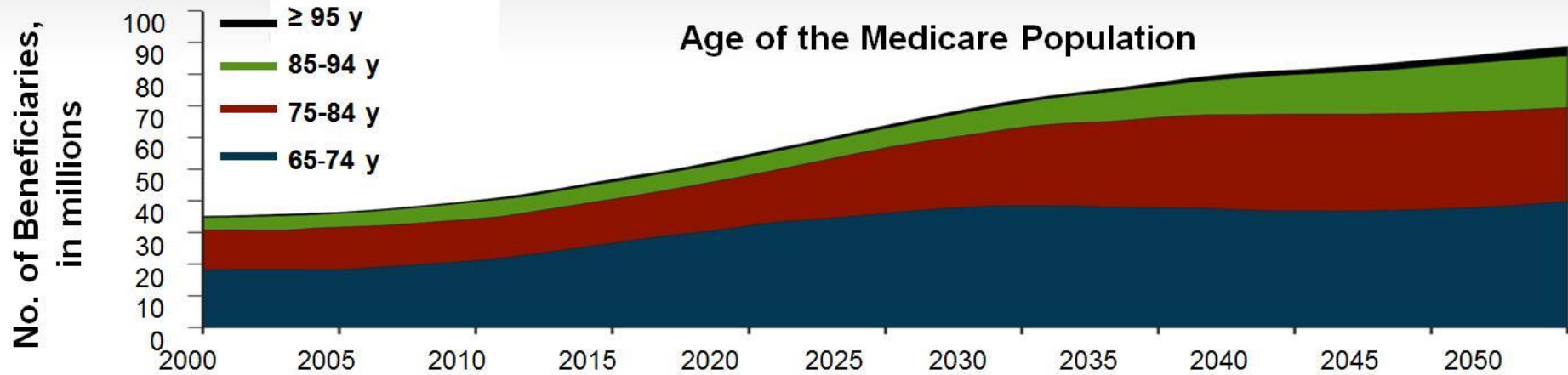
Risk of recurrence increases following initial AHF.²

Risk of ischemic heart disease and cardiovascular disease also increases.²

H, hospitalization; NYHA, New York Heart Association.

1. Gheorghide et al. *Am J Cardiol.* 2005;96(suppl):11G-17G. 2. Lee et al. *Am J Med.* 2009;122:162-169.

Medicare Spending

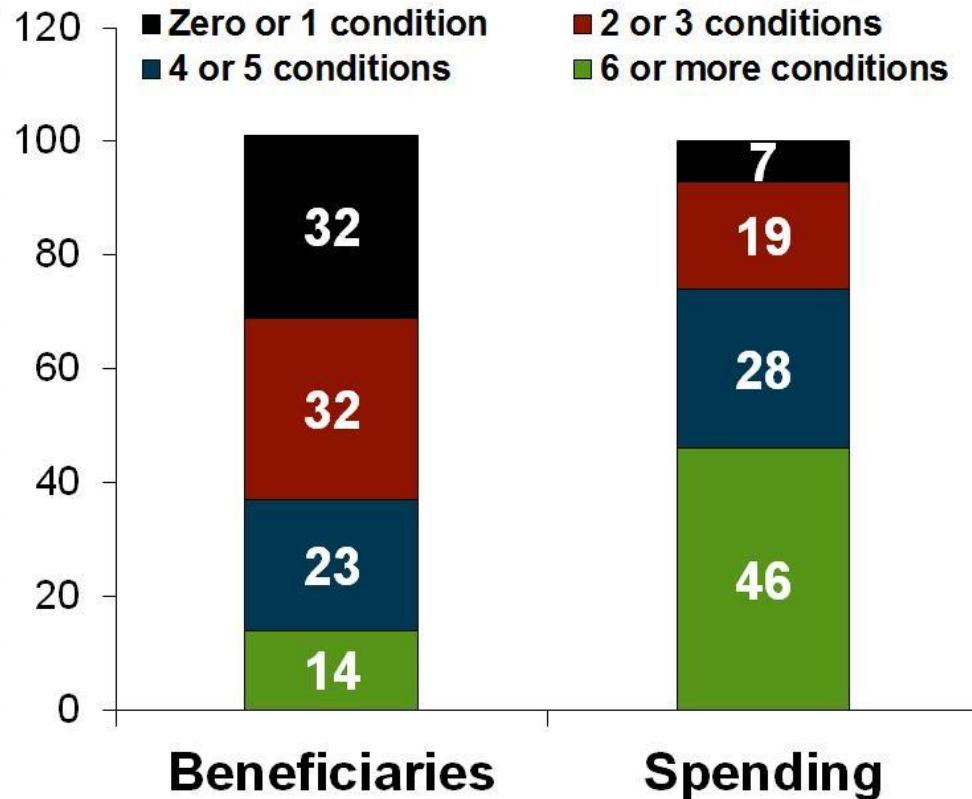


Medicare Spending, 2011

Dollars, in billions

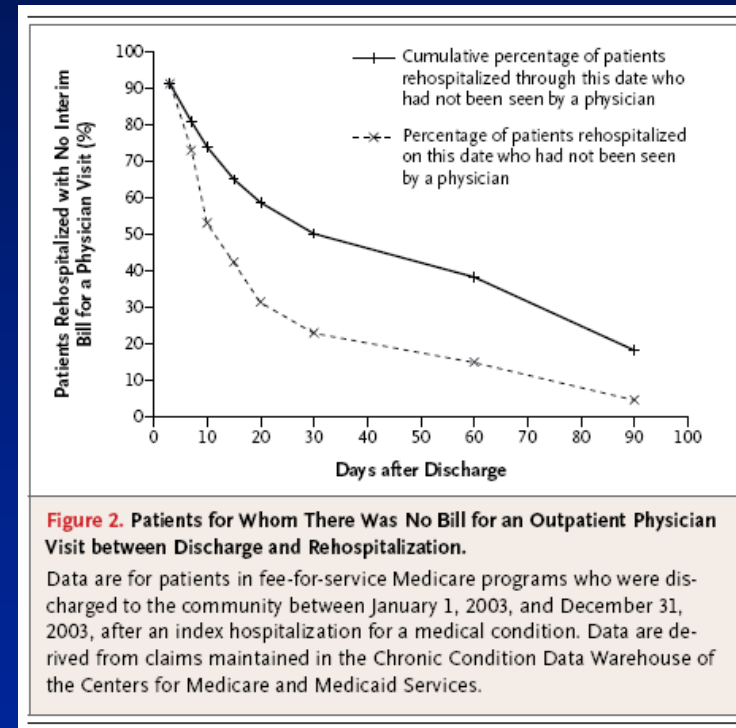
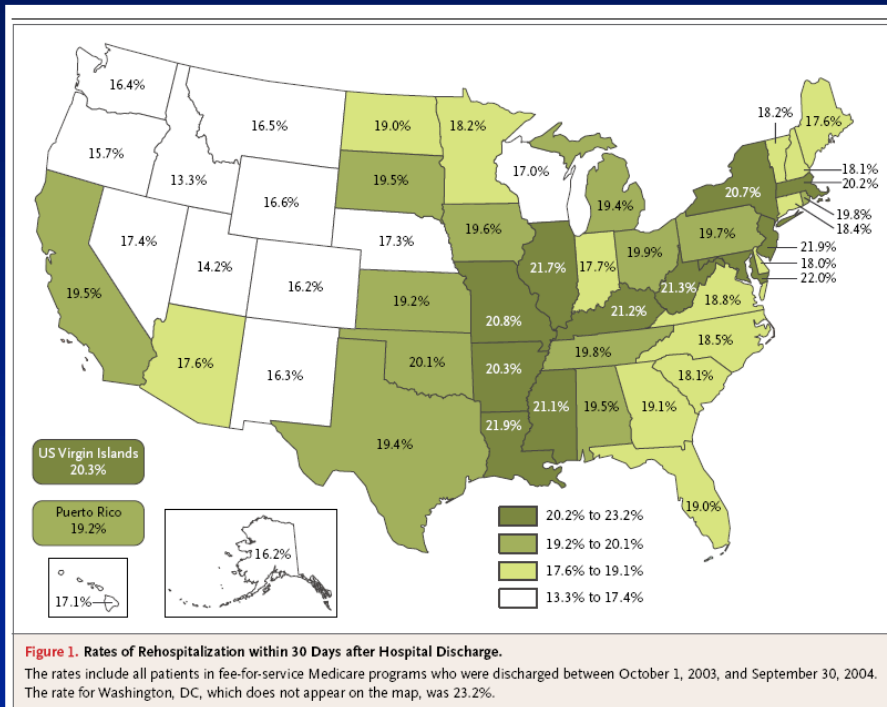
Total	549
Inpatient hospital	133
Medicare advantage	124
Physician fee schedule	68
Prescription drugs	67
Other part B services	48
Outpatient hospital	35
Skilled nursing facilities	33
Home health	20
Hospice	15
Administration	8

