

# Clinical characteristics and treatment patterns of acute coronary syndrome in a predominantly African-descent population

Trecia McFarlane,

Judith La Rosa,

Luther Clark,

Clinton Brown

& *Samy I McFarlane*<sup>†</sup>

SUNY, Downstate and Kings

County Hospital Center,

Division of Endocrinology,

Diabetes and Hypertension,

450 Clarkson Avenue,

Box 50, Brooklyn, NY

11203, USA

Tel.: +1 718 270 3711

Fax: +1 718 270 6358

smcfarlane@downstate.edu

**Background:** Acute coronary syndrome is the leading cause of morbidity and mortality regardless of race or gender. Although multicenter trials have provided information on gender differences and racial disparities in access to healthcare and application of treatment guidelines, very few data are available that assess gender differences in clinical characteristics, treatment trajectory and the severity of coronary artery obstruction in predominantly African-descent populations. **Methods:** Using the Can Rapid risk stratification of Unstable angina patients Suppress ADverse outcomes with Early implementation of the American College of Cardiology/American Heart Association guidelines (CRUSADE) qualitative initiative, a retrospective chart review was conducted in 198 consecutive patients admitted to the SUNY Downstate University Hospital with the diagnosis of acute coronary syndrome from September 1 2003 to August 31 2004. Sociodemographics, clinical characteristics and treatment patterns for men and women were analyzed. **Results:** Most patients (79.3%) were of African descent. Of the 198 patients in the cohort hospitalized for ACS, 64% were women. Women were more likely to be obese with a body mass index of 30 kg/m<sup>2</sup> or less (54 vs. 45% in men;  $p < 0.01$ ). The prevalence of coronary artery disease risk factors was similar in both sexes, except for insulin-dependent diabetes mellitus, which was noted more in women (54.3 vs. 40.9%;  $p = 0.033$ ) and cigarette smoking, which was noted more in men (22.5 vs. 9.4%;  $p = 0.018$ ). In the first 24 h of presentation, men were twice as likely to receive intravenous heparin (23.9 vs. 11% in women;  $p = 0.024$ ). Statin administration was more likely to be used in women (18.1 vs. 7% in men;  $p = 0.035$ ). Although not statistically significant, men were more likely to be referred for cardiac catheterization (73.2 vs. 66.1% in women;  $p = ns$ ). There was no gender difference in the severity of coronary artery disease obstruction (stenosis  $\geq 50\%$ ) as assessed by coronary catheterization (69.8 vs. 66.6%;  $p = ns$ , for men and women, respectively). **Conclusion:** Gender differences existed in the clinical characteristics and treatment patterns of acute coronary syndrome. However, there was no difference in the severity of coronary artery disease obstruction between men and women. Specific information on cultural attitudes and beliefs that might have influenced the presentation and treatment decision, should be examined in a prospective study.

Coronary heart disease (CHD) is the leading cause of morbidity and mortality in westernized countries [10]. Gender differences in morbidity and mortality of CHD exist, with women more likely to die after myocardial infarction (MI) than men [1]. Despite improvements and advances in medical care, together with the availability of multiple interventions that cause a decline in heart disease mortality, women continue to have disproportionately higher burden of disease mortality than men [1], particularly those with diabetes and ethnic women [2–4].

Although several hypotheses provide an explanation for this gender disparity, contributing evidence indicates that women (particularly diabetics) are less likely to be treated aggressively for this cardiovascular risk factor [5].

Furthermore, women are thought to have more obstructive coronary artery disease (CAD) than men [1]. Therefore, we aimed to assess the gender differences in the clinical characteristics, treatment trajectory and severity of CAD obstruction in men and women presenting with acute coronary syndrome (ACS).

## Methods

### Patient population

A retrospective chart review was performed on 198 patients ( $\geq 18$  years) who were admitted to SUNY Downstate University Hospital (NY, USA, a tertiary-based institution) between September 1 2003 and August 31 2004, with a diagnosis of ACS (either as unstable angina or acute MI [AMI]). In accordance with the American College

**Keywords:** acute coronary syndrome, african-descent population, coronary artery disease, coronary heart disease



Future Drugs Ltd

of Cardiology/American Heart Association (ACC/AHA) guidelines for ACS by Braunwald and colleagues [6], these patients have symptoms consistent with acute ischemia and have at least one of the following electrocardiographic changes consistent with ACS:

- Serial increase in serum cardiac markers (CK-MB and Troponin I)
- Documentation of CAD

