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Comparison of Cardiometabolic Risk and Associated Outcomes Among Elderly African Americans with a Nurse Practitioner Patient Navigator

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Abstract

The purpose of this study was to examine cardiometabolic risk, using continuous Metabolic Severity Score (MetS), and associated health outcomes (anthropometric measurement waist circumference or WC; BMI, physiological outcomes (BP), laboratory results (FBG, HDL, TRI) with and without the Nurse Practitioner Patient Navigator (NPPN) among elderly African Americans (AAs). A retrospective comparative design with a convenience sample (N = 60) was utilized to monitor MetS at baseline and after 6 months, from two groups, with NPPN and PCP (NPPNG), and with PCP (UCG) only. Results revealed statistically significant MetS differences between NPPNG and UCG (at baseline (p = .017), and after 6 months (p = .003). There was also statistically significant difference of MetS between baseline and after 6 months for NPPNG only (p = .002), and for male NPPNG patients (p = .016). Also, resource utilization analysis revealed insignificant differences between groups, except for unplanned office visit and medication refill (p = .006 and p = .022, respectively). Overall, results demonstrated lower MetS and medication refill rates in patients who were under the care of both PCP and NPPN. However, further research needs to be conducted to confirm current findings.

Keywords: Cardiometabolic Risk (CMR); Metabolic Severity Score (MetS); Nurse Practitioner (NP)

Introduction

African Americans (AAs) have higher mortality, morbidity, and disability from Cardiovascular Disease (CVD) than other ethnic groups in the United States (U.S.) [1]. For AAs, CVD remains the leading cause of death in the United States [2]. In 2010, among the elderly (65 years and older), CVDs was attributed to 500,000 deaths, and heart disease was the leading cause of death for both men and women in all racial and ethnic groups including whites, blacks, and Hispanics [3]. As a result, chronic disease, including Cardiometabolic Risk (CMR) is a major burden and precursor to symptomatic CVD, such as ischemic heart disease and stroke [3,4]. CMR is defined as a combination of traditional risk factors and includes increased body mass index (BMI)), high blood pressure (BP), high triglycerides (TRI), low High-Density Lipoprotein-(HDL), Cholesterol (CHOL), and High Fasting Glucose (FBG) [5]. Traditionally, CMR is determined in clinical practice using categorical criteria based on meeting 3 of the 5 traditional risk factor components with different reference range levels to indicate abnormalities [6]. Despite its utility and widespread use, traditional CMR criteria pose an important limitation namely, its inability to recognize that CMR exists as a continuum of risk and the overall, CMR severity or burden [6]. Due to this challenge, following individual changes overtime is difficult and often unreliable [6]. Another limitation is although there are recognized gender differences, reference ranges are based on years of studies from predominantly white participants, so the criteria is not ethnic specific [6]. This aspect is significant because in contrast to white populations, AAs tend to have higher TRI and low HDL [6,7]. Moreover, the use of categorical variables statistically decreases

power to measure outcomes from intervention studies [6].

Given these limitations, there has been an on-going need to improve measurement of CMR severity. The latest development involves a continuous metabolic severity score (MetS) developed by Gurka [6]. In general, the improved scoring system calculates a MetS from the five MetS components [6]. The MetS standardize the scores based on gender and race/ethnicity which results in overall scores that produces an overall estimate of MetS. The resulting MetS are z-scores derived from confirmatory factor analysis of the above-mentioned traditional MetS components to establish their weighted contribution to the latent MetS factor based on gender and race/ethnicity [6]. The MetS ranges from 0.60 and -0.45 [8]. Negative values typically indicate absence of, or low MetS, and positive values show high MetS [6,9]. Findings from one study revealed that MetS correlated to patient risk for Type 2 Diabetes Mellitus (T2DM) and CVD, so that low scores indicate lower incidence of these diseases, and higher scores as better indicators for the occurrence of T2DM and CVD [6]. As a result, MetS were used to determine and identify patients that are at high risk for cardiometabolic syndrome and may be utilized by health care providers as a basis to promote health and lifestyle changes [10]. For example, in a 10-year cohort study involving 15,792 participants aged 45-64 years, MetS was shown as a diagnostic tool in following an individual's MetS severity development, thus showing its potential in minimizing patient's risk for CVD [10].