Note: Individual dollar amounts may not sum to total due to rounding

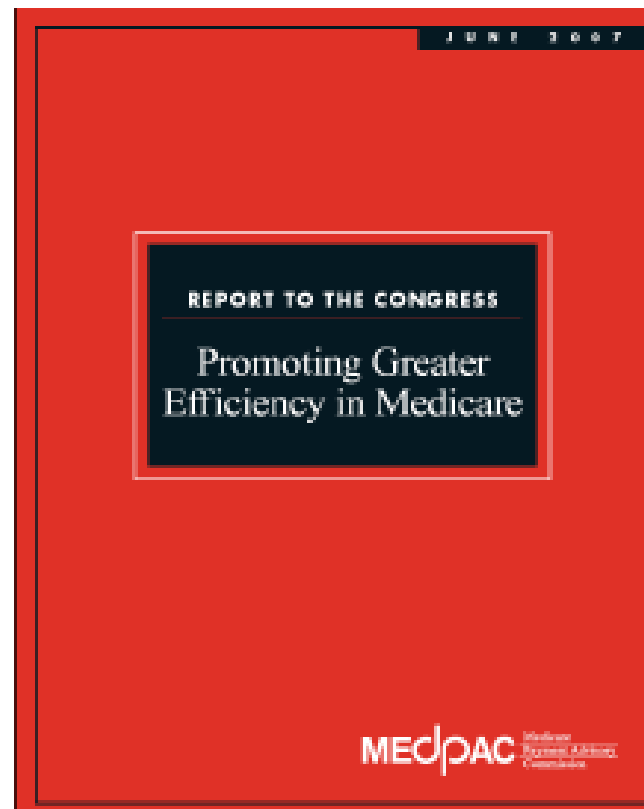


Heart Failure is the most common reason for 30 day rehospitalization

52% of heart failure patients are not seen in the first 30 days after a hospitalization



Readmission Labeled a National Priority by MedPAC



From: Medicare Payment Advisory Commission (MedPAC). 2007. *Report to Congress: Promoting Greater Efficiency in Medicare*. Available at: http://www.medpac.gov/documents/Jun07_EntireReport.pdf.

HF and AMI readmission highlighted.

**TABLE
5-3**

Hospital readmissions for seven conditions make up almost 30 percent of spending on readmissions

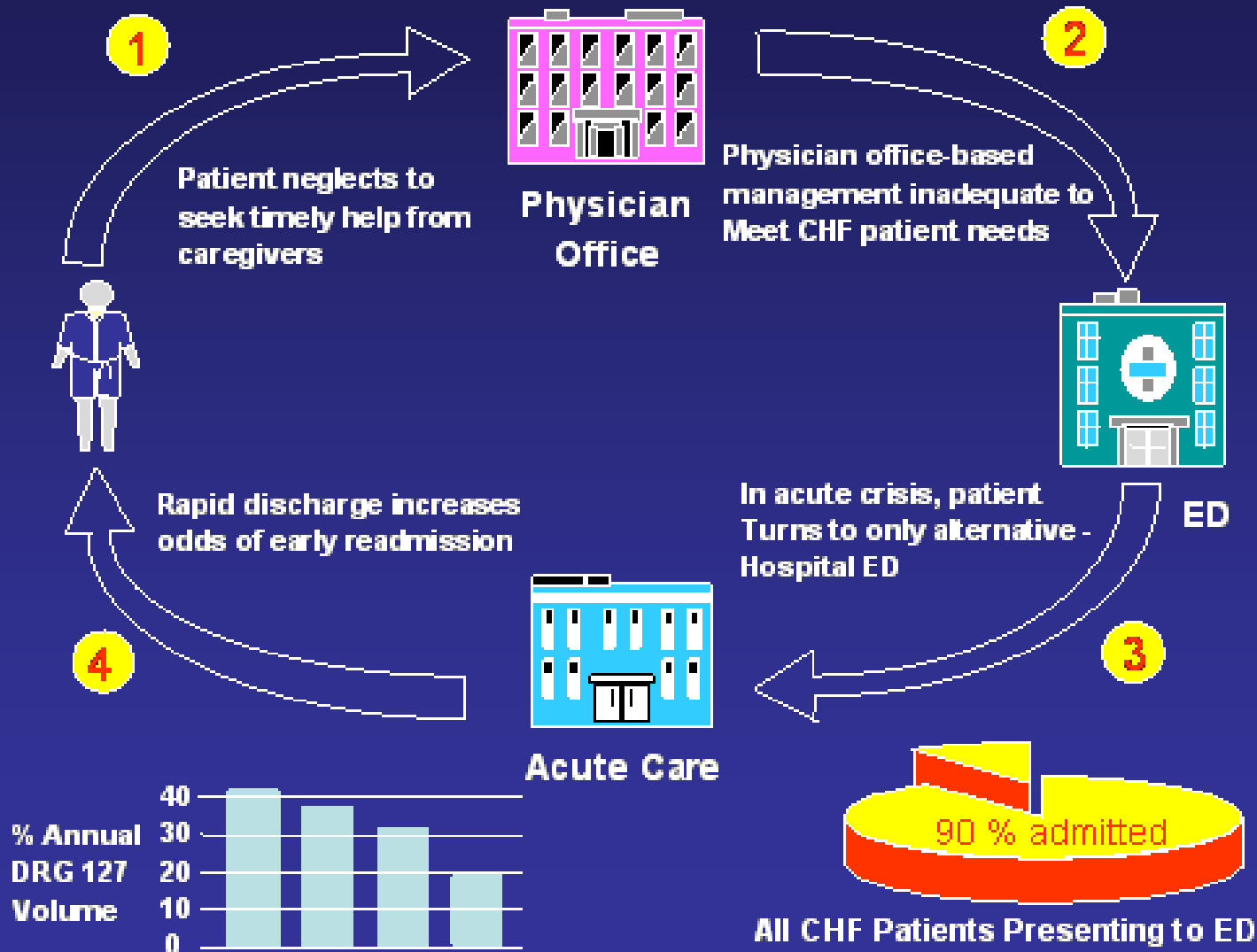
Condition	Type of hospital admission	Number of admissions with readmissions	Readmission rate	Average Medicare payment for readmission	Total spending on readmissions
Heart failure	Medical	90,273	12.5%	\$6,531	\$590,000,000
COPD	Medical	52,327	10.7	6,587	345,000,000
Pneumonia	Medical	74,419	9.5	7,165	533,000,000
AMI	Medical	20,866	13.4	6,535	136,000,000
CABG	Surgical	18,554	13.5	8,136	151,000,000
PTCA	Surgical	44,293	10.0	8,109	359,000,000
Other vascular	Surgical	18,029	11.7	10,091	182,000,000
Total for seven conditions		318,760			\$2,296,000,000
Total DRGs		1,134,483			\$7,980,000,000
Percent of total		28.1%			28.8%

Note: COPD (chronic obstructive pulmonary disease), AMI (acute myocardial infarction), CABG (coronary artery bypass graft), PTCA (percutaneous transluminal coronary angioplasty), DRG (diagnosis related group). Analysis is for readmissions within 15 days of discharge from the initial inpatient stay. Readmissions are identified using 3M's software that defines potentially preventable readmissions.

Source: 3M analysis of 2005 Medicare discharge claims data.

