QI in Heart Failure for VA Cleveland Facilities: An Implementation Plan

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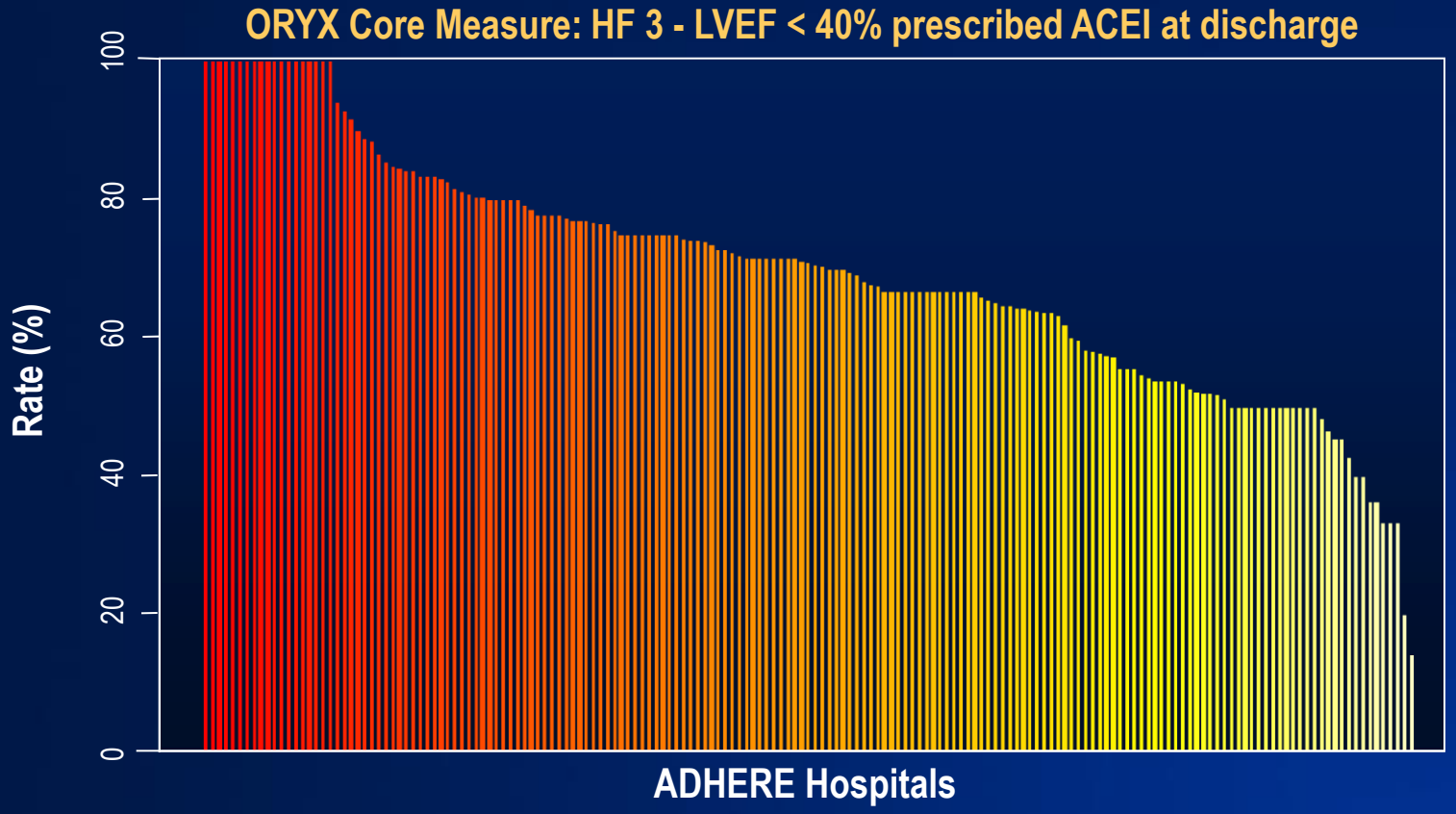
ADHERE