Role of Nurse Practitioner as a Patient Navigator

Because there is a greater prevalence of CMR among AAs, primary and secondary intervention is a priority among health care providers, especially in the primary care setting. The Nurse Practitioner Patient Navigator (NPPN) was recently introduced as a possible role to improve health outcomes. The patient navigator concept began in Harlem Hospital, New York in 1990 by Harold Freeman, MD to help the underserved patients get a cancer diagnosis and to have access to timely care.[11] This change created a 31% increase in breast cancer survival rates from 1995-2000 [11]. With this success, the National Cancer Institute implemented the Patient Navigator Academy to train navigators in 2005 [11].

The NPPN was designed to improve the quality of health care [11]. The elderly population is increasing and with it comes increases in chronic disease, which raises health care costs, necessitating coordination of care [11]. However, the best coordination of care model is one wherein a patient receives personalized primary care [11]. The goal for an NPPN is to enhance patient experience and satisfaction in their care, be cost effective, and improve care outcomes [11]. For example, NPPNs assess medication complaints to determine medication changes or increases, review current labs and relevant history, and educate patients on diet and sedentary lifestyles [12]. However, provision of excellent care also poses some of the challenges for an NPPN. Some of these difficulties include coordinating resources, performing services, and integrating data from multiple sources into one [13]. The NPPN also must be flexible in his or her work schedule to meet patient care needs and must be available for immediate response to physicians and patients. It is also important to have good communication and organizational skills and maintaining continue relationships with patients. A study [12] tested the effectiveness of NPPN in the management of Type 2 Diabetes (T2DM) in men and women with average age of 57.6 years. Findings revealed that majority of the patients who had NP-guided and PCP care achieved important health benchmarks such as hemoglobin A_{1c} (HbA_{1c}), systolic/diastolic blood pressures and Low-Density Lipoprotein Cholesterol (LDL-C), compared to the group of patients who were only monitored by their PCP. Despite the potentially good outcomes of this study, it still has some glaring several limitations: small sample size and lack of gender and ethnic distinction. Therefore, it is still not known if an NPPN can improve CMR and associated outcomes among elderly AAs in a primary care setting [12].

Purpose of the Study

The purpose of this study was to compare CMR and associated outcomes among elderly AAs with a NPPN versus usual care in primary care setting. The objectives of the study were: 1) to compare MetS of elderly AAs at baseline and six months between and within two groups: with a Primary Care Physician (PCP) versus those with a combined NPPN and a PCP; and 2) to compare resource utilization (i.e. hospital admissions, emergency department visits, unplanned office visits, and medication refill rates) between the two groups at 6 months.

Methods

This study was a retrospective comparative design utilizing a convenience sample from one southwestern primary care clinic. Appropriate approval to conduct this study, was granted by the clinic and the Institutional Review Board at the University of Alabama.

Setting

The primary care clinic was managed by a small staff comprising of one physician, a medical assistant, an office manager and a biller. The clinic provides primary preventive care of elderly patients with and without chronic illnesses such as diabetes, hypertension, heart disease.

Participants

Inclusion criteria was: 1) self-identified African American, 2) 65 years of age or older, 3) English speaking, and 4) who met all the components of CMR needed to compute a MetS. Exclusion criteria included: patients with renal failure, cancer, or were involved in other studies.

Procedure

The electronic database was queried for participants meeting the inclusion criteria until there were 60 participants in each group: the NPPN group (NPPNG) and Usual Care (UCG). The subjects were randomized into two groups: NPPNG comprised of subjects who were supported by combined roles of NPPN and PCP, and UCG included subjects who were supported by a PCP only. During the study, the NPPNG group had access to both an NPPN and their PCP, and the UCG group only had access their PCP. The NPPN also maintained a flexible work schedule that is dependent on patient needs, coordinated patient care and was always accessible to patient questions and concerns 24 hours a day. Also, patients from both groups received patient education on low-cholesterol diet, in print. Patients in NPPNG received additional education from the NPPN through verbal explanation and repetition, while the UCG received the printed patient education from their PCP only.