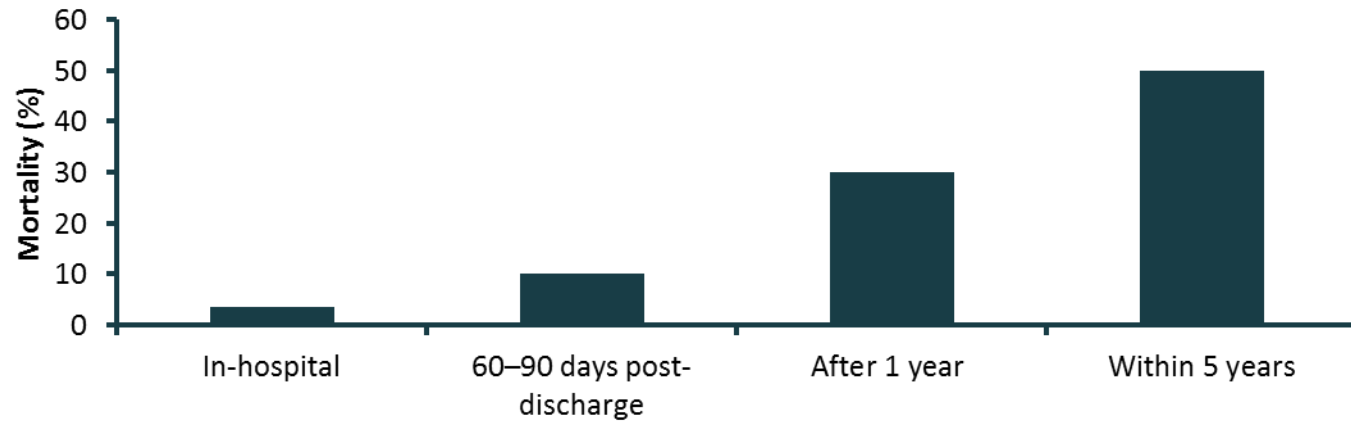
Vicious Cycle of Conventional Care

Conventional CHF Care



Risk of Death Is High Following Hospitalization for AHF

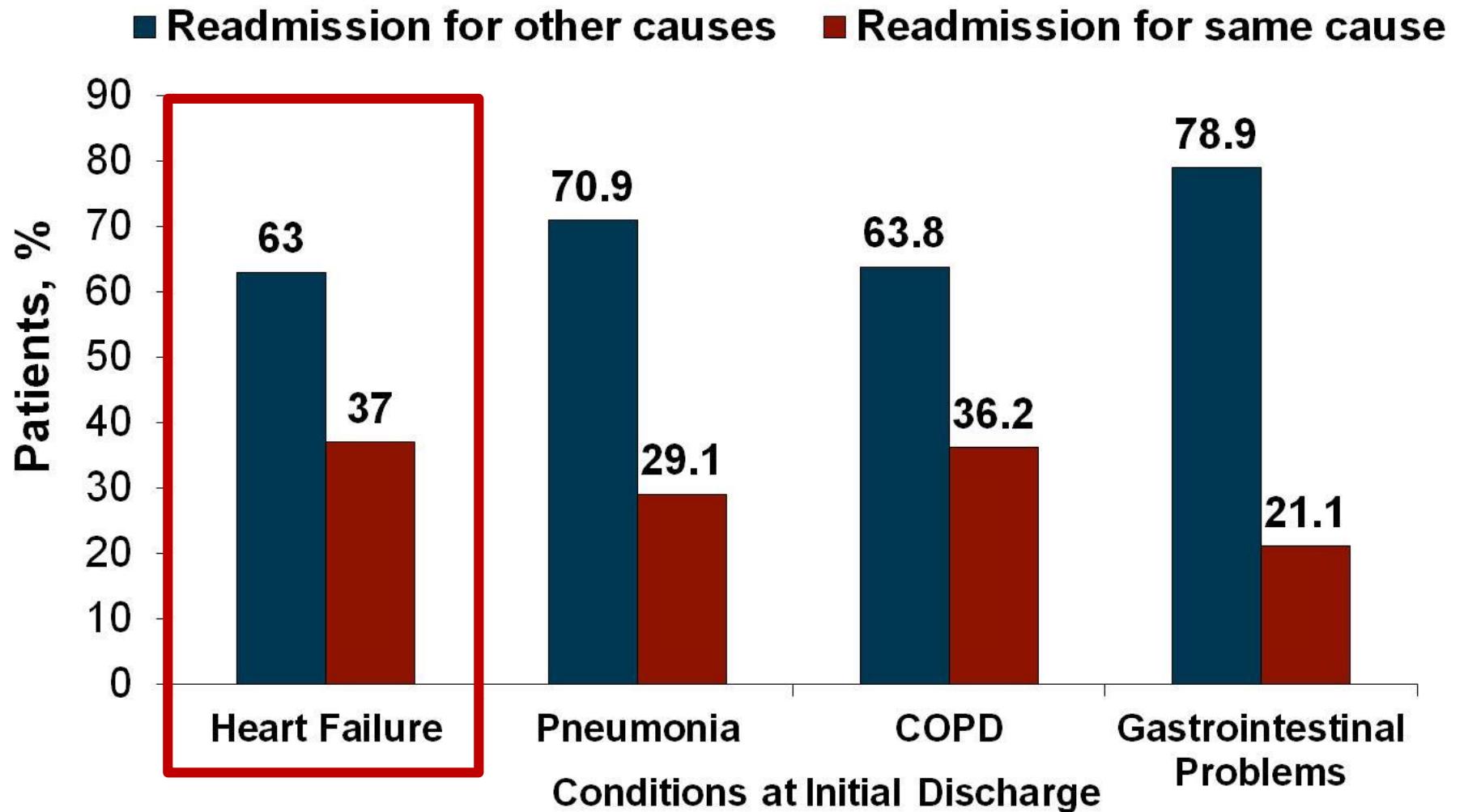
Mortality rates following hospitalization for AHF^{1,2}



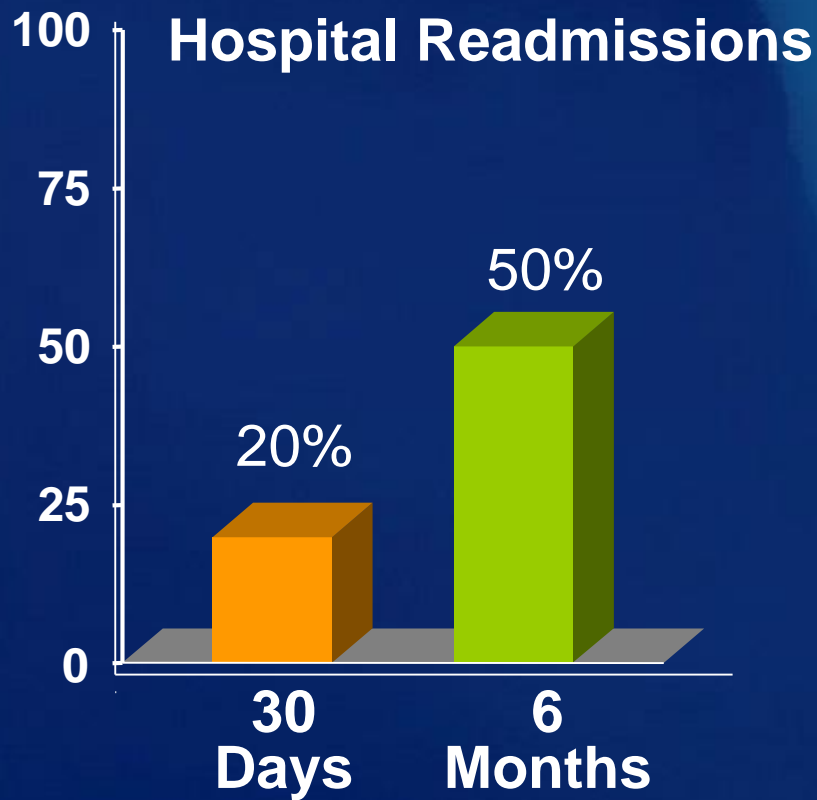
Risk of death increases progressively and independently with each HF event¹

Number of hospitalizations predicts mortality^{3,4}

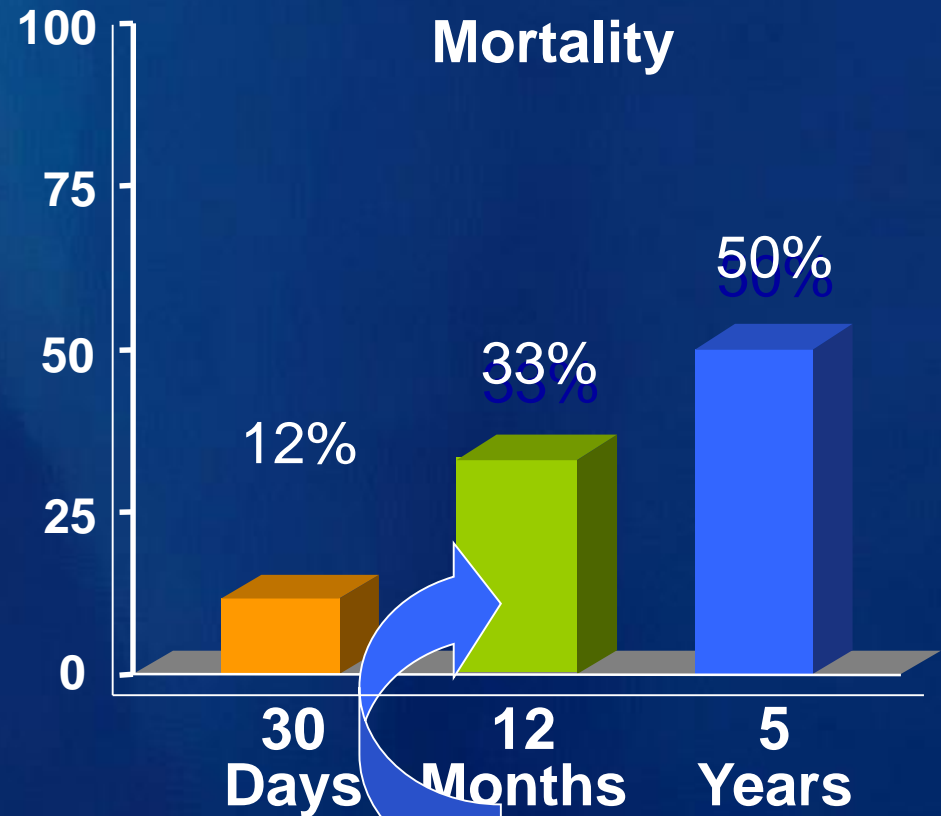
Proportions of Readmissions for Causes Other Than the Condition at Initial Discharge



Outcomes in Patients Hospitalized With HF



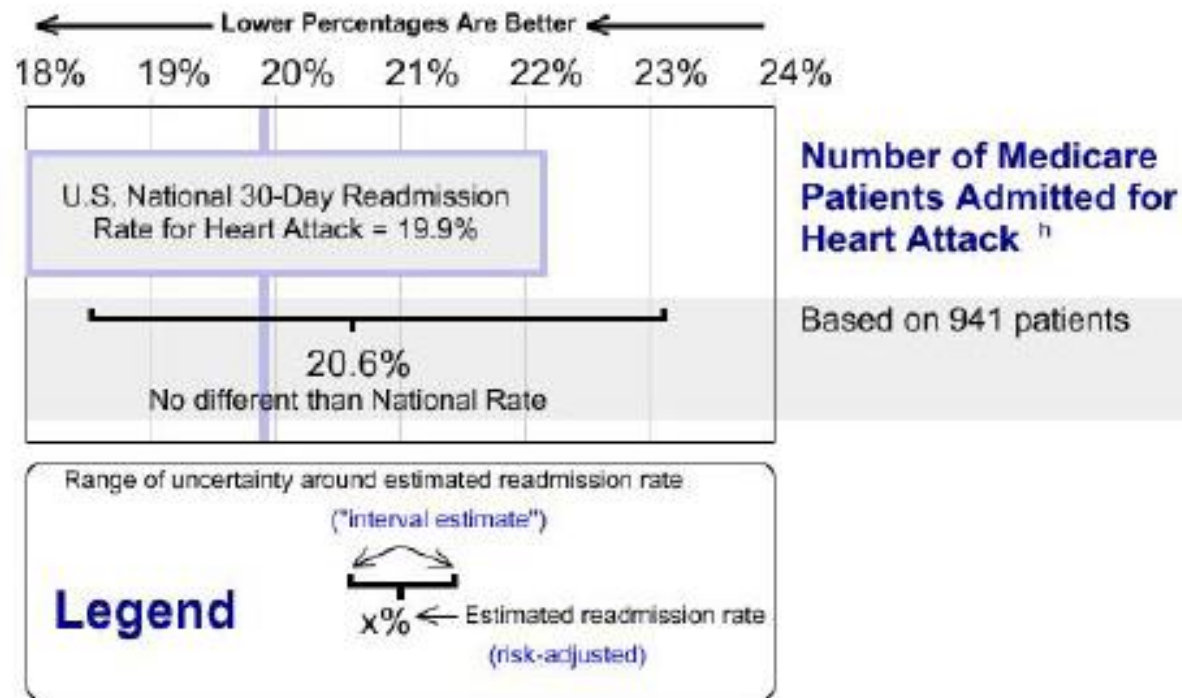
Mean LOS: 6.5 days



*Annual mortality rate-
NYHA class III HF-
12% [COPERNICUS DATA]
NYHA class II HF-
7% [SCD-HeFT DATA]*

Public Reporting AMI and HF RSRR.

