

## Physician Gender Role in Treatment of Male and Female Patients in Cardiac Fellows' Ambulatory Clinic

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### ABSTRACT

**AIM:** The quality of care provided to ambulatory cardiac patients has been reported as being influenced by patient gender with women receiving less evidence-based treatments than men. In order to test whether the treating physician's gender is in part responsible for this disparity, we compared compliance with performance measures for men and women patients treated by men and women physicians in our cardiology fellows' ambulatory clinics.

**METHODS:** All patients were enrolled into the American College of Cardiology (ACC) Practice Innovation And Clinical Excellence (PINNACLE®) registry. Data were collected between January 2009 and May 2012. The elements of care measured were 10 established ACC and American Heart Association (AHA) performance measures for coronary artery disease (CAD), congestive heart failure (CHF), and atrial fibrillation (Afib). Patients were evaluated for compliance with as many of the measures for which each was eligible.

**RESULTS:** A total of 2001 patients with CAD (51%), CHF (19%) and non-valvular Afib (23.3%) were enrolled. The remaining 134 patients (6.7%) had hypertension only and were not included in the analysis. Mean age was 66.4 years. 51% of patients were female and 75% Caucasian. There were no statistically significant differences in treatment by patient gender, although when sub-stratified by physician gender, female patients treated by male physicians tended to be less likely to be on warfarin ( $p=0.07$ ). In univariate analysis,

female physicians were more likely than males to provide self-care education to CHF patients ( $p=0.017$ ). In all other performance measures, there was no significant difference by physician gender on treatment of male and female patients

**CONCLUSION:** Compliance with select performance measures was not influenced by the gender of the patient or the treating physician at our cardiology fellows' ambulatory clinic.

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**Key words:** Gender; Ambulatory Care

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### INTRODUCTION

The quality of care provided to cardiac patients has been reported as being influenced by patient gender<sup>[1-3]</sup>. A European cross sectional study showed that men with CHF were more likely to receive evidence based drug treatment than women<sup>[4]</sup>. An epidemiologic heart failure study in a Canadian population similarly demonstrated that women, less frequently than men, were prescribed angiotensin-converting enzyme inhibitors (ACEI) or had noninvasive assessments of ventricular function and ischemia in the inpatient setting<sup>[5]</sup>. Women with heart failure treated in the ambulatory setting are less frequently treated with ACE inhibitors as well<sup>[6]</sup>. Similar to patients' gender, in one report physicians' gender has also been shown to influence drug treatment in patients<sup>[4]</sup>, e.g. drug treatment is more complete when female physicians are taking care of the patients with heart failure. However, the influence of physician gender on the disparity in compliance rates to performance measures in cardiac outpatient care of men and women patients has not been studied. All of the studies cited above analyzed patients treated before 2008.

ACC/AHA clinical practice guidelines have proliferated since first being developed in 1984<sup>[7]</sup>. In 2013 and 2014 alone, 15 guidelines were established or updated<sup>[8]</sup>. Practice guidelines are increasingly becoming part of the teaching curriculum in training programs<sup>[9]</sup>.

We hypothesized that current training, with its focus on guideline driven standardization of treatment, would reduce treatment variation by cardiology trainees and therefore would eliminate disparities in care provided to women and men. We also chose to examine whether the gender of the treating physician influenced cardiac care to female and male patients. Accordingly, we compared compliance with performance measures for patients enrolled into the ACC's PINNACLE<sup>®</sup> registry by patient gender and physician gender in our cardiology fellows' ambulatory clinics.

## METHODS

Clinical data were collected retrospectively from January 2009 to May 2012 from all ambulatory patients enrolled into the PINNACLE<sup>®</sup> registry from our Cardiology Fellows clinic. The Cardiology Fellows were not aware of our research questions at the time of their patient clinic visits. Patient encounters where the patient gender or physician provider could not be identified were excluded. Data for 10 ACC/AHA performance measures for CAD<sup>[10]</sup>, heart failure<sup>[11,12]</sup>, and non-valvular atrial fibrillation<sup>[13]</sup> were collected. Data collection was performed utilizing paper forms from the PINNACLE<sup>®</sup> registry. For many of the cardiac performance measures, rates are reported at the patient-level; therefore, we included data from only the baseline enrollment visit to minimize over-representation by patients with multiple visits. Patients who met the guideline-specified eligibility criteria for each individual therapy, with no contraindications, intolerance, or other documented reasons for not receiving it, were eligible for inclusion in the analyses for that measure. Use of the CHF education measure was based on documentation that the patient had received written or verbal education on one or more elements of education during their office visit.