The following variables were recorded from the participants' electronic record at baseline and 6 months later:

1) Anthropometric measurement (waist circumference or WC; BMI),
2) Physiological outcomes (BP),
3) Laboratory results (FBG, HDL, TRI)
4) Resource utilization (hospital admissions, emergency department visits, unplanned office visits, and medication refill rates)

MetS for each participant was then calculated using an online MetS calculator developed by Gurka based with the following components: WC, BMI, TRI, HDL, systolic BP and FBG [6].

Data Analysis

Descriptive statistics were used for participant characteristics, physiological and anthropometric measurements, laboratory results and resource utilization. Between group comparison was performed using two-tailed t-test of independent samples. To compare MetS scores at baseline and at 6 months, a paired t-test was used. Chi square test was utilized for categorical variables. A p-value of $< .05$ was considered statistically significant [14]. Statistical analyses were conducted using SPSS version 22 [15].

Results

Patient Characteristics

Age and Gender: Overall, there were 50% (N = 60) males and 50% (N = 60) females. In each group, there were 50% (N = 30) males and 50% (N = 30) females. Average mean age for total sample was 69.65 (SD = 2.1) years. In NPPNG group, the overall mean age was 71.2 (SD = 3.9) years. Mean age of males was 73.4 (SD = 2.6) years, and female mean age was 68.7 (SD = 1.8) years (Table 1). In UCG group, overall mean age was 68.1 (SD = 2.9) years. Male mean age was 69.2 (SD = 1.5) years, and female mean age was 67.0 (SD = 2.0) years. There was no statistical significance in overall ages between the two groups (p = .23).

	ALL	NP	UCG	p-value	
				NPPNG	UCG
WC					
Baseline				.002*	.711
Male	29.95 (4.64)	28.67 (4.34)	31.23 (4.64)		
Female	31.93 (4.91)	32.13 (4.05)	31.73 (5.71)		
6 months				.001*	.711
Male	29.85 (4.66)	28.47 (4.32)	31.23 (4.64)		
Female	31.93 (4.91)	32.13 (4.05)	31.73 (5.71)		
Triglycerides					
Baseline				.342	.731
Male	227.75 (25.09)	232.23 (22.05)	223.27 (27.43)		
Female	225.50 (41.81)	224.4 (28.86)	226.6 (45.20)		
6 months				.126	.041*
Male	220.68 (22.45)	218.03 (20.87)	223.33 (23.98)		
Female	207.72 (31.73)	206.67 (34.09)	208.77 (29.74)		
HDL					
Baseline				.178	.871
Male	42.27 (10.66)	41.6 (10.72)	42.93 (10.74)		
Female	40.87 (7.92)	38.4 (7.04)	43.33 (8.08)		

6 months				.013*	.004*
Male	43.85 (10.50)	46.83 (10.70)	46.87 (10.47)		
Female	40.73 (5.63)	40.97 (6.38)	40.50 (4.86)		
SBP					
Baseline				.528	.397
Male	145.45 (21.38)	136.77 (21.79)	154.13 (17.29)		
Female	144.95 (20.71)	140.1 (18.71)	149.8 (21.78)		
6 months				.528	.397
Male	145.45 (21.38)	136.77 (21.79)	154.13 (17.29)		
Female	144.95 (20.71)	140.1 (18.71)	149.8 (21.78)		
Glucose					
Baseline				.055	.049*
Male	137.38 (25.82)	132.67 (23.31)	142.1 (27.69)		
Female	124.98 (22.88)	120.4 (25.06)	129.57 (19.85)		
6 months				.055	.049*
Male	137.38 (25.82)	132.67 (23.31)	142.1 (27.69)		
Female	124.98 (22.88)	120.4 (25.06)	129.57 (19.85)		

Table 1: Summary of Patient Anthropometric and Laboratory Measurements. Mean (SD). * statistical significance at $p < 0.05$. N = 60.