Rate of Readmission for Heart Attack Patients



Hospital Compare. US Department of Health and Human Services, 2009.
<http://www.hospitalcompare.hhs.gov/Hospital/Search/compareHospitals.asp>

The Rule

- “Section 3025 of the Affordable Care Act added section 1886(q) to the Social Security Act establishing the Hospital Readmissions Reduction Program, which requires CMS to reduce payments to Inpatient Prospective Payment Systems (IPPS) hospitals with excess readmissions, effective for discharges beginning on October 1, 2012.”

Rehospitalizations in Heart Failure

- Nearly one in four patients hospitalized with HF is rehospitalized within 30 days of discharge

Opportunity to Improve

- 30-day rates of rehospitalizations in HF have risen over the past 2 decades and vary widely by hospital, even after adjusting for case mix and other factors

Opportunity to Improve

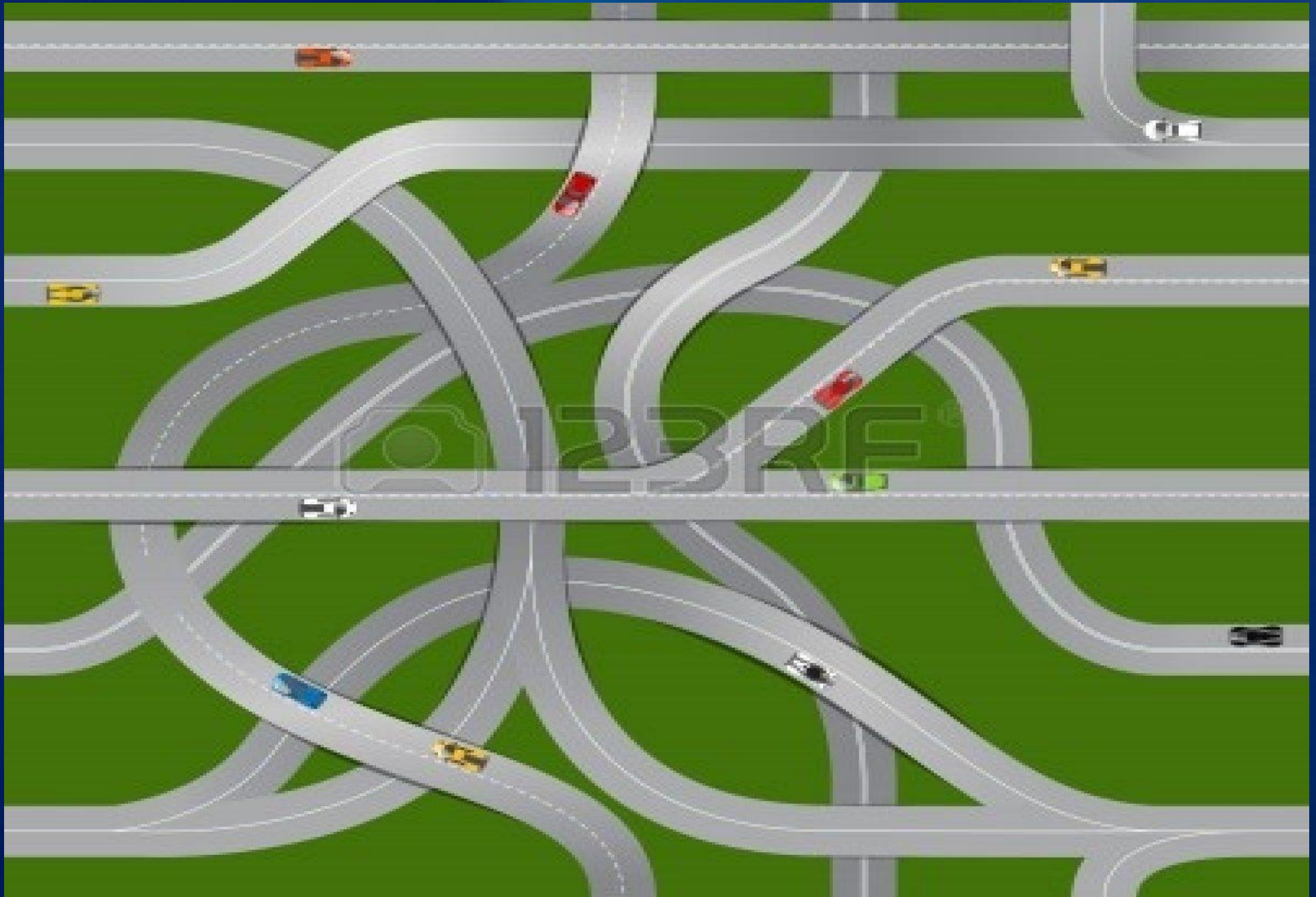
- Many HF hospitalizations are preventable, but effective strategies to prevent rehospitalizations are underutilized

Opportunity to Improve

Transitions of care beyond the front door: Wishful thinking!



Transitions of care beyond the front door: Reality

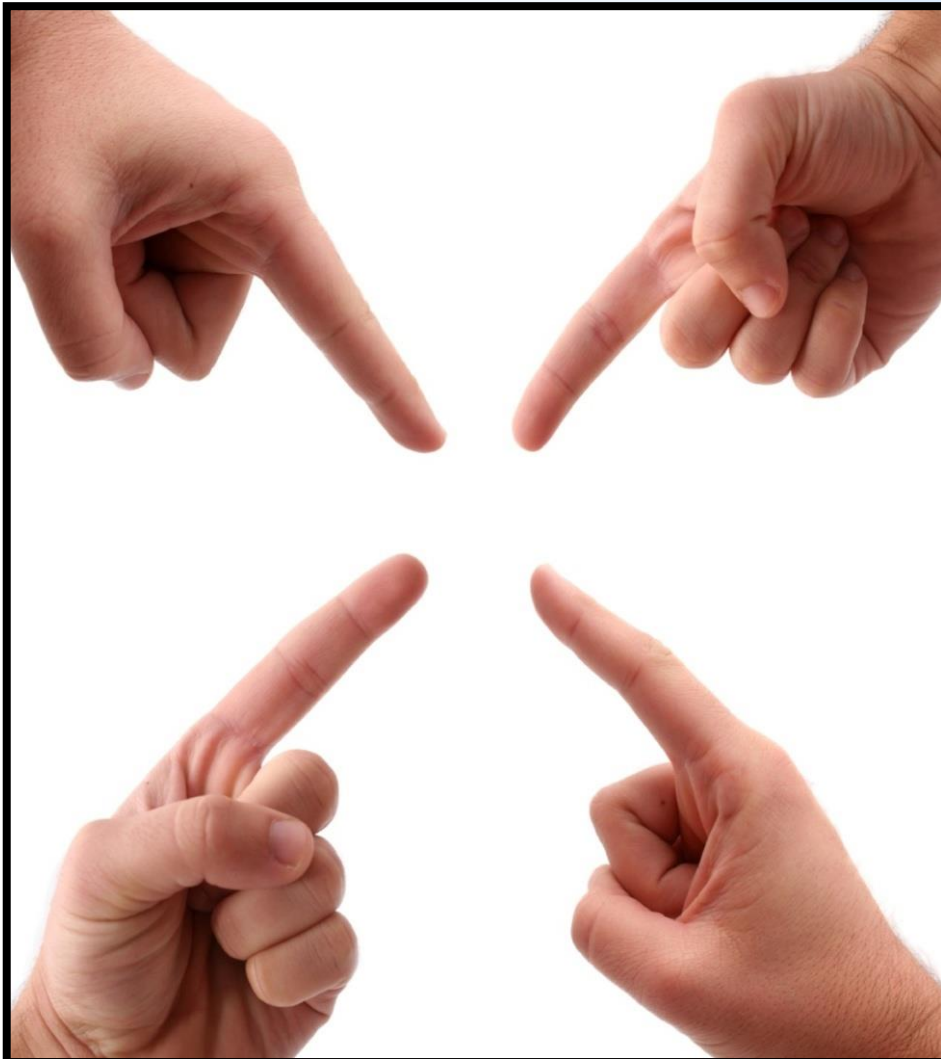




Hospital to Home



Excellence in Transitions



THE **BLAME** GAME



START
INSTRUCTIONS

CREDITS

Is this metric fair?