Medical records of eligible patients were also examined. Data collection was performed using the Can Rapid risk stratification of Unstable angina patients Suppress ADverse outcomes with Early implementation of the ACC/AHA guidelines (CRUSADE) quality improvement initiative instrument, provided with permission from the Duke Clinical Research Institute (DCRI), Duke University (NC, USA). The study was approved by the Institutional Review Board at SUNY Downstate prior to initiation. The data included:

- Baseline clinical characteristics
- Use of acute medications (home and in the first 24 h)
- Use and timing of both invasive and non-invasive cardiac procedures

- Laboratory results
- In-hospital clinical outcomes
- Discharge therapies and interventions

**Statistical analysis**

For descriptive analyses, comparison between men and women were made on baseline characteristics, treatment patterns and procedure use. Median values were used to describe continuous variables and percentages were reported for categoric variables. Sociodemographic, lifestyle and medical history characteristics were examined by gender, and t-test or chi-square analyses were performed to assess gender differences. These variables included:

- Age
- Body mass index (BMI)
- Race
- Insurance status (private or health maintenance organization, Medicare or Medicaid and self or none)
- Family history of CHD
- Hypertension
- Diabetes mellitus (DM)

**Table 1. Age, ethnic origin and birthplace.**

Variable	Male (%) n = 71	Female (%) n = 127	Total (%) n = 198
Age (yrs) median	60	64	62
<b>Ethnic origin</b>			
Asian	2.8	1.6	2.0
Black	70.4	84.3	79.3
Caribbean-Indian	2.8	1.6	2.0
Caucasian	2.8	1.6	2.0
Hispanic	21.1	10.2	14.1
Other	0.0	0.8	0.5
<b>Birthplace (region)</b>			
Africa (Ghana)	0.0	0.8	0.5
Asia (Bangladesh, Russia, Pakistan & India)	5.6	3.2	4.0
Caribbean*	49.2	38.6	42.4
Central America (Panama & Honduras)	5.6	3.2	4.0
Europe (UK)	1.4	0.0	0.5
North America (USA)	21.1	36.2	30.8
South America (Colombia & Guyana)	11.3	8.7	9.6
Unknown	5.6	9.4	8.1

\*Grenada, Haiti, Cuba, Jamaica, Dominican Republic, Puerto Rico, Grenada, Trinidad & Tobago, St Lucia, St Thomas, St Vincent, Virgin Islands, St Nevis, Barbados and Belize.

**Table 2. Baseline clinical characteristics.**

	Male (%)	Female (%)	Total (%)	p-value
<b>Medical history</b>				
Family CAD history	18.3	22.8	21.2	0.587
Hypertension	91.5	96.9	94.9	0.172
Diabetes requiring insulin <sup>‡</sup>	9.9*	22.8*	18.2	0.033
Current/recent smoker	22.5*	9.4*	14.1	0.018
Hypercholesterolemia	71.8	76.4	74.7	0.499
Prior CAD	59.2	65.4	63.1	0.443
Prior MI	28.2	22.0	24.2	0.388
Prior PCI	33.8	43.3	39.9	0.227
Prior CABG	21.1	21.3	21.2	1.000
Prior CHF	9.9	14.2	12.6	0.504
Prior stroke	8.5	7.1	7.6	0.782
Renal insufficiency	8.5	2.4	4.5	0.070
<b>Health insurance (p value: 0.075)<sup>§</sup></b>				
HMO/Private	33.8	39.7	37.6	
Medicare/Medicaid	46.5	51.6	49.7	
Self/None	19.7	8.7	12.7	

\* $p < 0.05$  for differences between males and females; <sup>§</sup>Overall p-value; <sup>‡</sup>Requiring insulin treatment.

CABG: Coronary artery bypass graft; CAD: Coronary artery disease; CHF: Congestive heart failure;

HMO: Health maintenance organization; MI: Myocardial infarction; PCI: Percutaneous coronary intervention.

- Current/recent smoker
  - Hypercholesterolemia
  - Blood pressure and heart rate on admission
  - ST segment changes
  - Positive cardiac markers
  - Type of facility (i.e., having access to diagnostic cardiac catheterization, percutaneous coronary intervention [PCI] and/or coronary artery bypass graft [CABG])
- Also included was previous history of:
- MI
  - Congestive heart failure
  - PCI
  - CABG
  - Stroke
  - Renal insufficiency

All analyses were performed using the statistical package SPSS 13.0<sup>®</sup> (SPSS, Inc., IL, USA) with statistical significance set at a two-sided  $\alpha$ -level of 0.05.