Waist Circumference: The overall mean WC for the NPPNG was 30.40 inches (SD = 4.51 inches) at baseline and 30.30 inches (SD = 4.54 inches) at 6 months (Table 1). The mean WC for the males in the NPPNG was 28.67 inches (SD = 4.34 inches) at baseline and 28.47 inches (SD = 4.32 inches) at 6 months. The mean WC for the females in NPPNG was 32.13 inches (SD = 4.05 inches) at baseline and it was the same (mean = 32.13 inches, SD = 4.05) at 6 months. The overall mean WC for the UCG was 31.48 inches (SD = 5.17 inches) at baseline and at 6 months. The male mean WC was 31.23 inches (SD = 4.64) at baseline and at 6 months. The female mean WC for the UCG was 31.73 inches (SD = 5.71 inches) at baseline and at 6 months. For both initial and after 6-month measurement period, WC of females in NPPNG was significantly higher than males: at baseline p =.002, and at 6 months' p = .001. Table 1 provides a summary of this variable.

Systolic Blood Pressure: The overall mean systolic BP for the NPPNG was 138.43 mmHg (SD = 20.21 mmHg) at baseline and at 6 months. The mean systolic BP for the males in the NPPNG was 136.77 mmHg (SD = 21.79 mmHg) both at baseline and at 6 months. The mean systolic BP for the females in NPPNG was 140.10 mmHg (SD = 18.71 mmHg) at both time periods. The overall mean systolic BP for the UCG was 151.97 mmHg (SD = 19.62 mmHg) at both time periods. The male mean systolic BP was 154.13 mmHg (SD = 17.29 mmHg) at both time periods. The female mean systolic BP for the UCG was 149.80 mmHg (SD = 21.78 mmHg) for both time periods. There were no significant differences in systolic BP between groups at baseline and at 6 months (for NPPNG, p = .528 for and for UCG, p = .397). Table 1 provides a summary of this variable.

Fasting Blood Glucose: The overall FBG for the NPPNG was 126.53 mg/dl (SD = 24.78 mg/dl) at both time periods. The mean FBG for the males in the NPPNG was 132.67 mg/dl (SD = 23.31 mg/dl) at both time periods. The mean FBG for the females in NPPNG was 120.40 mg/dl (SD = 25.06 mg/dl) at both time periods. The overall mean FBG for the UCG was 135.83 mg/dl (SD = 24.71 mg/dl) at both time periods. The male mean FBG was 154.13 mg/dl (SD = 17.29 mg/dl) at both time periods. The female mean FBG for the UCG was 149.80 mg/dl (SD = 21.78 mg/dl) at both time periods. FBG levels of males in UCG were higher than females before and after six months (p = 0.49). Table 1 provides a summary of this variable.

Triglycerides: The overall mean TRI for the NPPNG was 228.32 mg/dl (SD = 31.58 mg/dl) at baseline and 212.35 mg/dl (SD = 28.60 mg/dl) at six months (Table 1). The mean TRI for the males in the NPPNG was 232.23 mg/dl (SD = 22.05 mg/dl) at baseline and 218.03 mg/dl (SD = 20.87 mg/dl) at 6 months. The mean TRI for the females in NPPNG was 224.40 mg/dl (SD = 38.86 mg/dl) at baseline and 206.67 mg/dl (SD = 34.09 mg/dl).at 6 months. The overall mean TRI for the UCG was 224.93 mg/dl (SD = 37.11 mg/dl) at baseline; and 216.05 mg/dl (SD = 27.77 mg/dl) at 6 months. The male mean TRI was 223.27 mg/dl (SD = 27.43 mg/dl) at baseline and 223.33 mg/dl (SD = 23.98 mg/dl) at 6 months. The female mean TRI for the UCG was 226.60 (SD = 45.20) at baseline and 208.77 (SD = 29.74) at 6 months. Statistically significant differences between genders were found at the end of the 6- month period for UCG (p = .041). Table 1 summarizes this variable.