**Are there not patients who need to be in the
hospital?**

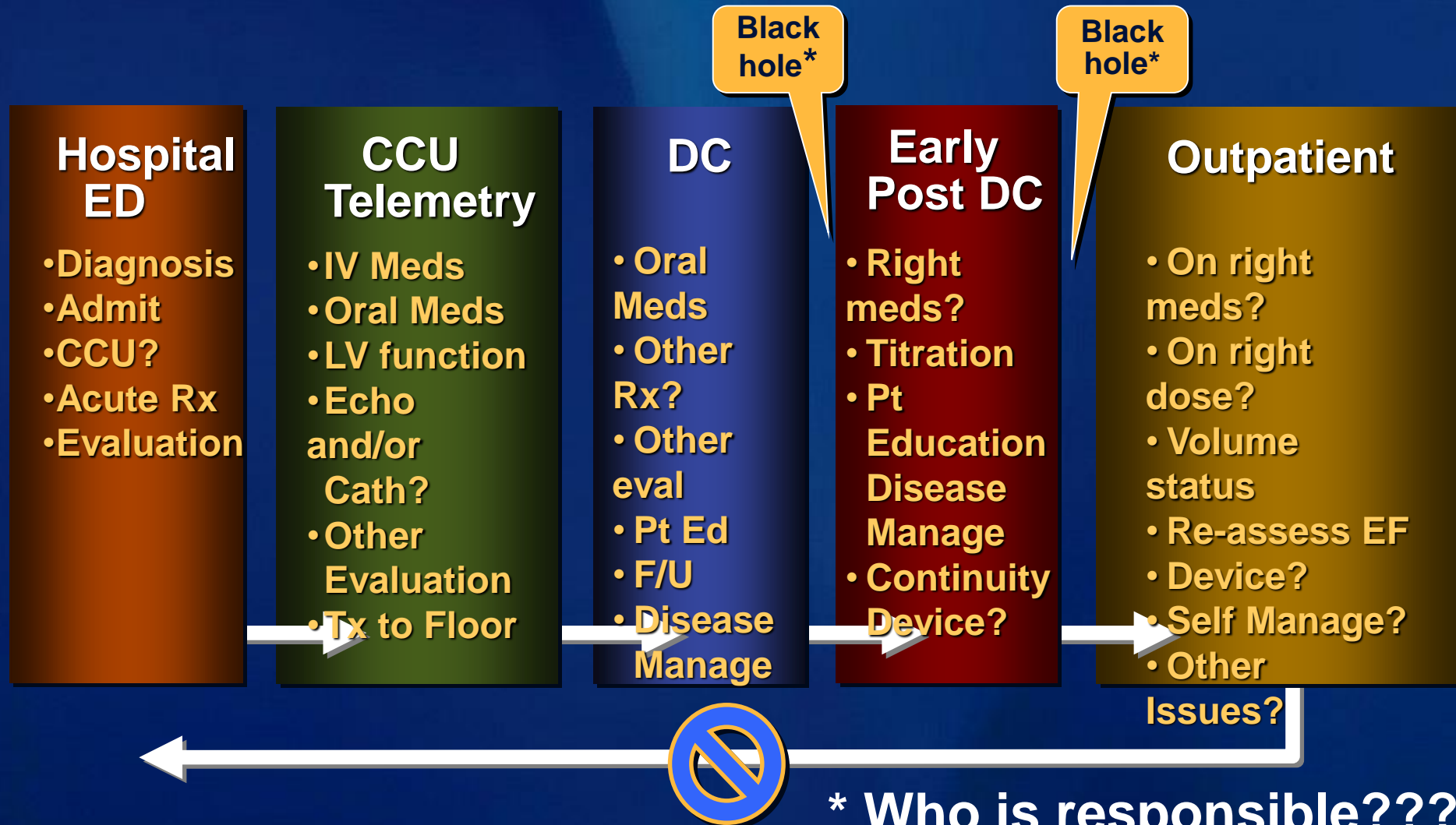
Penalties for CMS already in place.

News FLASH!!!!

It's the "handoff"

Continuity of HF Care

Reliable Care: Not Missing the Steps



How to best transition care?

- **Work closely with ED: Decongest the ED**
 - Observation status with care paths
- **Personal physician visits to home**
- **Visiting nurses trained in HF care**
- **Phone monitoring by a nurse/team**
- **Early/frequent visits to HF team**
- **Home monitoring (scale, phone systems, implanted devices, internet based reporting)**
- **Let the patient decide when to call**

Understanding health care as a system

How we improve what we make

What society needs

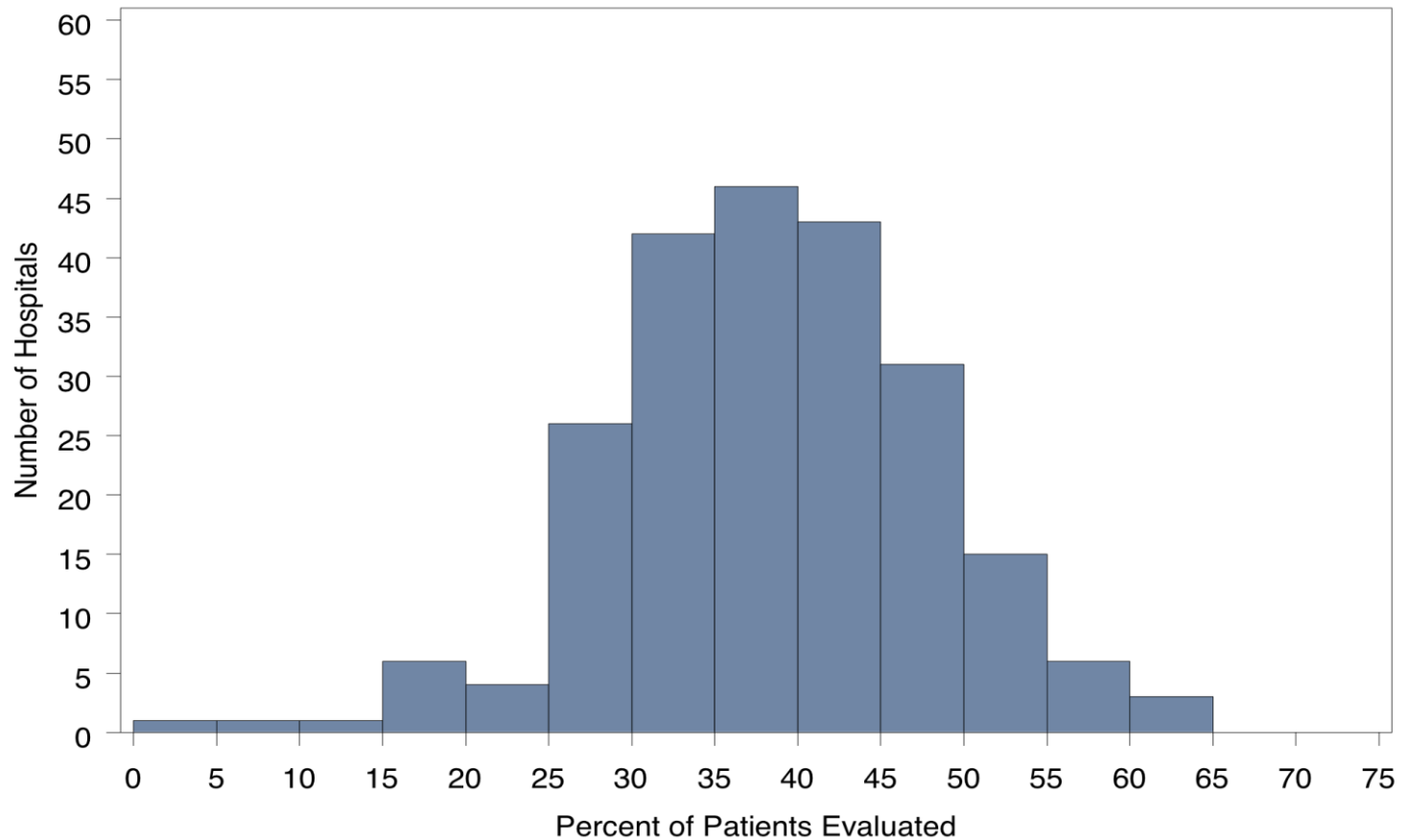
How we create, make health care



Hospital Variation in Early Follow-up After Heart Failure Hospitalization

**Median
Follow-up
Visit within
7 days =
37.5%**

225 Hospitals



Study Conclusions

- Rates of physician follow-up within 1 week of discharge were low and varied substantially across hospitals.
- Patients discharged from hospitals with more consistent early follow-up with 7 days have lower risk of 30-day readmission.
- Enhanced transition planning and ensuring that patients are evaluated within a week of discharge represents an achievable target for hospital quality improvement.



H2H Core Concepts

- ***Post-discharge medication management.*** Patients must not only have access to the proper medications, they need to be properly educated on how to use them.
- ***Early follow-up.*** Discharged patients should have a follow-up visit scheduled within a week of discharge, as well as the means of getting to that appointment.
- ***Symptom management.*** Patients must recognize the signs and symptoms that require medical attention, as well as the appropriate person to contact if those signs/symptoms appear.



