



An RN/CHW Exemplar: Managing Hypertension in an Urban Community

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Abstract

This effectiveness study was designed to evaluate a community-based registered nurse (RN)/Community Health Worker (CHW) healthcare delivery model. In an effort to improve clinical outcomes by decreasing blood pressures in a predominantly low income, African American Community, the RN/CHW team provided regular blood pressure monitoring to residents of four public housing developments in Newark, NJ. A retrospective chart review was conducted at the Jordan and Harris Community Health Center (J&HCHC). The Center was established in 2011 with funding from the Health Resources Services Administration (HRSA) of the US Department of Health and Human Services. The goal of the J&HCHC was to demonstrate the effectiveness of an RN managed clinical site in improving health outcomes. Community engagement and empowerment were the cornerstones of the endeavor. Employing residents from the community as CHWs supports this community based model of healthcare delivery. Hypertension is one of the most common chronic illnesses affecting the adult population residing in the housing developments served by the J&HCHC. These preliminary results demonstrate that there was a significant decrease in mean systolic pressure for three years and the diastolic pressures decreased for three years with a statistically significant drop for one of the three years. This study reveals the potential contribution that a community-based RN/CHW healthcare delivery model can have in addressing health disparities in underserved communities.

Keywords: Community nursing; Community health workers; Hypertension; Healthcare delivery model; RN managed care

High Blood Pressure Among African Americans

Hypertension is the leading risk factor for cardiovascular disease and stroke, impacting more than 360,000 Americans in 2015 and causing nearly 1000 deaths each day [1]. Approximately 70 million American adults have high blood pressure, but only half (52%) have the condition under effective control [1]. Further, hypertension in the United States is characterized by significant ethnic, racial and socioeconomic disparities. Prevalence of the disease is greatest among African Americans, who also have the highest rates of uncontrolled essential hypertension [2] in which secondary or other causes are not present [3]. African-Americans from lower socioeconomic groups are more likely to develop hypertension than are others [4]. The New Jersey (NJ) Department of Health and Senior Services estimates that 29% (53,286) of Newark, New Jersey's adult population has hypertension [5]. Unlike acute diseases that may respond to short-term interventions, hypertension requires long-term supervision, including monitoring, education regarding self-management, behavior change, and medication compliance. In order to change health outcomes for populations at risk for hypertension and its complications, it is crucial to provide case management services that promote patient understanding of the disease and encourage active patient participation in managing hypertension through close monitoring and adherence to prescribed treatment regimens.

The Nurse-Managed Healthcare Model

Many studies have examined hypertension management utilizing a nurse-managed healthcare model. The majority of these studies indicate that this model offers more effective hypertension

management than physician-managed primary care [6-8]. Preliminary evidence demonstrates that a nurse-managed healthcare model can positively impact patient satisfaction, patient adherence, self-management and quality of life [9]. Community based, nurse-managed health care presents an innovative approach for marginalized African American communities where access to healthcare for regular blood pressure monitoring is limited by geography, transportation or other socio-economic barriers [10,11].

Expanding the Scope of Nursing Practice: The Community Based RN/CHW model

The United States has spent decades addressing the issue of health disparities and despite these efforts, continues to struggle with the worst health outcomes found among industrialized nations, with the poor suffering the most [12]. Clearly, a crucial disconnect exists between the health care needs of vulnerable populations and the sophisticated U.S. healthcare system. Health disparities were not created in a vacuum, but are the result of discrimination and dislocation, both of which contribute to poor health outcomes [13]. Traditional hierarchical models of care that employ a top-down approach, with the health care provider at the top and the recipient at the bottom, are not meeting the needs of the poor and underserved [14]. Identifying new health care paradigms and developing innovative models of care that successfully address the determinants of health are critical if this gap is to be closed and costs contained.

The Jordan and Harris Community Health Center (J&HCHC) is an example of a program based on a community-participatory empowerment model—a deliberate shift away from the traditional top-down health care paradigm. The J&HCHC utilizes a health promotion, case management, nurse managed approach to care that has been implemented in Newark, New Jersey with funding from the US

Department of Health and Human Services, Health Resources Services Administration (HRSA) and the Healthcare Foundation of New Jersey. Using the IOM's definition for primary health care, the J&HCHC provides integrated, accessible healthcare services to residents relying on partnerships and relationship building as core principles for healthcare provider practice.

With offices in four Newark Housing Authority there should be parenthesis around NHA public housing developments in Newark, NJ, the J&HCHC is an academic community endeavor built on trust that places power in the hands of the community by relying on a community advisory board (CAB) for direction and oversight. The program is available to nearly 6000 public housing residents. The majority of these residents are low-income African Americans. On-site registered nurses (RNs) provide primary healthcare services to address chronic conditions in an effort to improve health outcomes [15]. The RN performs patient assessments, reviews diet, lifestyle and medications and then coordinates healthcare services.