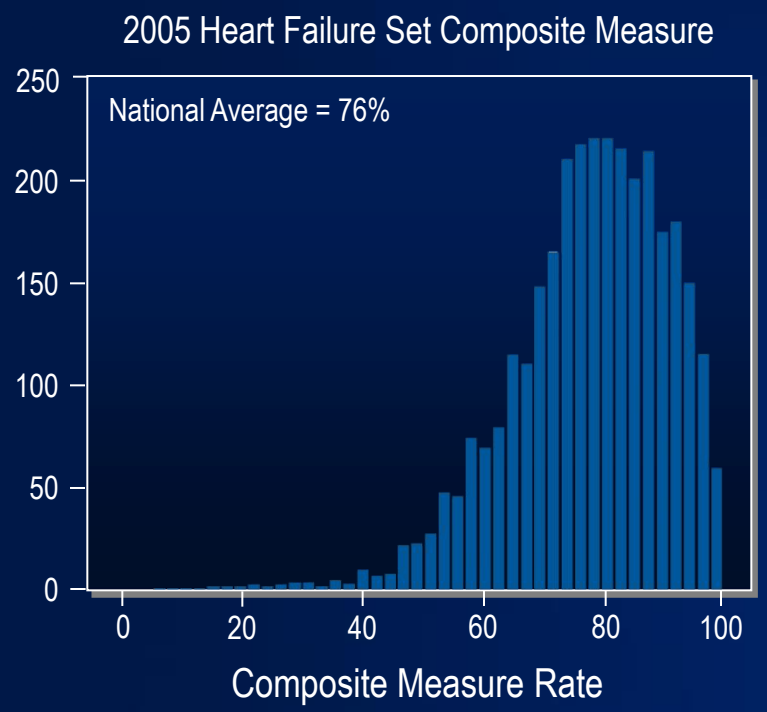
Variation in ACE Inhibitor Use for HF

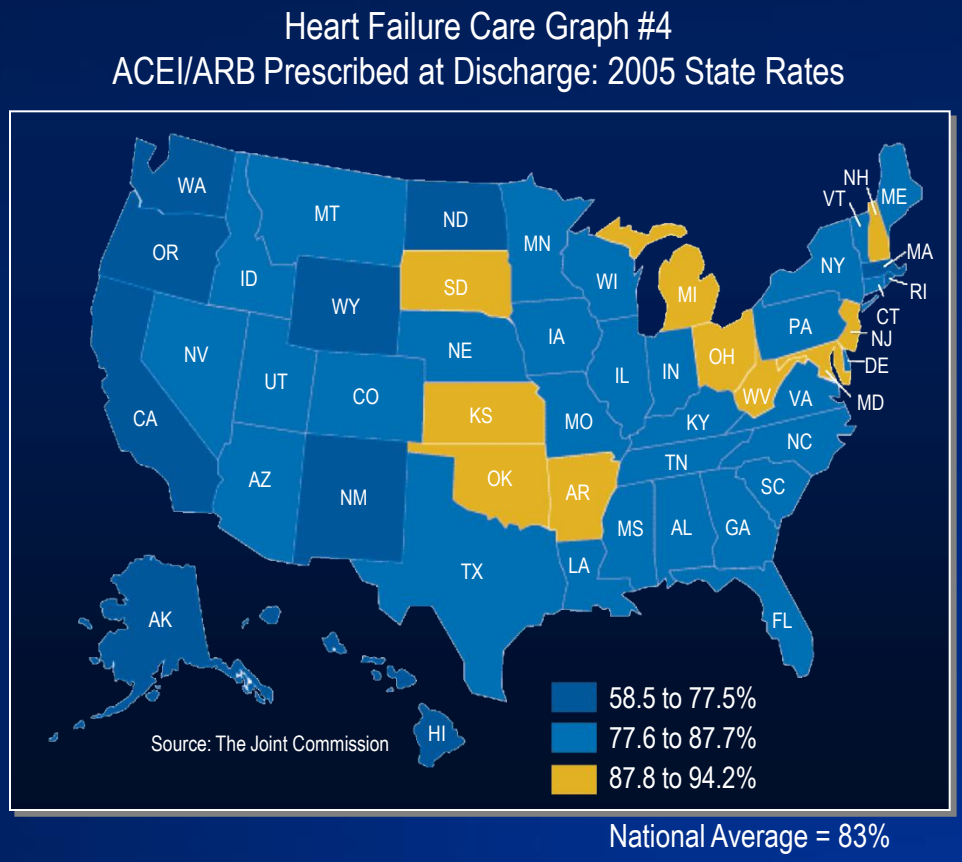


ADHERE: Dec 2002, 206 Hospitals; 23,193 patients (subset with LVEF ≤ .40, no CI)

Fonarow GC et al. *Arch Intern Med.* 2005;165:1469-1477.