High-Density Lipoprotein: The overall mean HDL for the NPPNG was 40.00 mg/dl (SD = 9.14) at baseline and 43.90 mg/dl (SD = 9.22) at 6 months. The mean HDL for the males in the NPPNG was 41.60 mg/dl (SD = 10.72) at baseline and 46.83 mg/dl (SD = 10.70) at 6 months. The mean HDL for the females in NPPNG was 38.40 mg/dl (SD = 7.04) at baseline and 40.97 mg/dl (SD = 6.38) at 6 months. The overall mean HDL for the UCG was 43.13 mg/dl (SD = 9.43) at baseline and 43.68 mg/dl (SD = 8.71) at 6 months. The male mean HDL was 42.93 mg/dl (SD = 10.74) at baseline and 46.87 mg/dl (SD = 10.47) at 6 months. The female mean HDL for the UCG was 43.33 mg/dl (SD = 8.08) at baseline and 40.50 mg/dl (SD = 4.86) at 6 months. Females had significantly lower HDL values than males: NPPNG, p = .013 versus UCG, p = .004. Table 1 provides a summary of this variable.

Objective1: To compare MetS of Elderly African Americans at Baseline and Six Months between the two Groups and Within Groups, UCG versus NPPNG

Mets Between and Within Groups: The overall mean Mets for the NPPNG was 0.78 (SD = 0.61) at baseline, and 0.68 (SD = 0.62) at 6 months (Table 2). For the NPNNG, the mean male MetS at baseline was 0.76 (SD = 0.58) and for females, it was 0.80 (SD = 0.65) (Table 2). At 6 months, the mean male MetS was 0.63 (SD = 0.52) and for females was 0.73 (SD = 0.71). For overall genders in NPPNG, there was statistically significant differences between baseline and at 6 months (p = .002) (Table 2). There was also statistically significant difference in MetS between baseline and at 6 months for males in the NPPNG (p = .016); but not for females in NPPNG (p = .060) (Table 2). The overall mean Mets for UCG was 1.05 (SD = 0.61) at baseline and 1.02 (SD = 0.61) at 6 months. For the UCG, the mean male MetS at baseline was 1.13 (SD = 0.68) and for females was 0.98 (SD = 0.54). At 6 months, the mean male MetS was 1.06 (SD = 0.67) and for females was 0.97 (SD = 0.54). There was no MetS differences between baseline and at 6 months within UCG (p =.256). There were also no MetS differences between baseline and at 6 months within each gender (p = .244 for males, and p = .870 for females). In evaluating MetS differences between the two groups, NPPNG and UCG were different at baseline (p = .017) and at 6 months (p = .003). Table 2 summarizes these findings.

MetS between NPPNG and UCG	p-value		
Baseline	.017*		
6 months	.003*		
MetS within Groups	NPPNG	UCG	p-value
Baseline			
All	0.78 (0.61)	1.05 (0.61)	.002*
Male	0.76 (0.58)	1.13 (0.68)	.016*
Female	0.80 (0.65)	0.98 (0.54)	.060
6 months			
All	0.68 (0.62)	1.02 (0.61)	.256
Male	0.63 (0.52)	1.06 (0.67)	.244
Female	0.73 (0.71)	0.97 (0.54)	.870

Table 2: Between and Within Group MetS Differences. * statistical significance at $p < 0.05$. N = 3.