*Helping Cardiovascular Professionals
Learn. Advance. Heal.*

ORIGINAL ARTICLE

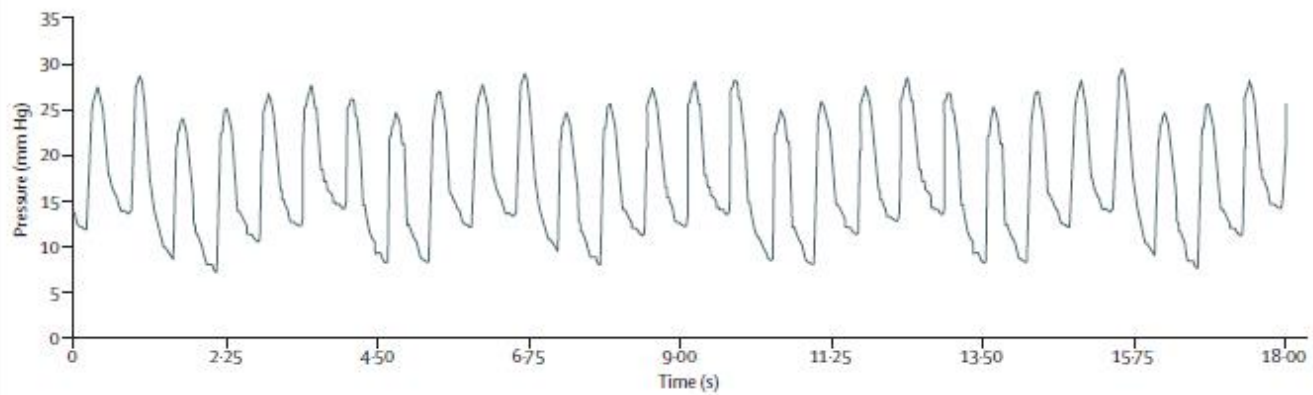
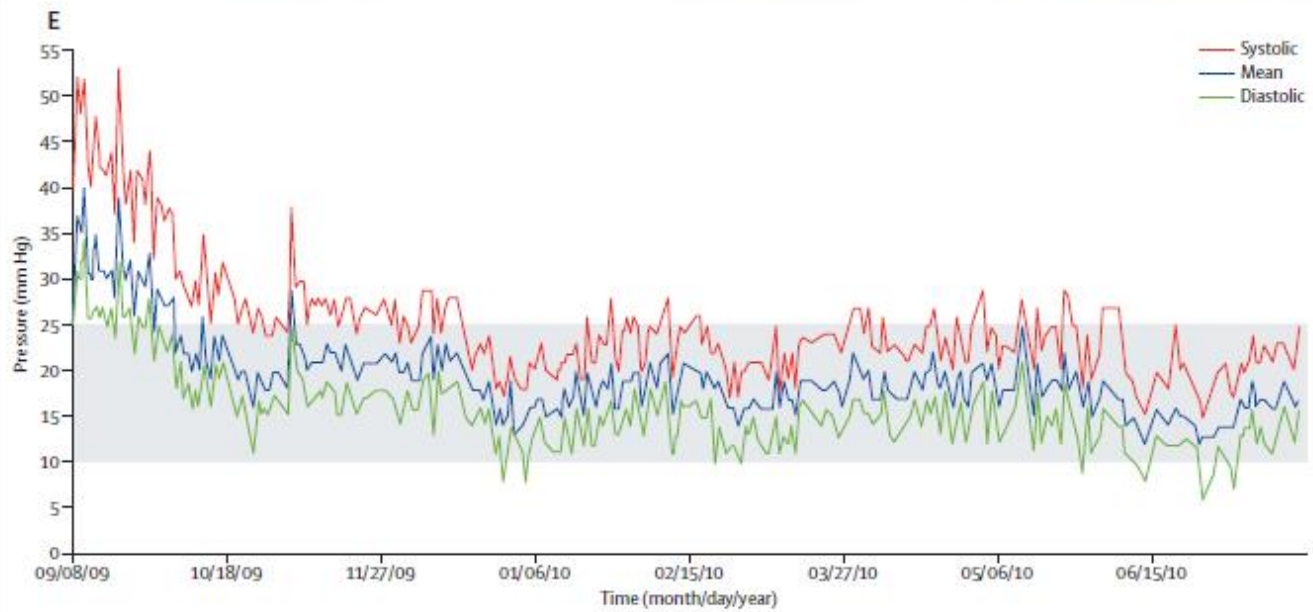
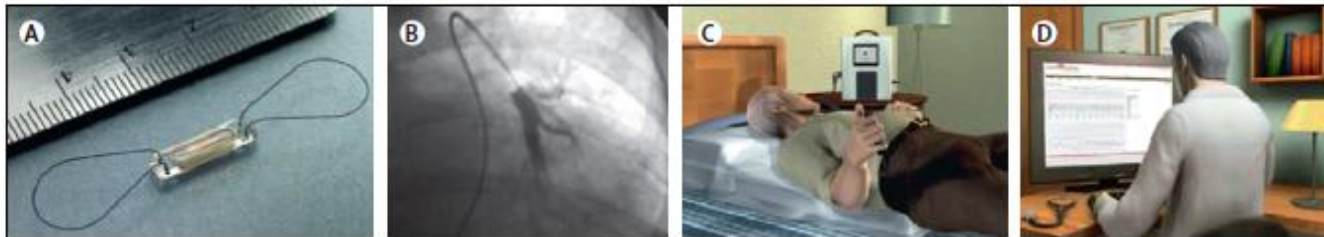
Telemonitoring in Patients with Heart Failure

Sarwat I. Chaudhry, M.D., Jennifer A. Mattera, M.P.H., Jephtha P. Curtis, M.D.,
John A. Spertus, M.D., M.P.H., Jeph Herrin, Ph.D., Zhenqiu Lin, Ph.D.,
Christopher O. Phillips, M.D., M.P.H., Beth V. Hodshon, M.P.H., J.D., R.N.,
Lawton S. Cooper, M.D., M.P.H., and Harlan M. Krumholz, M.D.

CONCLUSIONS

Among patients recently hospitalized for heart failure, telemonitoring did not improve outcomes. The results indicate the importance of a thorough, independent evaluation of disease-management strategies before their adoption. (Funded by the National Heart, Lung, and Blood Institute; ClinicalTrials.gov number, NCT00303212.) N Engl J Med 2010;363:2301-9.

Implantable monitors



Improved Adherence to ACC/AHA HF Guidelines Translates to Improved Clinical Outcomes in Real World HF Patients

- Each 10% improvement in ACC/AHA guideline-recommended composite care was associated with a 13% lower odds of 24-month mortality (adjusted OR 0.87; 95% CI, 0.84 to 0.90; $P < 0.0001$).

7-10 day visit: Why may it not work

- What processes occur?**
- Information obtained/acted upon**
- Changing course of therapy**
- Uptitration of evidence based care**
- Patient education---who delivers?**

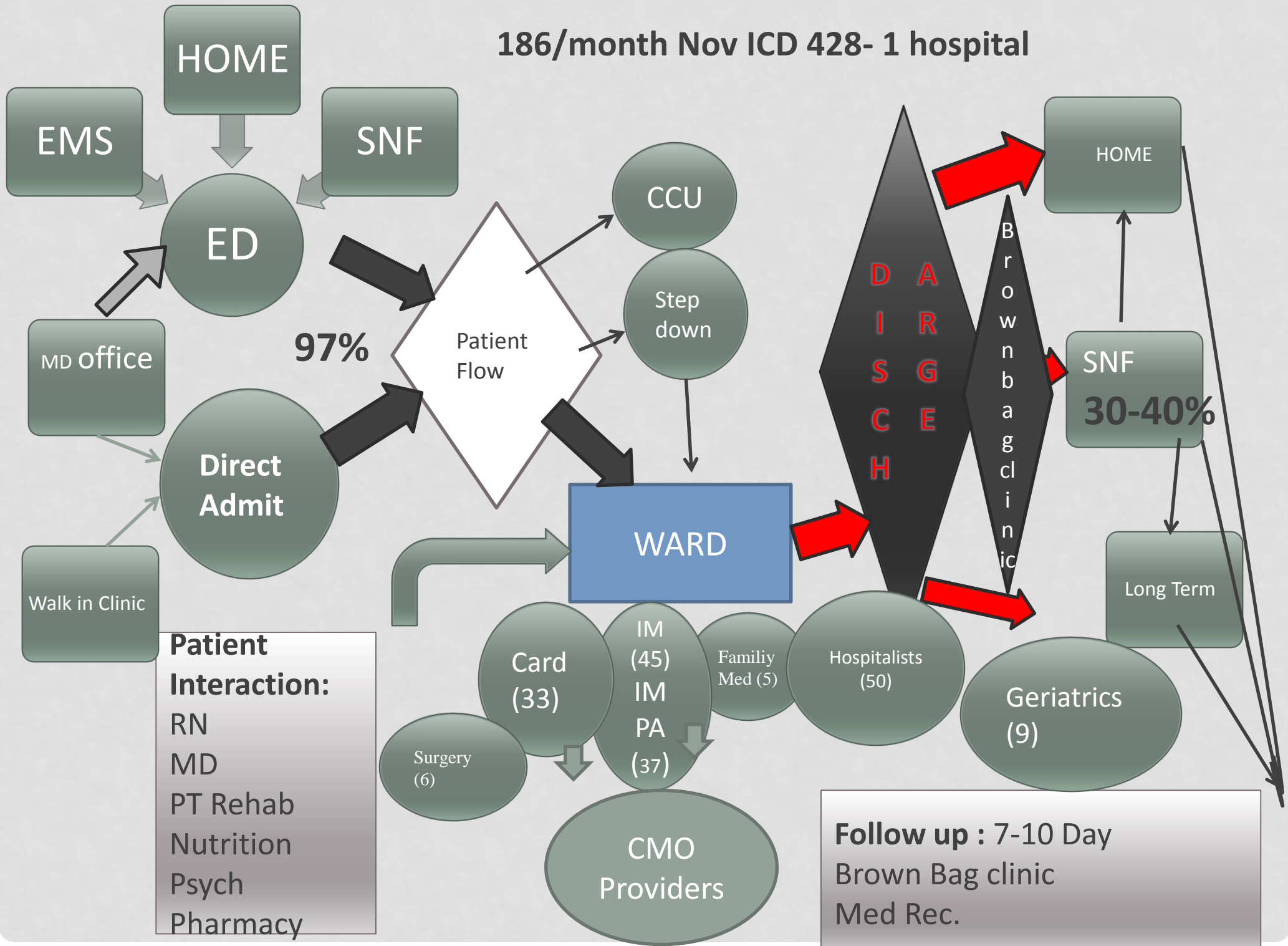
Shouldn't it work?