## Results

### Clinical & demographic characteristics

Most patients in this study presented with symptoms relating to unstable angina/non-ST

elevation (NSTE) MI. Of the 198 patients who met the criteria for ACS, 64% (n = 127) were women and 36% (n = 71) were men (Table 1). The median age for both men and women was 60 and 64 years, respectively. The population consisted primarily of black patients (79.3%) followed by Hispanics (14.1%). These patients were US immigrants from different regions of the world, with most of these individuals (42.4%) from the Caribbean Islands such as Jamaica, Trinidad and Tobago and Haiti, followed by the USA (30.8%). Referring to Table 2, the cohort had a high prevalence of hypertension (94.9%) hypercholesterolemia (74.7%), prior CAD history (63.1%), and DM (49.5% for insulin-dependent DM [IDDM] and nonIDDM combined). The prevalence of renal insufficiency was low (4.5%). There were no differences in gender with respect to medical history except for IDDM history (female: 22.8%; male: 9.9%; p-value 0.033) and current/recent smoking (female: 9.5%; male: 23.9%; p value 0.018). Both men and women had Health Maintenance Organization/private and Medicare/Medicaid health insurance. However more men (19.7%) were self-paid or had no insurance, in comparison with women (8.7%). As shown in Table 3 the median BMI for men and

**Table 3. Body mass index by gender.**

Variable	Male (%) n = 71	Female (%) n = 127	Total (%) n = 198
BMI median	28.2	30.7	29.4
BMI < 25	20.3 (n = 13)	14.0 (n = 16)	16.3 (n = 29)
BMI ≥ 25-29.99*	50.0 (n = 32)	31.6 (n = 36)	38.2 (n = 68)
BMI ≥ 30*	29.7 (n = 19)	54.4 (n = 62)	45.5 (n = 81)

\*Chi-square (<0.01). BMI: Body mass index (in standard measurements).

women was 28.2 and 30.7 ( $p < 0.01$ ), respectively. In this population, men were more likely to be overweight (BMI: 25–29.9 kg/m<sup>2</sup>), 50 versus 31.6% in women;  $p < 0.01$ . Women were more likely to be obese (BMI > 30 kg/m<sup>2</sup>, 54.4 vs. 29.7% in men).

#### Treatment pattern

There were no differences between gender for acute (within 24 h) and discharge medications except for intravenous heparin and statin administration in the first 24 h (Table 4). Intravenous heparin was being administered more in men (23.9%) versus women (11.0%;  $p = 0.045$ ), while statin use was more prevalent in women 18.1 versus 7.0% in men ( $p = 0.035$ ).

Two thirds of the study population underwent cardiac catheterization (Table 5). Although men were more likely to be referred for cardiac catheterization than women, this was not statistically significant ( $p = 0.302$ ). There was no difference in

**Table 4. Use of medical treatment by gender.**

	Male (%)	Female (%)	Total (%)
<b>Medication in 1st 24 h</b>			
GP1Ib/IIIa	38.0 (n = 27)	37.8 (n = 48)	37.9 (n = 75)
ASA	78.9 (n = 56)	78.0 (n = 99)	78.3 (n = 155)
Heparin i.v.*	23.9 (n = 17)	11.0 (n = 14)	15.7 (n = 31)
Heparin LMW	53.5 (n = 38)	55.9 (n = 71)	55.1 (n = 109)
β-blocker	54.9 (n = 39)	53.5 (n = 68)	54.0 (n = 107)
Statin†	7.0 (n = 5)	18.1 (n = 23)	14.1 (n = 28)
Clopid	31.0 (n = 22)	23.6 (n = 30)	26.3 (n = 52)
<b>Discharge medication</b>			
ASA	87.3 (n = 62)	85.8 (n = 109)	86.4 (n = 171)
β-blocker	71.8 (n = 51)	70.1 (n = 89)	70.7 (n = 140)
ACEI/ARB	59.2 (n = 42)	62.2 (n = 79)	61.1 (n = 121)
Statin	66.2 (n = 47)	67.7 (n = 86)	67.2 (n = 133)
Clopid	66.2 (n = 47)	68.5 (n = 87)	67.7 (n = 134)

\*Chi-square ( $p$ -value 0.024); †Chi-square ( $p$ -value 0.035).