CHWs play a critical role in the prevention of chronic disease [16]. Their impact in control of hypertension has been demonstrated in a number of studies [17]. CHWs at the J&HCHC come from within the communities served by the Center. They understand the lived experience of their neighbors and friends. They serve as advocates and health navigators, eliminating cultural barriers, maximizing adherence to clinical directives, and promoting health. They educate the community at multiple levels (individually or in small groups) about the merits of medical intervention and help facilitate healthcare delivery and compliance with medical directives. They were trained in blood pressure measurement using standards established by the American Heart Association. From 2012 to 2014, a total of 4497 blood pressure screenings were performed.

Other studies conducted at nurse-managed health centers across the country have demonstrated that nurse-led services can have a significant impact on chronic diseases [18]. The purpose of this study was to evaluate the efficacy of this health care delivery model to decrease blood pressure in a previously underserved community. As the US healthcare system moves toward the triple aim of access, quality and cost containment, it is critical that new models of healthcare delivery be explored. In keeping with the IOM's 2010 report on the Future of Nursing, professional nursing team members must function to the full scope of their training and education in order to meet the triple aim [19].

Demonstrating the effectiveness of this community-based RN/CHW model is the first step in developing a plan for successfully addressing health disparities in underserved communities and improving population health.

Methods

Study design and data collection

Retrospective chart review was conducted for J&HCHC patients over a 3-year period (2012-2014). Patients were included if they: 1) were older than 18; 2) were experiencing systolic blood pressure (SBP) of 140 mmHg or higher and/or diastolic blood pressure (DBP) at least 90 mmHg or higher; 3) had baseline SBP and DBP measured at beginning of the year and 4) had at least 1 year of follow-up. Exclusion criteria included pregnancy, terminal illness, and other conditions that prevented the patient from interacting with RNs and CHWs, such as cognitive impairment. In order to minimize reviewer bias, the data

abstractor for this study remained blind to the purpose of the study [20,21].

BP measurement

Blood pressures were recorded by the RN or CHW with patients in an upright seated position with feet flat on the floor while at rest for at least 5 minutes [22]. At each visit, patient BPs were measured two or more times, once in each arm, separated by two minute intervals period. The average of all BP readings was used for this study's data analysis. SBP, DBP and pulse were measured by an electronic blood pressure monitor (Welch Allyn Spot Vital Signs LXi). All study participants had BP measured at baseline (beginning of the year) and at 1 year (at the end of the year).

Data analysis

Mean values (\pm SD) for continuous variables and percentage for categorical variables were computed. Data were analyzed using SAS 9.3 for Windows. A paired t-test was utilized to compare all baseline data and changes from baseline. All quantitative statistical tests were two-sided. A p value of ≤ 0.05 was used to establish statistical significance.

Results

Demographic characteristics

A total of 158 patients were included in this study. Table 1 presents the three-year participants' demographic characteristics. Participants were predominantly female (77.6% for 2012, 85.7% for 2013, and 82.8% for 2014) and Black/African American (81.6%, 76.2% and 100% for three year respectively) with average ages of 53.2, 56.0 and 54.1. 55.1% of study participants reported that they had a high school diploma or GED in 2012, as did 38.1% in 2013 and 34.4% in 2014. In 2012, over 50% had an annual household income of less than \$20000, while 42.9% did so in 2013 and 24.1% did so in 2014. In 2012, 30.6% reported no health insurance, 42.9% lacked it in 2013, and only 6.9% were without coverage in 2014.

Demographic Characteristics	2012	2013	2014
	N=72	N=41	N=45
Age (Mean years)	53.2	56	54.1
Range (years)	(85-18)	(86-31)	(77-31)
Gender (%)			
Female	77.6	85.7	82.8
Male	22.4	14.3	17.2
Marital Status (%)			
Single	46.9	42.9	24.1
Married	10.2	14.3	3.4
Divorced	10.2	9.5	7.8
Widowed	10.2	11.9	4.2
Race (%)			
Black/African American	81.6	76.2	100

White	4.1	16.7	0
Ethnicity (%)			
Hispanic	8.2	16.7	0
Non-Hispanic	79.6	76.2	100
Number in Household (Mean)	2.3	2.1	2.1
Range	(1-5)	(1-5)	(1-4)
Education			
Less than high school	4.1	11.9	6.9
High school graduate	44.9	33.3	24.1
Some college	14.3	9.5	0
College graduate	2	0	0
GED	10.2	4.8	10.3
Household Income			
Less than \$20000	53.1	42.9	24.1
\$20000-\$29000	2	11.9	0
\$30000-\$39000	4.1	2.4	0
Don't know or Refused	40.8	42.9	75.9
Insurance (%)			
Yes	46.9	28.6	34.5
No	30.6	42.9	6.9
Missing	22.4	28.6	58.6

Table 1: Demographic characteristics of study participants.