Variability in HF Care Quality

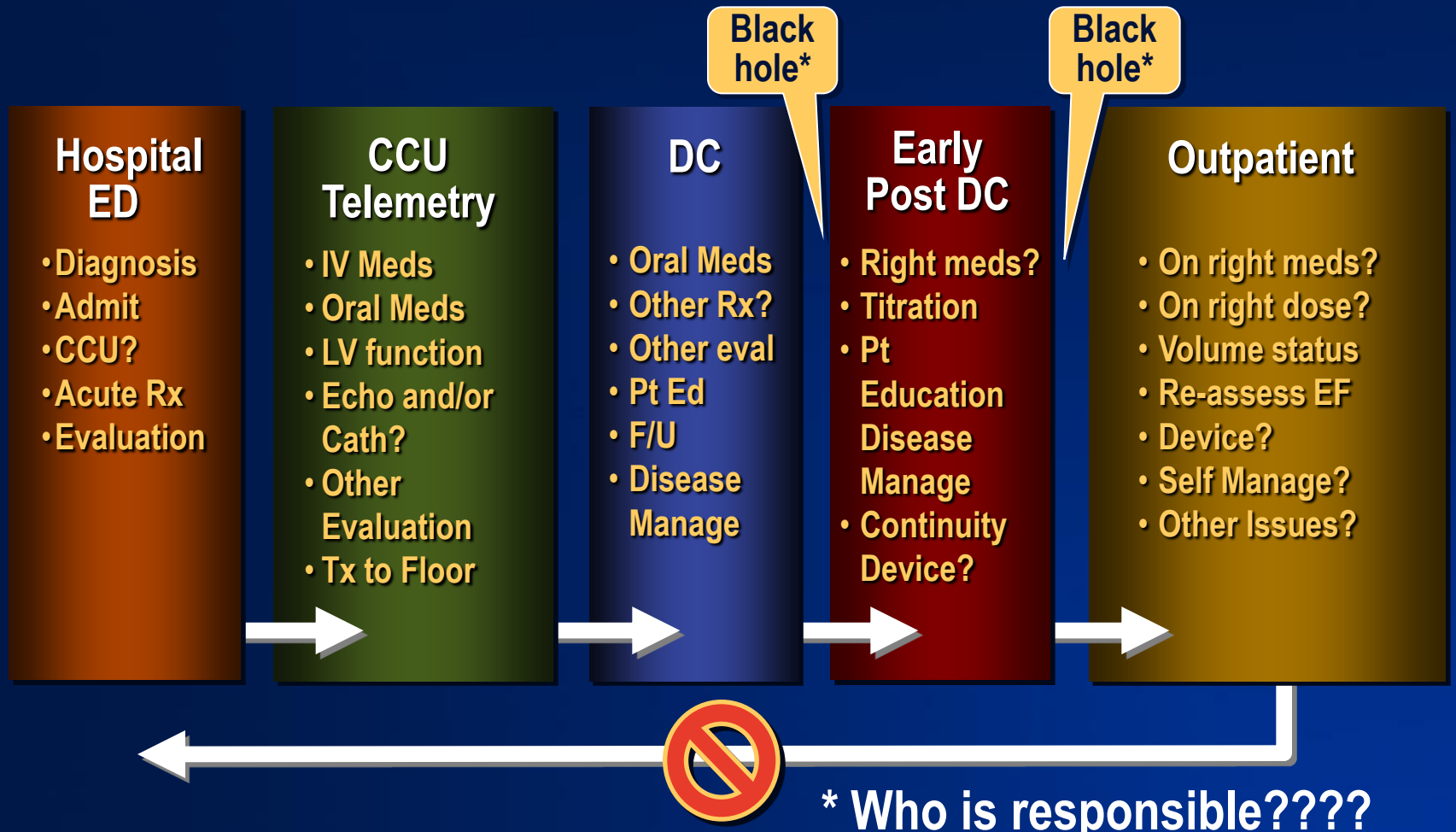




Joint Commission. Improving America's Hospitals. Available at: http://www.jointcommissionreport.org.