Summary statistics for patients' demographic and clinical characteristics were reported as means with standard deviations for continuous variables and as proportions for categorical variables. We examined the aggregate proportion of patients whose care was compliant with established ACC and AHA performance measures for CAD, CHF, and Afib. The numerator for these rates was the total number of patients that met the performance measure and the denominator was the total number of eligible patients for that performance measure.

Preliminary data analysis was completed using  $\chi^2$  analysis. To assess the association of compliance with the other data we used Student's *t*-test or ANOVA for continuous variables and  $\chi^2$  analysis for categorical variables. Using stratified analysis, we then compared compliance with each measure by patient gender, stratified by gender of the physician. For each analysis, the null hypothesis was evaluated at a two-sided significance level of 0.05 with 95% confidence intervals (CIs) calculated. Data was analyzed using SPSS v. 21.0.

## RESULTS

During the study period 2001 patients were enrolled whose care was provided by 9 male and 3 female cardiology fellows, in their various years of fellowship training. Baseline characteristics of the study population patients by the patient gender are presented in table 1, the mean age was 66 years, half (50.6%) were female and 75% were Caucasian. The female patients were slightly older than males, mean

age 67 versus 65. More than half of patients enrolled had CAD (51%), 19% had CHF and 23.3% had non-valvular Afib. Hypertension was the predominant co morbidity (80%) followed by dyslipidemia and diabetes. Within the study sample, the mean systolic blood pressure was 127 +/- 18, mean diastolic blood pressure was 74 +/- 10, and mean heart rate was 71 +/- 12.

**Table 1 Patient Demographics.**

Demographics	Total (n=2001)	Male (n=971)	Female (n=1001)	P- value
Age (Mean)	66.4 ± 14.9	65.5 ± 14	67.4 ± 15.5	0.006
Sex (%)		49.4	50.6	
Race (%)				0.014
Caucasian	75.1	78	72.3	
African American	23.5	20.7	26.4	
Other	0.14	1.3	1.4	
<b>Cardiac Conditions with Performance Measures (%)</b>				
Coronary artery disease	51.1	61.6	40	<0.0001
Heart Failure	19.1	19.9	14.4	<0.0001
Atrial Fibrillation	23.3	24.7	22.4	0.23
<b>Medical History (%)</b>				
Hypertension	79.8	81.6	78.3	0.06
Dyslipidemia	60.9	66.8	55.7	<0.0001
Diabetes	23.1	23.5	22.5	0.605
Stable Angina	0.7	0.6	0.8	0.624
Unstable Angina	0.8	0.7	0.9	0.65
Prior Stroke/TIA <sup>1</sup>	6.2	5.8	6.7	0.38
Prior Myocardial Infarction		22.1	12.3	<0.0001
Left Ventricular Ejection Fraction	17.3	52.2±13.8	56.4±12.4	<0.0001

<sup>1</sup> TIA-transient ischemic attack

### Compliance with Performance Measures by Patient Gender

Figure 1 summarizes the compliance rates by patient gender in 10 select performance measures. We found that compliance rates were generally similar between men and women for these select performance measures. Apparent differences by gender were observed in two of the 10 measures; i.e., use of ACEI or ARB in CAD patients with left ventricular systolic ejection fraction  $\leq 40\%$  or diabetes and warfarin use among patients with atrial fibrillation and a CHADS<sub>2</sub> score of  $\geq 2$ . However, even these 2 apparent differences cannot be assumed to be accurate as the sample size is very small for these two parameters and the findings are not statistically significant.

Table 2 summarizes the compliance rates with the 10 performance measures in patients whose physician provider gender was identified.

When comparing the achievement of overall compliance rates by physician gender for select performance measures, in univariate analysis, female physicians were more likely than males to provide self care education to heart failure patients ( $p=0.017$ ), but no statistically significant difference was identified by physician gender in any of the other select performance measures.

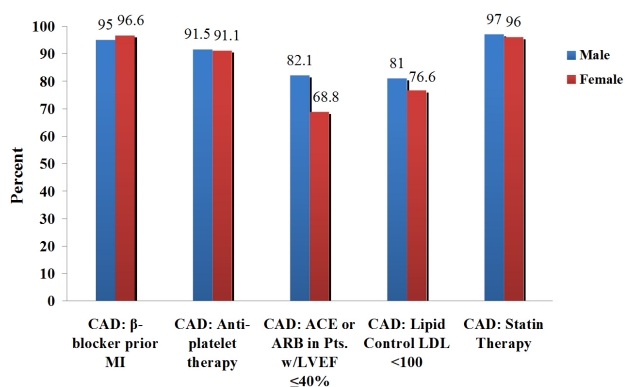
Compliance rates for performance measures were similar between men and women treated by the male physicians, with none achieving statistical significance. By univariate analysis, the only trend suggesting differing treatment by gender was in male physicians achieving lower compliance rates in their female patients for whom warfarin was indicated for non valvular atrial fibrillation (67.5% in male vs 56% in female,  $p=0.07$ ).