BP outcomes

A comparison of patient baseline and change in follow-up is presented in Table 2. It is noteworthy that improvements were statically significant in 2012, with decreases at 12 months in mean systolic pressure (from 159.6 mmHg to 149.0 mmHg, a 10.6 mmHg decrease, $p < 0.0001$), and in mean diastolic pressure (from 92.2 mmHg to 87.5 mmHg, a 4.7 mmHg decrease, $p = 0.018$).

In 2013, the mean systolic pressure decreased 11.1 mmHg (from 160.9 mmHg to 149.8 mmHg), and the mean diastolic pressure decreased 7.1 mmHg (from 93.2 mmHg to 86.1 mmHg). In 2014, results show that the mean of systolic pressure significantly decreased 6.6 mmHg (from 157.7 mmHg to 151.1 mmHg). The mean diastolic pressure decreased 5.0 mmHg (from 94.4 mmHg to 89.4 mmHg). All changes from baseline to the 12 month follow-up were statistically significant.

Discussion

This study's results demonstrate that underserved patients with uncontrolled hypertension receiving coordinated case managed care from RNs and CHWs can achieve significant improvement over three years. Interestingly, Clark et al. reviewed 11 nurse-led intervention studies seeking to improve control of high blood pressure in patients

with diabetes; the meta-analysis concluded that nurse managed care could improve on physician-led or usual care, producing better results in some cases [17]. Thus, the findings of the J&HCHC study echo the clinical outcomes of other nurse-led health care delivery efforts. However, this study not only provides clinical evidence that community-based RN/CHW care offers an effective model, it also supports the importance of community-based health care delivery enacted through partnership between an academic institution and a marginalized community.

	Baseline Mean (SD)	12 months Follow-Up Mean (SD)	95% CI for Mean Differences	t	P
2012 (N=72)					
Systolic (mmHg)	159.6 (17.5)	149.0 (11.8)	(6.8,14.4)	5.6	<0.0001
Diastolic (mmHg)	92.2 (16.4)	87.5 (10.9)	(0.8,8.5)	2.4	0.018
2013 (N=41)					
Systolic (mmHg)	160.9 (18.1)	149.8(8.7)	(5.8,16.3)	4.3	<0.0001
Diastolic (mmHg)	93.2 (16.3)	86.1(11.1)	(2.9,11.4]	3.4	<0.0001
2014 (N=45)					
Systolic (mmHg)	157.7 (12.3)	151.1 (10.5)	(3.7,9.4)	4.7	<0.0001
Diastolic (mmHg)	94.4 (11.2)	89.4 (8.7)	(0.7,9.2)	2.4	0.023

Table 2: Changes in blood pressure by year.

The study presented here reveals that adequate BP control is associated with CHW activities guided by RN oversight. Both roles are crucial. Through CHW home visits, follow up calls and healthcare coordination [8,23,24]; the J&HCHC yielded improved clinical outcomes in terms of BP control. CHWs act as gatekeepers and facilitators who are able to culturally identify with community members and assist them with chronic disease management.

J&HCHC study BP reduction findings were generally consistent over the course of three years. Compared to patients in medical model healthcare delivery, this community based RN/CHW exemplar has demonstrated that it can adequately address patient adherence through RN/CHW-driven health education and supervision of medication regimens prescribed for this chronic illness.

Limitations

This study had several limitations. First, the majority of participants were Black/African American females. Involving a more diverse population would have been informative and would have increased confidence in the study's generalizability. Second, the study did not consider other comorbidities such as diabetes, stroke and coronary heart disease, which are often associated with hypertension. Third, hypertension treatment is effective only when the patient is motivated [25]. A motivated patient is willing to monitor his or her blood pressure, change his or her life style, and take necessary medications. In theory, both motivation and support improve patient outcomes.

However, behavioral changes and adherence to prescribed medication regimens were not included in this study, limiting understanding of those behavioral factors that might have contributed to this improvement.

Conclusion

The effectiveness of community healthcare is closely related to the partnership that is forged between healthcare providers and the community they serve [26]. This community-based RN/CHW healthcare delivery model offers a new paradigm for increasing access, improving quality and containing costs while addressing the social determinants of health. It demonstrates that improved blood pressure control can be achieved, potentially improving a range of health outcomes. Based on J&HCHC study findings, it is clear that the RN/CHW team's health education, health promotion, patient recruitment, and monitoring and coordinating efforts were effective in decreasing blood pressure among a community of underserved African Americans. Although clinical outcomes are the determining factor in demonstrating the effectiveness of health care delivery models, other structural factors are also critically important in maximizing the effectiveness of care, including where care is delivered, how trust is forged between the community and its providers, and provider success in reaching out to the population served. It is likely that the RN/CHW healthcare delivery program is successful because it overcomes those structural barriers that constrain marginalized, underserved communities.

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