Continuity of HF Care

Reliable Care: Not Missing the Steps



Fonarow GC. *Rev Cardiovasc Med.* 2006;7:S3-11.

Can Education Change Practice for HF?

Bandura's Social Cognitive Theory

- The belief that one is capable of performing a behavior that leads to a desired outcome.
- A recognized model that describes the process through which individuals learn from one another.
- The fundamental component of learning, according to Bandura, is self-efficacy, which is believed to influence all aspects of behavior.
- Can influence the acquisition of new behaviors, the inhibition of existing behaviors, and the disinhibition of behaviors.
- The central paradigm is that self-efficacy is attained through four key sources: **performance accomplishments, vicarious experience, verbal persuasion, and physiological state**

Education and changing practice

- Richards -- clinical practice education groups resulted in at least short-term changes in prescribing behaviors among general practitioners.
- Feucht and Rice -- physician education resulted in increased appropriate antibiotic use, decreased inappropriate use, and a decrease in duplicated gram-negative coverage.
- Soumerai et al. -- some interventions designed to improve physician prescribing behavior did not prove to be effective.
  - Passive conveyance of information was ineffective.
  - Knowledge translation was found to be slightly effective.
  - When interventions combined 2 or more strategies, they were more likely to be successful.
- Combined strategies are the intervention package in this proposal
  - didactic coupled to a preceptorship

Systematic review of physician CME strategies (n=99)

- When combining 2 interventions, 64% were positive and 31% were negative
- Best models :
  - Practice enabling strategies
  - Reinforcing methods
  - Predisposing strategies
  - Opinion leaders
  - “impactors” on learning resources
  - Bandura’s personal, environmental/sitautional and behavioral factors.

Davis et al. JAMA Aug 23 2005

Question and Approach

- **Does didactic education in addition to a preceptorship program result in an increase RAAS inhibition and lower diuretic doses for patients with heart failure?**

- **A randomized educational intervention in VA Cleveland Facilities.**

RAAS = ACE inhibitor (ACEI), Angiotensin Receptor Blocker (ARB) , spironolactone

Specific Aims:

1. To determine if a HF educational program which combines 2 strategies of education (didactic + preceptorship) via the NHeFT training program changes provider behavior as measured by changes in process measures including increases in RAAS inhibition and a concomitant decrease in diuretic dose comparing pre-training doses to post training doses in the same patients with a diagnosis of HF in the Firm Clinic at the VA Medical Center,at the Brecksville and McCafferty facilities. .

2. To determine if the NHeFT training program with a preceptorship increases Guideline-evidenced HF medical therapy in new patients with HF identified after training when compared to the benchmark dosing of the SMA clinic.

Hypotheses #1 and 2:

- Lowering of diuretic doses to a flexible diuretic regimen will facilitate uptitration of ACE I/ARB doses. Attendance in the NHeFT program will lead to quality improvement in HF care as evidenced by increases in RAAS inhibition and lowering of diuretic doses beyond only being familiar with evidence-based Guidelines. The doses used after training will approximate the doses of the SMA clinic which is used as benchmark.