ACEI: Angiotensin-converting enzyme inhibitor; ARB: Angiotensin II type I receptor blocker; ASA: Acetylsalicylic acid; GP: Glycoprotein; i.v.: Intravenous; LMW: Low molecular weight.

the degree of coronary artery obstruction between men and women (66.6 vs. 69.8%, respectively). Those considered to have significant CAD must have 50% or less obstruction in one or more major epicardial coronary vessels. We used this criterion as applied in accordance with the CRUSADE qualitative initiative. In the cohort, more women were referred for revascularization; however, this difference was not significant.

#### Discussion

In a predominantly African-descent immigrant population, our study demonstrates gender differences in the baseline clinical characteristics and risk factors for CAD in patients presenting with ACS. Consistent with previous data, men in our cohort were more likely to receive intravenous heparin during the acute presentation of ACS. However, statin use was more frequent in female patients. Notably, there were no differences in glycoprotein (GP)IIb/IIIa, acetylsalicylic acid and β-blocker use between men and women in our cohort – in the first 24 h or at the time of discharge. Whether this finding represents improvement in the care provided to women contrary to previously published data remains to be seen in future studies.

Overall, the high prevalence of hypertension, hypercholesterolemia and DM is consistent with the myriad chronic diseases and other health problems that disproportionately affect people of African descent. The study revealed no significant differences between gender with regards to these CAD risks factors except for DM and cigarette smoking. The higher prevalence of DM among women noted in our study might reflect the higher rate of obesity observed in this patient population.

Finally, our data showed no gender differences in the amount of coronary obstruction or in the presence of traditional cardiovascular risk factors (except for DM and obesity), indicating that other nontraditional risk factors, such as inflammation and hypercoagulability, might play a disproportionately higher role in cardiovascular morbidity and mortality among women compared with men.

#### Study limitations

Several limitations of the study must be acknowledged. First, our data are limited by the small sample size as well as other factors pertaining to the retrospective design of the study. The study was only performed at one institution in a particular Brooklyn neighborhood. Finally, as this was a chart

**Table 5. Invasive procedures by gender.**

Variable	Male (%)	Female (%)	Total (%)
Cardiac catheterization	71.8 (n = 51)	65.4 (n = 83)	67.6 (n = 134)
Obstructive CAD (stenosis ≥ 50%)	66.6 (n = 34)	69.8 (n = 58)	68.6 (n = 92)
Revascularization	64.7 (n = 22)	72.4 (n = 42)	69.6 (n = 64)

CAD: Coronary artery disease.

review, only limited information was available regarding sociodemographic factors such as level of education and income, post hospitalization clinical outcomes, cultural attitudes, and belief system.

### Conclusion

From this pilot study, a prospective longitudinal study is being implemented to assess the impact of the metabolic syndrome component and religious/cultural attitudes and beliefs, which may play a vital role in the time to treatment dilemma in this patient population. The metabolic syndrome describes a state of hypertension, insulin resistance, abdominal obesity, dyslipidemia and prothrombosis/proinflammation that has been shown to increase risk of atherosclerosis and correlates with poor clinical outcomes. Also, more hospitals in other Brooklyn neighborhoods are needed to participate for a more racially and ethnically diverse study population.

Acculturation in the USA may have undesirable effects on the health of many immigrants' lifestyle practices. Such practices which include smoking, drinking alcohol, drug use and unhealthy dietary patterns may account for a greater burden of disease than they would in their respective countries of origin. Further

### Highlights

- In a select urban population of men and women, largely of African descent, coronary artery disease (CAD) risk factors differed, but the severity of CAD did not.
- Treatment patterns differed between men and women regarding the use of intravenous heparin and statin.
- Men were twice as likely to receive heparin compared with women.
- However, women were more likely to receive statin therapy compared with men.

### Bibliography

1. Blomkalns AL, Chen AY, Hochman JS *et al.* Gender disparities in the diagnosis and treatment of non-ST-segment elevation acute coronary syndromes. *J. Am. Coll. Cardiol.* 45(6), 832–837 (2005).
2. Nicasio J, El-Atat F, McFarlane SI, LaRosa JH. Cardiovascular disease in diabetes and the cardiometabolic syndrome: focus on minority women. *Curr. Diab. Rep.* 5(3), 208–213 (2005).
3. Sorelle R. Cardiovascular disease rates in women with diabetes. *Circulation* 104(20) e9044–e9045 (2001).
4. Coulston AM. Cardiovascular disease risk in women with diabetes needs attention. *Am. J. Clin. Nutr.* 79, 931–932 (2004).

analyses of ACS in foreign-born immigrants are needed to address these practices which assimilate the American lifestyle, and the impact that these practices may have on future generations.