Overall there were low numbers of patients treated by the female physicians. Therefore in the final analysis, performance measures were excluded when the total number of patients treated by female physicians was  $\leq 20$ . None of the other performance measures demonstrated statistically significant difference between men and women treated by the female physicians.

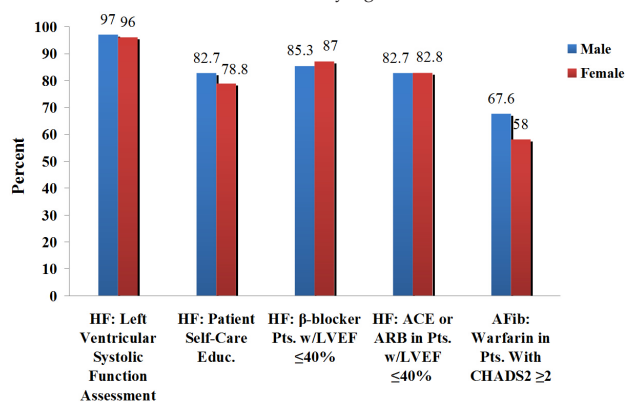
## DISCUSSION

In the United States in 2007 there were over 79 million physician office visits with a diagnosis of cardiovascular disease, of which almost 15 million carried coronary disease as the primary problem<sup>[14]</sup>. Given the growing national alarm regarding the high 30-day readmission rates for both heart failure and coronary artery disease, there is a clear need to identify potential gaps and to improve the quality of outpatient cardiovascular care. Patient and/or physician gender-related differences in medical treatment of ambulatory cardiac patients could influence the quality of care provided.

Data from CLARIFY (Prospective observational Longitudinal Registry of patients with stable coronary artery disease) of 33,285 outpatients with stable CAD receiving standard management showed few differences between the treatments received by men and women at baseline. Women in CLARIFY were slightly less likely to be receiving lipid-lowering agents (90.1 vs 92.9%), aspirin (87.0 vs 87.9%), and thienopyridines (25.3 vs 26.8%) and more likely to



None of the differences were statistically significant.



**Figure 1** Rates of Compliance for Select Performance Measures by Patient Gender.

be treated with all categories of antianginal agents (except beta-blockers) than men<sup>[15,16]</sup>. In our study, both men and women received antiplatelet, beta blocker and statin therapy at similar rates but we found that female patients with CAD were less frequently receiving therapy or achieving therapeutic goals for lipid management. It is possible that male patients who had higher prevalence of a prior myocardial infarction received stronger recommendations from physicians about cholesterol management or are more likely to follow through with recommendations than are patients with other manifestations of atherosclerosis. We also found unadjusted rate difference in the prescription of ACEI or ARB therapy in those with concurrent LVEF ≤40% or diabetes being less in women compared to men (69% vs 82%). This apparent difference is not statistically significant and may simply be due to the small number of female patients, only 28, with ejection fractions <40%.

In a nested case-control study of patients with heart failure in the outpatient setting (IMPROVE HF) incremental use of guideline-recommended therapies (beta blocker, cardiac resynchronization therapy, ACEI/ARBs, implantable cardioverter-defibrillators, anticoagulation for atrial fibrillation, and HF education) was associated with survival benefit, plateauing once any 4 therapies were provided<sup>[17]</sup>. In our study, both men and women with heart failure received beta-blocker and ACEI/ARB therapy at similar rates. Although adherence to guidelines is an important predictor of outcome in CHF, the actual dosages of ACEI/ARBs or beta-blockers used have a major impact on mortality and morbidity of patients<sup>[18]</sup>. In the HART trial physician non-adherence was adversely and independently associated with a high number of comorbidities, older age, more advanced HF, and minority status<sup>[19]</sup>. However, we could not measure adherence to recommend doses as they are not collected in the PINNACLE<sup>®</sup> registry.

Atrial fibrillation is the most common cardiac arrhythmia and is associated with a heavy burden of morbidity and mortality, mainly due to an increased risk of cerebrovascular events and cardiac failure. CHADS<sub>2</sub> index integrates elements from several schemes and is based on a point system in which two points are assigned for a history of stroke or TIA and one point each is assigned for age over 75 years and a history of hypertension, diabetes mellitus, or recent heart failure. Anticoagulation with a vitamin K antagonist like warfarin is recommended for patients with more than one moderate risk factor to prevent stroke and systemic thrombo-embolism. In our study the assessment of the thrombo-embolic risk factors in patients with non-valvular Afib and atrial flutter was performed only in 65% of patients and compliance with prescription of warfarin for those with CHADS<sub>2</sub> score ≥2 was only at 62.8%, with a trend towards women being prescribed less compared to men (58% vs 78.6%; *p*=0.09). This disparity is concerning in the light of recent studies identifying female sex as an independent stroke risk factor in some<sup>[20]</sup>. The challenge to assessing the achievement of compliance with the