- **Is it a monitor or the system its deployed in?**
- **Who monitors the monitor?**
- **Who responds to monitoring signals and how?**
- **Do those that monitor and assess have authority to change therapy?**

Clinic Evaluation

	Total Population (n=122)	Post Hospital Discharge (n=73)	Systolic Dysfunction (n=67)
Age (mean \pm SD)	68 \pm 11 years	69 \pm 10 years	65 \pm 11 years
EF \leq 40%	55%	50%	100%
Oral/Injectable/Inhaled Medications mean (range)	15 (4-27)	14 (4-26)	13 (6-24)
Medication Discrepancies	52% (n=64)	52% (n=38)	51% (n=34)
Number of Discrepancies mean (range)	3 (1-12)	3 (1-12)	3 (1-12)
Medication Optimization	71% (n=87)	71% (n=52)	75% (n=50)
Number of Medications Optimized median (range)	2 (1-5)	2 (1-5)	2 (1-4)
Days between discharge and clinic visit (mean \pm SD)	n/a	10 \pm 6 days	n/a
30-day all cause readmission rate % (mean number of days)	n/a	8% (16 days)	n/a
Mortality within 30 days	1.6% (n=2)	2.7% (n=2)	1.4% (n=1)

186/month Nov ICD 428- 1 hospital



Typical List of Meds: BB Clinic



Date 5/18/15

✓ **HFBIC/MAP @ 1:00 PM** 40+ F

DOB 10/10/49; Phone (718) 589-3024
 CMT 118794475 → HF Homecare?

Resp: 2/1-2/1/15 → HF exacerbation
 P.T. Sybil Suckow, MD
 Cardiol. Dr. Richard Nester
 Also in medical.

****HF Medication**
 KPA reduced VAD 2001 FMD Hsp Water 4/1/15

****ALL MEDS**
 CAD, HTN, DM, HLD, SOB, Anemia, CAD (2002), Acromioclavicular joint, asthma, HF, Fall Risk, Depression.

Med	Dose	Freq	W
1. Lasix 50mg BID	50mg	BID	1
2. Lasix 50mg QD	50mg	QD	1
3. Furosemide 40mg QHS	40mg	QHS	1
4. Metoprolol 50mg QHS	50mg	QHS	1
5. Lasix 50mg QHS	50mg	QHS	1
6. Metoprolol 50mg BID	50mg	BID	1
7. Lisinopril 20mg QHS	20mg	QHS	1
8. Lisinopril 20mg QHS	20mg	QHS	1
9. Lisinopril 20mg QHS	20mg	QHS	1
10. Lisinopril 20mg QHS	20mg	QHS	1
11. Lisinopril 20mg QHS	20mg	QHS	1
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41. Lisinopril 20mg QHS	20mg	QHS	1
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46. Lisinopril 20mg QHS	20mg	QHS	1
47. Lisinopril 20mg QHS	20mg	QHS	1
48. Lisinopril 20mg QHS	20mg	QHS	1
49. Lisinopril 20mg QHS	20mg	QHS	1
50. Lisinopril 20mg QHS	20mg	QHS	1

Notes:
 Nitroglycerin 0.4mg/pcn
 Atipulav: (sisis) ① → Te?

First Aid Pharmacy
(718) 893-5700

- ① Δ Toprol 100mg QD
- ② Hydralazine 10mg TID
- ③ Torsemide 40mg BID (D/c Furosemide)
- ④ Lasix



Work Flow

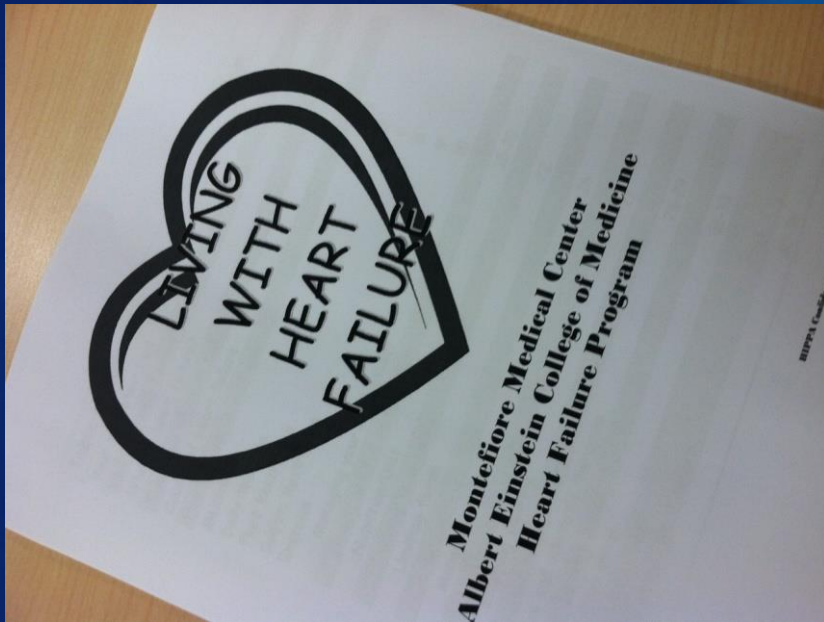
- Staffed by clinical hospital pharmacists
 - Clinical pharmacists as "preceptors"
 - Nurse practitioner/Fellow/attending available
 - Symptom evaluation (vitals, questionnaire, KCCQ)
 - Review pre-discharge BNP, serum Cr, electrolytes;
 - If none, order
 - Focus on medications
 - Education, drug interaction self-management tools, pill box fills, discard duplicates
- One half day per week
 - 6 slots, 1hr each

Medicine reconciliation/Patient education

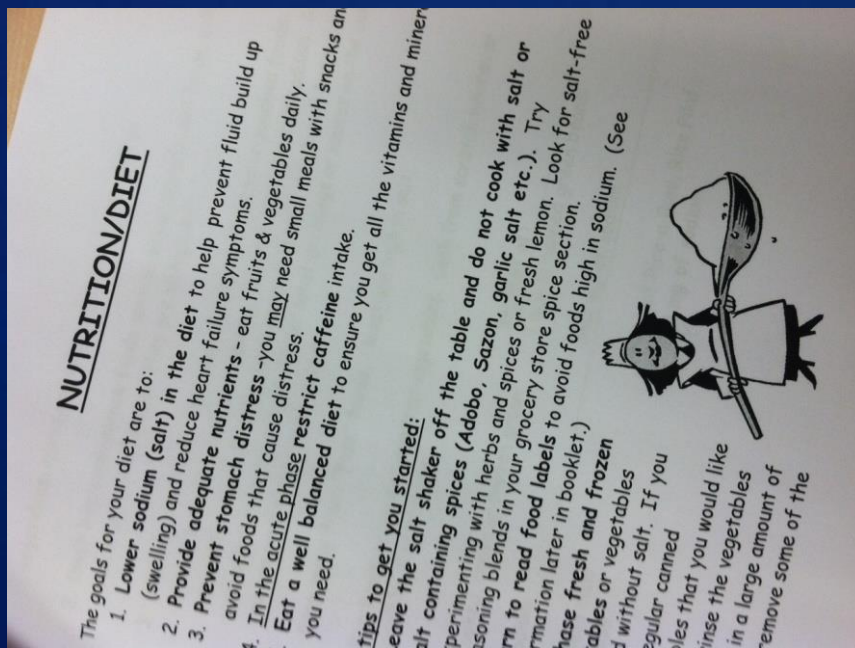


- ▶ Each clinic session is staffed by clinical hospital pharmacists
 - Clinical pharmacists act as “preceptors”
 - Nurse practitioner/Fellow/attending available

Patient education



- ▶ Educate patients/caregivers about *indications* and *adverse effects* of medications
- ▶ Patient education booklet: "Living with Heart Failure"
- ▶ Update Med list in EMR
- ▶ Letter sent to PMD/Cardiologist about changes made/updated med list during the clinic
- ▶ Next appointment scheduled



Identify the problem



Eliminate poly-pharmacy



Duplicates/Expired/No longer needed



Brown Bag Clinic: Montefiore

Parameter (n=32)	Mean \pm Std Dev
Age (years)	61 \pm 14
Gender (% women)	25%
HF-PEF (n)	8
EF (%)	72 \pm 8
Pro BNP	1382.5 \pm 159 pg/ml
HF-REF (n)	24
EF (%)	30 \pm 6
Pro BNP	7008 \pm 7905 pg/ml
KCCQ overall Score	52.14 \pm 20.46

30 Day Readmissions



BB: 8 readmits ≤ 30 days ---8.3%

4 for HF (50%)

Controls: 16 readmits ≤ 30 days—24.4%

Barriers

- ❑ **Discomfort of physicians at changing or up-titrating medications: “MY patient”. “I want to do this myself”.**
- ❑ **Discomfort of physicians in ACEI use in patients with abnormal renal function: “I have already tried this. He/she doesn’t tolerate it.”**
- ❑ **Experience with diuretic flexible regimen—new to providers**
- ❑ **Clinical inertia or
“I already do the right thing for patients. Do not need any other guidance”**
- ❑ **Pts without transportation to attend**

We needed to go to the hospitalization



Navigating the In-patient Landscape



A whiteboard with handwritten notes in black and green ink. A large blue oval is drawn on the left side, partially overlapping the text. The text is organized into columns: Patient Name, Age, Sex, Dx (Diagnosis), EKG, Treatment, and Attending. The entries include patient names like 'Nancy', 'M...', and 'V...', along with various medical abbreviations and percentages. At the bottom, there are additional notes in green ink.