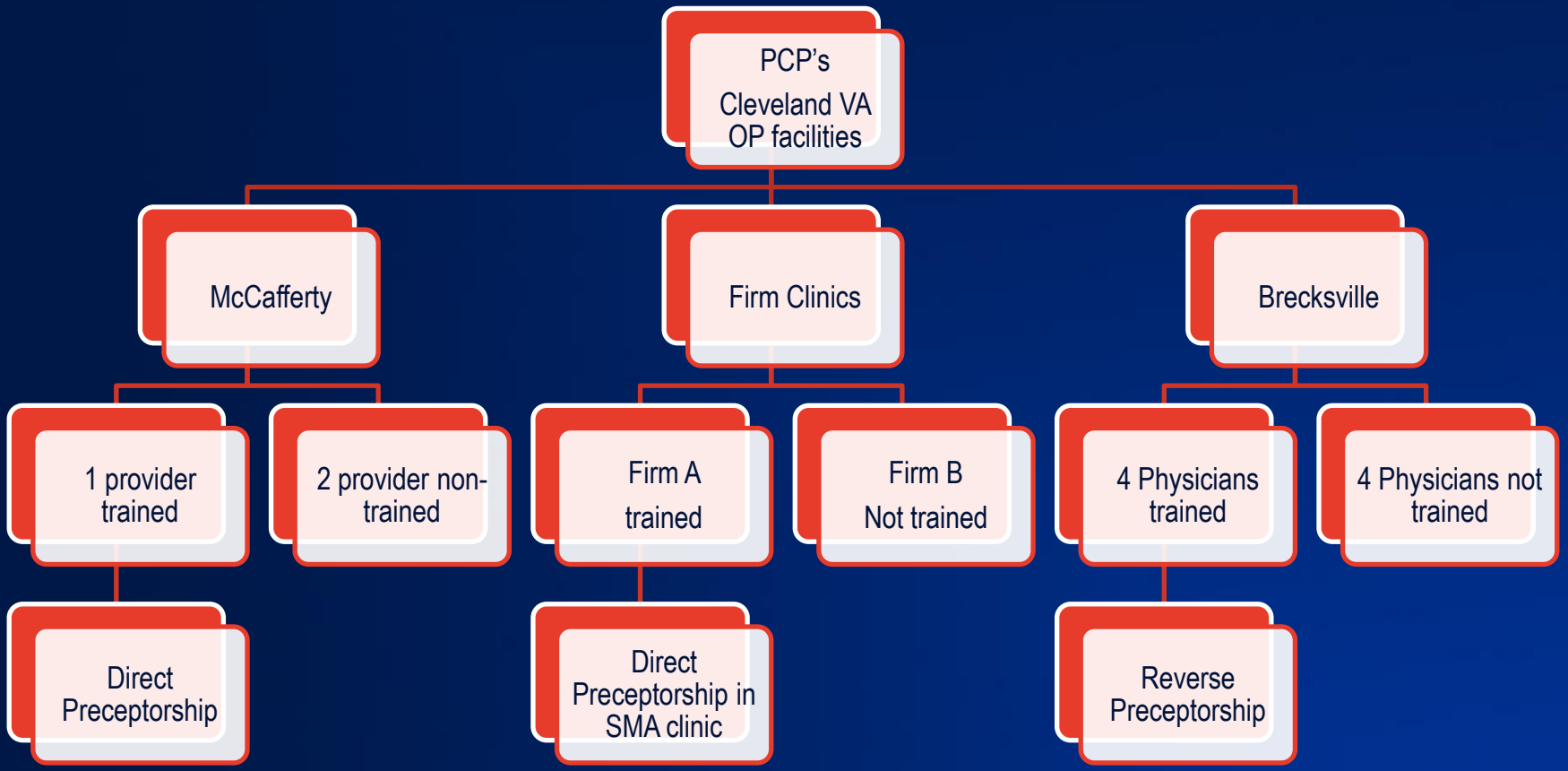
Endpoints:

- **Primary:**
  - **Pts with EF<40% on ACE/ARB and BB +- diuretic at any time and considered optimal medical therapy**
- **Secondary:**
  - **Pts with EF <40% with an increase in ACE/ARB and a decrease in diuretic dose >=6 months post training/**

Definition

- **Success=**
  - **Normed doses or doses used in the RCT of**
    - **SOLVD (ACEI)**
    - **ValHeFT (ARB) and MERIT (BB).**
- **enalapril= 18 mg/d,**
- **metoprolol 149 mg/d,**
- **valsartan goal 320 mg/d**

Randomization



Control group provided with copies of AHA/ACC Guidelines and PM

N-HeFT Overview

- Began in 1994 at Temple University
- Sponsored and administered by Case Western Reserve University since 1999
- Customized accredited training
- 32 host sites: leading heart failure centers
- Application to practice
- Outcomes-driven mentoring

32 Centers of Excellence

PURPOSE OF THE NETWORK

- Disseminate best practices to interdisciplinary medical teams who are eager to learn and enhance their care for HF patients

- Continuously improve the quality of the program as an educational delivery system

N-HeFT *Online*

Web site www.nheft.org

- **Online Curriculum**
  - **Cardiology Core**
  - **Primary Care Core**
  - **Allied Health Core**
  - **Electives**
- **Faculty**
  - **Standard curriculum**
  - **Resources**
  - **Tools**