Objective 2: To Compare Resource Utilization Between the Two Groups at 6 Months

1.1.1. Hospital Admission: The total hospital admission for the NPPNG at 6 months was at 8% (N = 5); total hospital admission for the UCG at 6 months was 12% (N = 7). There were a variety of reasons for hospital admission and included: falls, upper respiratory infection, pneumonia. Hospital admissions by gender revealed a total of 8% (N = 5) males and 12% (N = 7) females went to the hospital during the study period. For the NPPNG, there were 40% (N =2) males and 60% (N = 3) females who were admitted. For the UCG, there were 43% (N = 3) males and 57% (N = 4) females who were admitted. There were no statistically significant differences between NPPNG and UCG (p = .543). There were also no significant differences between gender within NPPNG (p = .640), and within UCG (p = .688). Table 3 summarizes these findings.

Variables	NPPNG		UCG		p-value
	% (n)	Total % (n)	% (n)	Total % (n)	
Hospital admission		8% (5)		12% (7)	0.543
Male	40% (2)		43% (3)		
Female	60% (3)		57% (4)		
ED visit		8% (5)		18% (11)	0.107
Male	40% (2)		45% (5)		
Female	60% (3)		54% (6)		
Unplanned office visit		0% (0)		12% (7)	.006*

Male	0% (0)		43% (3)		
Female	0% (0)		57% (4)		
Medication refill		0% (0)		8% (5)	.022*
Male	0% (0)		60% (3)		
Female	0% (0)		40% (2)		

Table 3: Summary of Resource Utilization by Study Participants. Data are % and raw number (in parentheses). Taken 6 months after initiation of study. * significance at $p < 0.05$.

Emergency Department Visit

The mean ED visits for the NPPNG at 6 months was at 8% (N = 5) and the mean ED visits for the UCG at 6 months was 18% (N = 11). Reasons for ED visits were all due to upper respiratory infection. ED visits by gender revealed 12% (N = 7) males and 15% (N = 9) females went to the ED during the study period. For the NPPNG, there were 40% (N = 2) males and 60% (N = 3) females who visited the ED. For the UCG, there were 45% (N = 5) males and 54% (N = 6) females who visited the ED. There were no statistically significant associations between NPPNG and UCG (p = .107). In examination by gender, there was no statistically significant finding within the NPPNG (p = .640) and UCG (p = .739). Table 3 summarizes these findings.

Unplanned Office Visit: There was no unplanned office visit for the NPPNG at 6 months. Unplanned office visits for the UCG at 6 months was 12% (N = 7). Reasons for office visits in the UCG included medication refills and treatment of urinary infection. For the UCG, there were 43% (N = 3) males and 57% (N = 4) females who made unplanned office visit. This difference in frequency between the two groups was statistically significant (p = .006), while gender association within UCG was not (p = .688). Table 3 summarizes these findings.

Medication Refills: There were no medication refills for the NPPNG at 6 months. The medication refill for the UCG at 6 months was 8% (N = 5). For the UCG, there were 60% (N = 3) males and 40% (N = 2) females who had their medications refilled. Between group differences revealed statistically significant findings in the UCG (p = .022). Table 3 summarizes these findings.

Discussion

MetS Scores Between Groups and Time Periods

The purpose of this study was to compare CMR, expressed as MetS and associated outcomes among elderly AAs with a NPPN versus usual care in primary care setting. Study results showed that there is statistically significant difference between NPPNG and UCG. Our results were similar to previous studies examining care coordination among various patients undergoing various health treatments ranging from CVD prevention with T2DM patients [16], Heart Failure (HF) management [17], and T2DM Electrophysiology (EP) care [18]. In all these studies, the investigators reiterated the centrality of NP in coordination of care among patients to achieve major health improvements so that patients who underwent health procedures with NP assistance fared better than those who did not.

Statistically significant differences of MetS during the two time periods were also found, but only within the NPPNG. MetS in both groups and with genders at baseline had higher scores than scores taken at the end of the study. Interestingly, between group comparisons of MetS showed statistically significant differences between groups. Study results reveal that NPPNG had comparably lower MetS than UCG. This may be attributed to the type of patient care by the NPPN. These patients had lower MetS, indicating lower CMR severity than the UCG, which would be appropriate for NP care. Consideration should also be given to the role of the NPPN. The NP had easy and quick access to other specialists such as cardiologist, endocrinologist, and gastrologist. The NP then coordinated the care by setting appointments, reviewing doctor recommendations with patients, and making sure that they were implemented and followed.