**Table 2** Compliance for Select Performance Measures by Patient Gender as treated by Male and Female Physicians.

Performance Measure	Male Cardiology Practice			P- Value	Female Cardiology Practice			P- Value
	Total %	Male %	Female %		Total %	Male %	Female %	
CAD <sup>1</sup> : Beta Blocker: prior Myocardial Infarction	95.6 (n=297)	94.7	97.2	0.53	95.5 (n=22)	100	90	0.26
CAD: Antiplatelet Therapy	91.3 (n=897)	91.4	91.1	0.86	91.5 (n=118)	91.7	91.4	0.95
CAD: Low Density Lipid <100	80.1 (n=266)	81.4	78	0.51	75.8 (n=66)	79.4	71.9	0.47
CAD: Statin therapy	96.8 (n=781)	97.5	95.7	0.21	94.9 (n=98)	92.2	97.9	0.33
HF <sup>2</sup> : Left Ventricular Systolic Function Assessment	80.3 (n=279)	82.9	76.5	0.186	84.4 (n=64)	81.8	87	0.56
HF: Patient Self-Care Education	83.9 (n=279)	83.5	84.3	0.86	95.3 (n=64)	93.9	96.8	0.59
HF: Beta Blocker in Patients with LVEF ≤40%	92.2 (n=128)	91.5	93.5	0.68	96.4 (n=28)	100	91.7	0.24
Atrial Fibrillation: Warfarin in Patients with CHADS <sub>2</sub> <sup>4</sup> ≥2	62 (n=242)	67.5	56	0.07	67.4 (n=46)	68.4	66.7	0.9

<sup>1</sup> CAD-Coronary Artery Disease; <sup>2</sup> HF-Heart Failure; <sup>3</sup> LVEF-Left Ventricular Ejection Fraction; <sup>4</sup> CHADS<sub>2</sub>-Congestive Heart Failure, Hypertension, age greater than 75, diabetes mellitus, stroke score

performance measures in these patients is the ambiguity regarding the medical or patient reasons for not prescribing warfarin. With recent improvements in risk stratification of stroke and with the availability of new oral anticoagulants, the value of the PINNACLE<sup>®</sup> registry will increase if these data are incorporated into the data collection form.

Few studies have evaluated the influence of physician gender in the treatment of ambulatory cardiac patients. In a recent observational cross-sectional trial evaluating drug therapy for CHF<sup>[4]</sup>, female physicians provided more complete CHF therapy than male physicians. Female physicians did not treat male or female patients differently with regard to the use and the dosage of ACE-Is or ARBs. In contrast, male physicians favored male patients for both prescription and dosage. Previous studies have also shown that female physicians emphasize patients' needs and opinion and encourage questions and cooperation from their patients more effectively than male physicians<sup>[21]</sup>. In our study, some differences were noted with lower compliance rates for select performance measures in female patients by both male and female physicians but there was no significant difference in the overall treatment provided to the male or female patients by female physicians or male physicians. A study of a greater number of treating physicians with larger patient population, probably using a national database, would provide power to identify more clearly whether physician gender influences ambulatory management of male and female cardiac patients.

#### Limitations

Our study reviewed adherence to guidelines by patients of only 9 male and 3 female Cardiology Fellows. This relatively small sample size may lessen the strength of our findings. Furthermore, our findings may not apply to the greater population of cardiologists. The data for our study were gathered by the physicians caring for the patients. Every effort was made to ensure the accuracy and completeness of these data, but errors and omissions could have occurred. It is possible that some patients considered eligible for treatment that were not treated may have had legitimate reasons that prevented treatment that were not documented in the medical record. Therefore, it is possible that low compliance rates with certain performance measures reflected under-documentation rather than under-performance. We do not have information on patient adherence that would ultimately influence the clinical outcomes. Our only socioeconomic information was the type of health insurance, and unmeasured economic factors may confound the associations we observed. Finally, the PINNACLE<sup>®</sup> registry data set does not include doses of the cardiac medications, nor does it include whether cardiac resynchronization and defibrillator therapies were provided to eligible patients.

## CONCLUSION

In a study with over 2000 patients enrolled in the PINNACLE<sup>®</sup> program from our ambulatory cardiology fellows' clinic, compliance with 10 preselected cardiac performance measures was not shown to be influenced by the gender of the patient or the treating physician. However, compliance with performance measures was variable, identifying an opportunity to improve quality of care of ambulatory patients.

## CONFLICT OF INTERESTS

There are no conflicts of interest with regard to the present study.

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