CASE
CASE WESTERN RESERVE UNIVERSITY
SCHOOL OF MEDICINE

National Heart Failure Training Program

Today is March 20, 2007

Home
About Program
- Program Highlights
- Annual Reports
- Network Members
- Mission/Purpose
- Outcomes
- Audience/Format
- Topics & Objectives
- Accreditation
Host Sites
How To Apply
N-HeFT ONLINE
N-HeFT News
N-HeFT Collaborations
Acknowledgements
Contact Us
Help

About The Program

The N-HeFT Network encompasses medical teams of heart failure experts who are dedicated to doing "the right thing for the right reason." Thirty-two host sites from all parts of the country invite medical professionals to visit their heart failure clinic to spend one or two days in interactive sessions at their sites. N-HeFT is sponsored and administered by Case Western Reserve University (CASE) for continuing medical education credit.

PROGRAM HIGHLGHTS

- Continuing education credits for physicians, pharmacists, and nurses
- Intensive small-group training focusing on your medical team's needs
- Current optimal approaches to heart patient care
- First hand exposure to the operations of a top tier heart failure clinic
- Convenience-matching the time and place best for your team
- Affordable: no cost except travel and lodging
- Ongoing support-Three follow up mentoring sessions to assist in implementing your goals for practice improvement
- Resources and tools-newly published guidelines, patient education materials, references, and quality tools to use in your practice


Cardiology


Primary Care


Allied Health Care


Training Instructions and Materials

Intervention: Standardization of Training

- **Curriculum in Current Project**
  - Developed and updated by network expert authors
  - Accredited for physicians, nurses, pharmacists
  - Primary Care Core
    - Overview
    - Physical exam, signs and sx
    - Medical therapy and how to do it (emphasis on uptitration of RAAS and downtiration of diuretics)
    - How to follow patients
- **Training Processes**
  - Standardized forms
  - Preceptorship (direct or reverse)
  - Follow up mentoring availability for consultation

Data collected: Patient population

- **All patients with ICD9 codes of HF including 402, 404, 428 and all modifiers.**
- **All patients > 18 and were evaluated for systolic function.**
- **Systolic function was determined from VA echo results. The records of patients without VA echocardiograms on file were evaluated to determine whether ejection fraction documentation was included elsewhere in the patient documentation (IP, CL).**
- **CPRS records of ACEI/ARB by use and doses, Beta Blockers (BB) by doses, loop diuretics by doses.**
- **All ACEI converted to enalapril equivalents. All ARB's converted to valsartan equivalents, beta blockers converted to metoprolol and all diuretics converted to furosemide equivalents..**

Time period for analysis

- A minimum of 6 months after training
  - Patients not being seen regularly
  - Allow for new patients in the system
  - Allow for provider adoption, reflection and testing of new indications, suggestions and modifications.

Analysis

- Date seen=clinic visit
- Date meds issued= assumed filled by Pharmacy
- Summary statistics.
- Aggregate data.
  - Unique pt identifier using a 3 stage algorithm
- Tests comparing proportion across independent groups
  - 0.05 for significance
  - No adjustments made for multiple comparisons.
  - Intent to treat and on therapy due to crossover of 2 providers.

Patient Flow

Therefore 126 pts excluded
From analysis at this point

Demographics

	Brecksville	McCaffery	WP Firm A	WP Firm B	SMA Clinic	%Missing	p-value
N	293	64	108	176	192	--	
Mean age (SD)	75.9 (10.0)	73.9 (10.7)	69.7 (9.8)	69.5 (11.0)	65.7 (11.7)	--	
Males (%)	97.6	95.3	99.1	99.4	99.5	--	
Race (%)							
-Afr. Amer.	1.7	1.6	34.2	31.2	23.0	50.3%	
-Caucasian	38.7	32.8	20.4	21.6	38.0		
-Hispanic	0.3	0	0	0	1.0		
-Other/refuse	0.3	0	0	0.6	0		
-Missing	59.0	65.6	45.4	46.6	38.0		
Missing Race/ethnicity	168 (57%)	42 (66%)	47 (44%)	80 (45%)	68 (35%)	49%	
Deceased during study	2 (0.7%)	2 (3.1%)	0	0	0	N/A	
Vital signs*							
Systolic (mmHg)	122	124	136	134	126	0%	<0.0001
Diastolic (mmHg)	65	71	75	72	71	0%	<0.0001
Pulse (/min)	71	72	74	72	74	<0.1%	0.076
Weight (lbs)	208	211	214	207	220	<0.1%	0.36
Height (in)	69	69	69	69	70	23%	0.088
Labs, median							
BUN,	23	20	19	19	20	4.6%	0.14
Creatinine	1.8	1.6	2.5	1.5	1.6	4.6%	N/A
Hbg	13.2	13.3	13.4	13.2	13.3	12 %	0.40