Improvements in health care due to the additional presence of NP was also similarly reported for patients with various diseases [11,19,20]. In particular, the presence of NPPN to assist underprivileged patients to access cancer diagnosis and care, saw a 31% increase in breast cancer survival rates from 1995 to 2000 [11]. Similarly, improvements in kidney function and overall renal outcome were observed among patients with chronic kidney diseases (CKD) when additional support was given by NPPN (in addition to physician care) in the strict implementation of current CKD guidelines [19]. There was a 20% reduction in incidence of composite renal endpoint (including death) among CKD study participants. In another study, NPPNs contributed to a reduction in readmission of stroke patients discharged at home [20]. Specifically, the study found that patients, who not only were stroke victims but had multiple chronic conditions such as T2DM, coronary artery disease, congestive heart failure, had a 48% reduction in 30-day

readmission after visiting an NPPN-led stroke clinic, 2 weeks after hospital discharge [20].

Differences in Resource Utilization Between Groups at 6 Months

In terms of resource utilization, unplanned office visit and medication refill showed significant differences between NPPNG and UCG. Moreover, NPPNG participants showed an increase compliance of medication as noted on medication refill rate from the pharmacy by the NP patient. Our study results support similar findings where a high (77%) mean medication adherence rate was achieved among patients receiving care from NPPNs [21]. Also, study results suggest that patients who were under NP care had no need for an unplanned office visit and for refilling their medicine, at least during the six-month period. This may be a result of the personalized care and communication that AA patients under NPPN experienced since they were instructed to call their NP prior to any clinical visits, hospital admissions, and ED visits. This unique patient management that an NPPN provide had been well-documented in psoriasis disease care [21]. The authors reported that NPPNs (as well as physician assistant) formed meaningful relationships and engaged patients in disease care (in this case, psoriasis) so that effective health outcomes and disease management were achieved [22].

Limitations

Several study limitations need to be considered. The current study involved a convenience sample from one clinic so the findings may not be generalized to all primary care practice settings. The sample size was also small and may have resulted in selection bias. Additionally, one examiner measured study outcomes and may have resulted in observer bias. A recommendation for future studies would be to include multiple clinics, a randomized and larger sample, and blinded and multiple examiners to measure outcomes to address these limitations. Our study also utilized short term outcomes over a 6-month period. While medication refills and unplanned office visits were not documented by the NPPNG, it is possible these incidents were not reported by the participant. The use of long term outcomes such as over a one-year period to realize long term results should be considered to determine if significant differences between the two groups exists.

Additional factors that introduce bias into the study include patient ability to comply to medication on their own, and individual ability to modify health changes on their own, without a navigator. A pre- and post-test on knowledge and self-care behaviors on CMR would help to determine appropriate participants for future studies. The presence of additional help, such as family or relative who may or may not live with patient but have strong influence on the patient, was not also taken into consideration for this study. Also, it is unknown whether both groups had equal opportunity or access to timely health care services and referral services supplied by a NP, within the last year. A survey prior to study implementation to assess these factors would alleviate these issues and also establish appropriate participants for future studies.

Conclusion

Results of the study demonstrate differences in MetS and resource utilization among elderly AAs who were under the care of both an NPPN and PCP, compared to a PCP alone. Patients under the care of a NPPN demonstrates significantly lower CMR severity over a 6-month period. Resource utilization trends, specifically unplanned office visit and medication refill, followed the same trend. This study adds to the literature on the benefits of the NPPN which claims that they have a positive impact in disease prevention and health promotion of patients, specifically minority and underserved populations [12]. Overall, our study reveals that the NPPN had improved CMR and associated outcomes than the usual care group. This finding suggests that the NPPN role may be beneficial in improved outcomes. Future studies are needed to further examine this role among various populations.

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