Patient	Age	Sex	Dx	EKG	Treatment	ATTENDING
Nancy	87	F	CHF	181-47	26% LADN PD	DR FERRELL
M...	80	M	HF	380-47	45%	DR JORDAN
V...	57	F	X	30%	Logit PC	DR JORDAN
90A			CHF/MI	MI	LAST PD	DR MEGER
91B			CHF	35%	IV LASIX	DR JORDAN
92A			CHF	30%	IV LASIX	DR KHARON
94A			CHF	20%	IV LASIX	DR KHARON
94B			CHF	30%	IV LASIX	DR LEVINE
95A			CHF	25%	IV LASIX	DR JORDAN
97			CHF	15%	LADN PD	DR COOPER
97A			CHF	55%		

Dashboard (1/25/2015)
Dr. [unclear] Great
Duke
OK High Risk re-admit



Barriers



- Obtaining the “right” number of patients
- Finding patients currently in hospital for HF
- Varying #'s by DRG
- Which ICD codes to use
- Multiple initiatives not well coordinated
- Referrals to BBC
 - HF Attending “stand-by” during BBC other than Dr. Piña
- Support from physicians/housestaff/PA's.

Brown Bag Clinic: Better Adherence Methods



Sampling of 50



- **HF primary admission** --33% with correct diagnosis on admission
- **HF 30 day Re-admission**-- 24% with correct diagnosis on admission
- Out of the 33% diagnosed correctly on primary admission with HF only 14% were re admitted for HF the others were admitted for other reasons but carried the diagnosis of HF or were incorrectly diagnosed on readmission
- **% Of patients seen by cardiology during either of the admissions = 47.6%**

Admission

- *Identification by CTCC (trained didactics)*
- RN: intake assessment
- PharmD: medication reconciliation/work-up

Hospitalization

- RN/PharmD education:
 - Disease progression
 - Signs/symptoms
 - Exercise/weight monitoring
 - Medication regimen and side effects
- RN/PharmD clinical functions:
 - Pro-BNP monitoring
 - Pharmacotherapy recommendations (GDMT)

Discharge

- RN: follow-up appointments/transitions of care
- PharmD: medication delivery/transitions of care

There need to be a links!



Hospital Strategies Associated With 30-Day Readmission Rates for Patients With Heart Failure

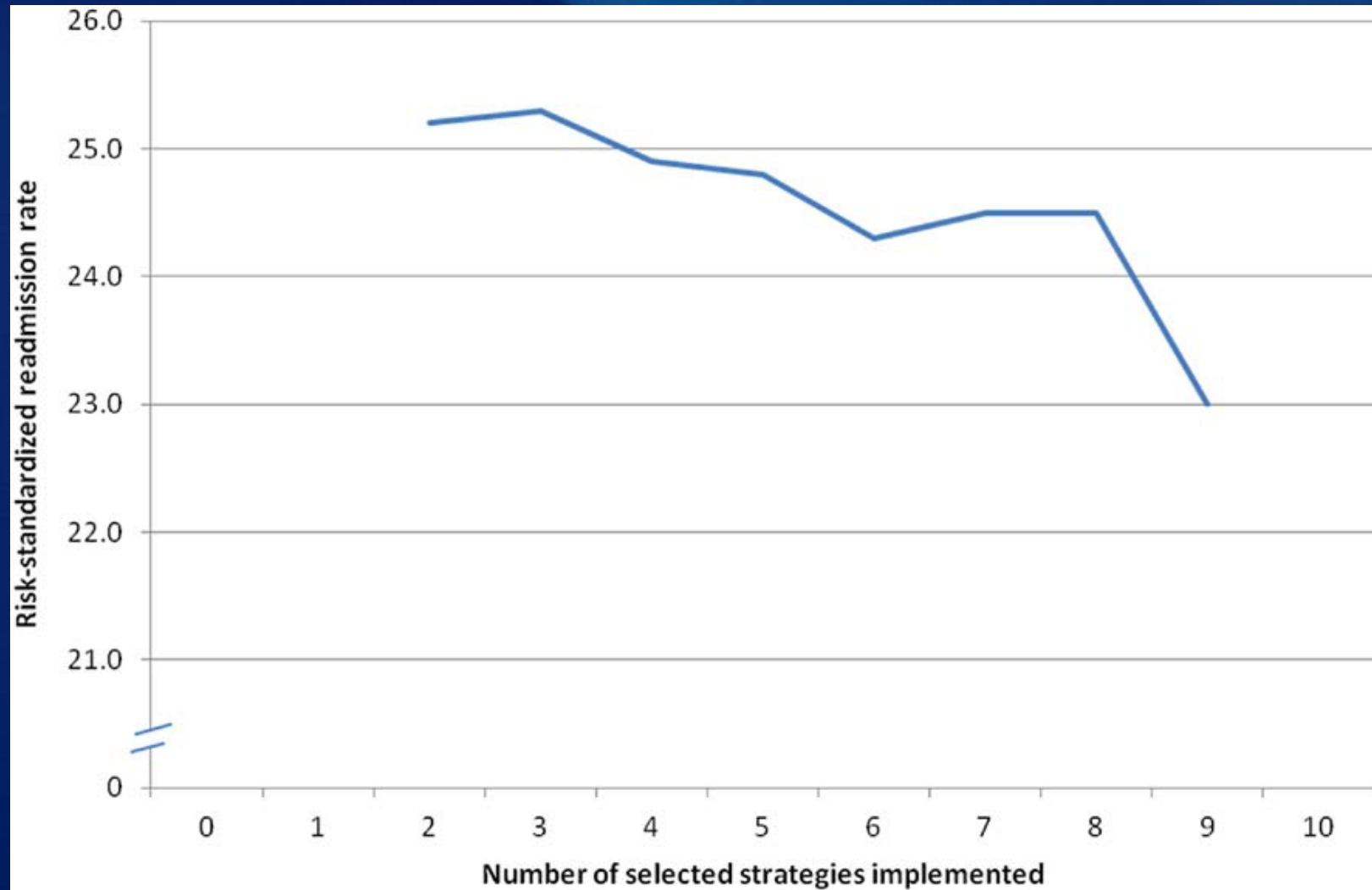
Elizabeth H. Bradley, PhD; Leslie Curry, MPH, PhD; Leora I. Horwitz, MD, MHS; Heather Sipsma, PhD; Yongfei Wang, MS; Mary Norine Walsh, MD; Don Goldmann, MD; Neal White, MD; Ileana L. Piña, MD, MPH; Harlan M. Krumholz, MD, SM

Background—Reducing hospital readmission rates is a national priority; however, evidence about hospital strategies that are associated with lower readmission rates is limited. We sought to identify hospital strategies that were associated with lower readmission rates for patients with heart failure.

- partnering with community physicians or physician groups to reduce readmission
- partnering with local hospitals to reduce readmissions
- having nurses responsible for medication reconciliation
- arranging follow-up appointments before discharge
- having a process in place to send all discharge paper or electronic summaries directly to the patient's primary physician
- assigning staff to follow up on test results that return after the patient is discharged

(Circ Cardiovasc Qual Outcomes. 2013;06:444-450.

Number of Strategies



(Circ Cardiovasc Qual Outcomes. 2013;06:444-450.

Hospital Discharge

Recommendation or Indication	COR	LOE
Performance improvement systems in the hospital and early postdischarge outpatient setting to identify HF for GDMT	I	B
<p>Before hospital discharge, at the first postdischarge visit, and in subsequent follow-up visits, the following should be addressed:</p> <ul style="list-style-type: none"> a) initiation of GDMT if not done or contraindicated; b) causes of HF, barriers to care, and limitations in support; c) assessment of volume status and blood pressure with adjustment of HF therapy; d) optimization of chronic oral HF therapy; e) renal function and electrolytes; f) management of comorbid conditions; g) HF education, self-care, emergency plans, and adherence; and h) palliative or hospice care. 	I	B
Multidisciplinary HF disease-management programs for patients at high risk for hospital readmission are recommended	I	B
A follow-up visit within 7 to 14 days and/or a telephone follow-up within 3 days of hospital discharge is reasonable	IIa	B
Use of clinical risk-prediction tools and/or biomarkers to identify higher-risk patients is reasonable	IIa	B



*Helping Cardiovascular Professionals
Learn. Advance. Heal.*



Strategies

- **Understand thyself—process map**
- **Triage of patients by risk factors for readmissions**
- **Using information on high-end users of care by cost analysis**
- **Identification of the “frequent flyers”**
- **Early clinic: Are these patients who come a different group.**
 - **Those who do not come to clinic.**
- **Transition to the next or chronic care appt.**
- **Should the EHR not help us???? So far...poorly**

If we want to work with a system to influence its direction -- a normal desire as we work with human organizations--the place for us to work is deep in the dynamics of the system where [its] identity is taking form.

Wheatley & Kellnor-Rogers, 1996