Ventricular Function

	Brecksville	McCaffert y	WP Firm A	WP Firm B	SMA Clinic
N (all pts, regardless of EF information)	293	64	108	176	**192**
Doc'n of LV (%)					
-Normal	45.0	57.8	42.6	55.7	**36.5**
-Low	45.0	34.4	50.0	38.1	**63.0**
-Inadequate (missing)	10.0	7.8	7.4	6.5	**0.5**
N, low EF	132	22	54	67	**121**
%, low EF	45.0	34.4	50.0	38.1	**63.0**
Mean LV (SD), all N	39.3 (16.1)	42.2 (15.7)	37.3 (16.7)	43.0 (16.7)	**33.8 (16.4)**
Mean LV (SD), low EF	25.5 (7.4)	25.1 (7.5)	24.1 (7.1)	25.7 (8.4)	**23.2 (8.6)**
Mean age (SD), low EF	**75.7 (10.0)**	**72.4 (11.3)**	**69.8 (9.6)**	**66.8 (10.5)**	**66.7 (12.0)**

Medication dosages: For low EF patients, regardless of training

Drug Class	Brecksville	McCafferty	WP Firm A	WP Firm B	SMA Clinic	ANOVA p-value (n*)
ACE-I (Enalapril equiv.)	16 mg (16)	29 mg (28)	35 mg (24)	36 mg (34)	36 mg (25)	**0.0017 (121)**
ARB (Valsartan equiv.)	134 mg (129)	80 mg (0)	182 mg (112)	130 mg (128)	117 mg (88)	**0.69 (33)**
BB (Metoprolol equiv.)	90 mg (55)	93 mg (77)	119 mg (80)	117 mg (60)	106 mg (55)	**0.33 (129)**
Loop (Furosemide equiv.)	**55 mg (44)**	**33 mg (12)**	**87 mg (60)**	**65 mg (41)**	**48 mg (33)**	**0.20 (70)**

Distribution of ACEI/ARB pre and post training in 336 pts

TOTAL n=336	No ACEI/ARB after training	No ACEI/ARB before training but yes after training	ACE/ARB prior to training	
N (%)	33 (9.82)	244 (72.62)	59 (17.56)	
ACE/ARB prior to training but no fill dates after training			n	%
			22	37%
ACE/ARB after training with fill dates				
			37	63%

ACE/ARB by Provider Training

Trained providers Patients n=251		Non-trained providers Patients n=85		p
Not on ACE/ARB pre training N(%)	On ACE/ARB after training N (%)	Not on ACE/ARB pre training N(%)	On ACE/ARB after training N(%)	0.0002
222 (88)	**200 (79.68 of 222)**	**55 (64.71)**	**44 (51.76 of 55)**	

Controlling for training, comparison using Cochran-Mantel-Haenzel test , 1DF, Statistic 13.89, p=0.0002

Therefore, training had a significant effect of patients being placed on ACEI/ARB de novo

Distribution of β-blocker pre and post training in 336 pts

TOTAL n=336	No β blocker after training	No β blocker before training but yes after training	β blocker prior to training	
N (%)	30 (8.9)	246 (73.21)	60 (17.86)	
β blocker prior to training but no fill dates after training			n	%
			23	38%
β blocker after training with fill dates			37	62%

Distribution of loop diuretic pre and post training in 336 pts

TOTAL n=336	No loop diuretic after training	No loop diuretic before training but yes after training	Loop diuretic prior to training	
N (%)	113(33.63)	175 (52.08)	48 (14.29)	
loop diuretic prior to training but no fill dates after training			n	%
			22	6.5%
loop diuretic after training with fill dates				
			26	7.74%