### Information resources

- McFarlane SI, Jacober SJ, Winer N *et al.* Control of cardiovascular risk factors in patients with diabetes and hypertension at urban academic medical centers. *Diabetes Care* 4, 718–723 (2002).
- Bhatt DL, Roe MT, Peterson ED *et al.* Utilization of early invasive management strategies for high-risk patients with non-ST-segment elevation acute coronary syndromes. *JAMA* 292, 2096–2104 (2004).
- Gu K, Cowie CC, Harris MI. Diabetes and decline in heart disease mortality in US adults. *JAMA* 281(14), 1291–1297 (1999).
- Roe MT, Ohman EM, Pollack CV *et al.* Changing the model of care for patients with acute coronary syndromes. *Am. Heart J.* 146, 605–612 (2003).
- Nakamura Y, Moss AJ, Brown MW *et al.* Ethnicity and long-term outcome after an acute coronary event. *Am. Heart J.* 138, 500–506 (1999).
- Patel H, Rosengren A, Ekman I. Symptoms in acute coronary syndromes: Does sex make a difference? *Am. Heart J.* 148, 27–33 (2004).
- Sowers JR. Recommendations for special populations: diabetes mellitus and the metabolic syndrome. *Am. J. Hypertens.* 16(Suppl. 11), 41–45 (2003).
- Himbert D, Klutman M, Steg G *et al.* Cigarette smoking and acute coronary syndromes: A multinational observational study. *Int. J. Cardiol.* 100(1), 109–117 (2005).
- Hoekstra JW, Pollack CV, Roe M *et al.* Improving the care of patients with non-ST-elevation acute coronary syndromes in the emergency department: The CRUSADE Initiative. *Acad. Emerg. Med.* 9(11), 1146–1155 (2002).

### Acknowledgement

The authors wish to thank the invaluable contributions of Edmond Malka, MPH and Michael Joseph, PhD, MPH.

5. McFarlane SI, Castro J, Kaur J *et al.* Control of blood pressure and other cardiovascular risk factors at different practice settings: outcomes of care provided to diabetic women compared to men. *J. Clin. Hypertens.* 7(2), 73–80 (2005).
6. Braunwald E, Antman EM, Beasley JW *et al.* for the ACC/AHA committee on the management of patients with unstable angina. 2002 Guideline update for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction – summary article: a report of the American College of Cardiology/American Heart Association task force on practice guidelines. *J. Am. Coll. Cardiol.* 40(7), 1366–1374 (2002).

#### Website

101. American Heart Association, Heart Disease and Stroke Statistics 2005 (Updated). [www.americanheart.org](http://www.americanheart.org) (Accessed October 2005).

#### Affiliation

*Trecia McFarlane MD,  
SUNY, Downstate and Kings  
County Hospital Center,  
Department of Preventive Medicine,  
and Community Health,  
450 Clarkson Avenue, Box 50, Brooklyn,  
NY 11203, USA  
sherricia@aol.com*

*Judith La Rosa, PhD, RN  
Professor of Preventive Medicine  
and Community Health  
SUNY, Downstate and Kings  
County Hospital Center,  
450 Clarkson Avenue, Box 50, Brooklyn  
NY 11203, USA  
Judie.LaRossa@downstate.edu*

*Luther Clark, MD  
Professor and Chief  
SUNY, Downstate and Kings  
County Hospital Center,  
Division of Cardiovascular Medicine,  
450 Clarkson Avenue, Box 50, Brooklyn,  
NY 11203, USA  
Luther.Clark@downstate.edu*

*Clinton Brown, MD  
Associate Professor  
SUNY, Downstate and Kings  
County Hospital Center,  
Division of Nephrology  
450 Clarkson Avenue,  
Box 50, Brooklyn,  
NY 11203, USA  
Clinton.Brown@downstate.edu*

*Samy I McFarlane, MD, MPH, FACP,  
Associate Professor of Medicine,  
Interim Chief  
SUNY, Downstate and Kings  
County Hospital Center,  
Division of Endocrinology,  
Diabetes and Hypertension,  
450 Clarkson Avenue,  
Box 50, Brooklyn,  
NY 11203, USA  
Tel.: +1 718 270 3711  
Fax: +1 718 270 6358  
smcfarlane@downstate.edu*