Loop diuretic by Provider Training

Trained providers Patients n=251		Non-trained providers Patients n=85		p
Not on loop diuretic pre training N(%)	On loop diuretic after training N (%)	Not on loop diuretic pre training N(%)	On loop diuretic after training N(%)	0.87
226 (90)	**144 (57.37 of 226)**	**62 (72.94)**	**31(36.47 of 62)**	

Controlling for training, comparison using Cochran-Mantel-Haenzel test , 1DF, Statistic 0.0287, p=0.87

Therefore, training had no significant effect of patients being placed on loop diuretics de novo

Primary Endpoint: On any β-blocker and ACEI/ARB

Trained providers Patients n=251		Non-trained providers Patients n=85		p
Met primary endpoint after Training N(%)	Did not meet the primary endpoint after training N(%)	Met primary endpoint after training N(%)	Did not meet the primary endpoint after training N(%)	0.0089
193(76.89)	**44 (17.53)**	**43 (50.59)**	**24(28.24)**	

Controlling for training, comparison using Cochran-Mantel-Haenzel test , 1DF, Statistic 6.84, p=0.0089

Therefore, training had a statistically significant effect of patients meeting their primary endpoint and considered optimally treated

Additional Data

- There was no statistically significant difference between trained and untrained providers for increases in ACEI or ARB doses
- There was a statistically significant difference in decreases of diuretic dose between trained and untrained providers, (30.77% vs 14.81%, p=0.0214
- None of the patients had a drop in diuretic dose before training.
- Training is significantly associated with a decrease in loop diuretic dose.

Secondary Endpoint: On any ACEI/ARB + loop diuretic

	On any ACEI/ARB + loop diuretic	Increase in ACEI/ARB + decrease in loop diuretic	p
Untrained	N=47	4 (8.51%)	0.0003
Trained	N=153	22(14.38%)	

In the untrained group, an increase in ACE/ARB was not associated with a decrease in diuretic. (p=0.60)

In the trained group, an increase in ACE/ARB was associated with a decrease in diuretic. (p=0.0023)

Summary of Findings

- The populations of patients in the SMA clinic are younger than in the other clinic facilities and have lower EF.
- The training program in the VA outpatient facilities is feasible with direct or reverse preceptorship..
- ICD codes identify the patients with a diagnosis of HF.
- 6.5% of patients with a diagnosis of HF had no documentation of LV function. -- presents an opportunity for quality improvement given that LV function is a performance and quality measure within the VA system and the Joint Commission.

Summary of findings (2)

- Medication doses can be accessed in the CPRS records and compared across time.
- At baseline, the doses of ACEI were similar among the SMA, Firm A and Firm B leaving small room for improvement. The doses in Brecksville were significantly lower.
- Overall the doses of ACEI/ARB were higher and diuretic doses lower in the patients of trained providers after training.
- Training was associated with increases in process measures of care in patients with HF which included more patients on optimal medical therapy including increases in ACEI/ARB and decrease in diuretics.
- This is the first report, to my knowledge, that shows changes in behavior of PCP for HF process measures using an educational model.

Limitations

- Patients who are identified prior to training may have missing data after training due to death, or change of venue for care or loss to followup. In addition, a visit to the clinic may not occur until after 6 months since many patients also have care with their own private physician.
- Documentation of EF may be missing if patient receives Cardiology care from private practitioners who may not make echocardiogram reports available to the VA providers.
- Patients who are truly intolerant to RAAS inhibition may be difficult to identify. Due to the potential of small numbers, no significance may be noted.
- It is difficult to assess patient adherence to therapy although this study was not designed to assess the outcomes beyond treatment. The issue date of the medication was, however, taken as the initiation of therapy.
- Patients often have other medications prescribed outside of the VA system and these medications will not be captured.

Limitations

- # of visits were higher in the trained patients and the providers who were trained have a larger number of informative records. This imbalance may have caused a bias due to the higher numbers. Otherwise, the larger number of encounters in the trained providers may be related to the education that emphasizes more frequent visits particularly to allow uptitration of medications.
- Our numbers may be underestimated since there could be a "halo effect" occurring within the practice groups that may have improved the care of HF patients for providers who were not trained.
- Whether other process measures of care or outcomes could be equally applied to a pre training, post training design.

The Quality Improvement Movement… Where Do We Go From Here…