A Community- Academic Partnership to Implement DASH Diet and Social/Behavioral Interventions in Congregate Meal Settings to Reduce Hypertension Among Seniors Aging In Place

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BACKGROUND:

Since 2015, the Rockefeller University Center for Clinical and Translational Science (RU-CCTS) and Clinical Directors Network (CDN) community-academic partnership has continued to deepen engagement with Carter Burden Network (CBN), a multi-site senior community services organization serving East Harlem, NY. Many seniors served by CBN are racial/ethnic minorities, live in poverty, suffer from multiple chronic conditions, depression, and food insecurity.

From 2016-2018, we co-developed and conducted a CTSA-funded pilot project to characterize the health of seniors attending two CBN sites, building infrastructure and capacity for future comparative effectiveness research. Results from the pilot study revealed that blood pressure for 54% of seniors did was "not controlled" (systolic ≥140 mmHg and diastolic ≥ 90 mmHg) (American Heart Association criteria). High blood pressure poses a significant and modifiable risk for cardiovascular disease (CVD) in seniors, increasing risk for stroke, heart attack, heart failure, and kidney failure, and associated increases in mortality, morbidity, disability, functional decline, and healthcare costs.

From 2018-2020, supported by a nutritional innovation award from the DHHS-Administration for Community Living, we leveraged CBN's provision of daily congregate meals design and implement an intervention to lower blood pressure in the congregate meal settings of CBN.

OBJECTIVE:

The Rockefeller University, Clinical Directors Network, and Carter Burden Network received an Administration for Community Living Nutrition Innovation grant to test whether two evidence-based interventions -- the implementation of Dietary Approaches to Stop Hypertension (DASH)-concordant meals in the congregate meal program, and health education programs designed to enhance blood pressure self efficacy -- together lower blood pressure among seniors aging in place and receiving congregate meals at a neighborhood senior center. The DASH diet has been proven in research settings to lower blood pressure in as little as 14 days. Its implementation has never been tested among seniors in the setting of congregate meals.

AIMS:

Primary Aim: To determine whether implementation of the DASH diet through the congregate meal programs delivered at two Carter Burden Network sites, along with contemporaneous multi-component education to support self-efficacy related to blood pressure management can lower blood pressure in seniors receiving the program.

Other Aims:

- Leverage and grow a sustainable, multi-stakeholder partnership;
- Implementation of DASH-concordant meals;
- Optimize client acceptance of the intervention;
- Support cognitive and behavioral change;
- Provide positive feedback and enhance self-efficacy through onsite and home blood pressure (BP) monitoring;
- Enhance the value of the value of nutritional service programs by reducing waste; and
- Implement a scalable and sustainable monitoring and evaluation system.

PRIMARY OUTCOME:

Primary outcome is the reduction of Blood Pressure (BP) as measured by:

1. Change in mean systolic BP (SBP) at Month 1 after implementation of the DASH-aligned congregate meals, compared to mean Baseline SBP measured before the institution of dietary or behavioral interventions

2. Increase in the proportion of individuals whose blood pressure is within the range of "controlled" according to Eighth Joint National Committee (JNC-8) guidelines (For age > 60 years, SBP/DBP < 150/90) at 1 Month compared with baseline (Month 0).

METHODS:

Creating DASH-Aligned Menus for Congregate Meals:

Figure 1A: Planned Daily Serving Goals at CBN sites vs. Recommended Total Daily DASH Servings

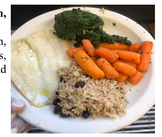
FOOD GROUPS	DASH DIET SERVING GOALS AT CBN for LUNCH MEAL		RECOMMENDED DAILY DASH DIET SERVINGS AT 1800 Kcals *(3)
	COVELLO	LUNCHEON CLUB	
PROTEIN*(1)	2-4	2 -4	≤ 6
GRAINS	2	2	6
VEGETABLES	2	2	4
FRUIT	2	2	4
DAIRY	1	1	2
FAT	1	1	2
SWEETS *(2)	2-3/wk	2-3/wk	≤ 5
NUTS, LEGUMES, DRIED PEAS AND BEANS	4/wk (@ break &/or lunch)	4/wk	4

Figure 1B: Examples of menu changes effected to achieve DASH-Concordant CBN Menus

Monday		
Covello Original	Action	Covello Revised
chicken piccata w/ lemon sauce (p)	→	chicken piccata w/ lemon sauce (p)
	+	parsley (fl)
Bowtie noodles (g)	Δ	WW noodles (g)
1 slice WW bread (g)	Δ	1 whole grain rolls (g)
Normandy blend mixed vegetables (v)	→	Normandy blend mixed vegetables (v)
	+	sauteed spinach (v)
Kiwi (f)	→	kiwi (f)
	+	Canned peaches (f)
	+	flavored H20 (fl)
1% milk (d)	→	1% milk (d)
butter (O/F)	Δ	olive oil spread (O/F)
	+	Mrs Dash (fl)

Legend:			
Covello Original	Action	Covello Revised	
3/6 protein	→	3/6 protein	(p)
2/6 grains	Δ	2/6 grains	(g)
1/4 veggies	+	2/4 veggie	(v)
1/4 fruit	+	2/4 fruit	(f)
1/3 dairy	→	1/3 dairy	(d)
1/3 fat	Δ	1/3 fat	(O/F)
			added flavor

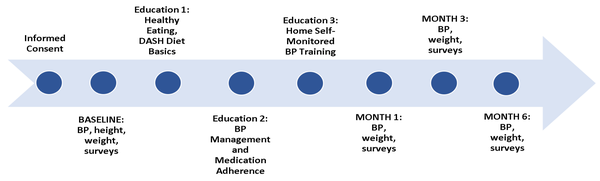
Covello Lunch, October 2019: Fish, Spinach, Baby Carrots, and Rice and Beans



DASH Intervention Celebration of the Chefs: On December 19, 2019, the Project Team celebrating the efforts of the chefs and food services staff in implementing and sustaining the DASH-aligned menus for the study. A selection of DASH-aligned treats was served. We were joined by a special guest, Kathleen Otte, Administration on Community Living, Regional Administrator, Region I & II.

Study Timeline:

Figure 2: Summary of Study Visits and Education Sessions



CONCLUSIONS:

1. Three sets of CBN congregate meal menus were aligned with DASH. The food service staff successfully delivered the intervention as planned; the clients consumed the meals slightly less than expected.

2. Food preferences were assessed in advance and throughout the menu intervention, showing responsiveness of the food service staff to issues, and overall sustained high satisfaction with the DASH aligned menus.

3. Educational programs were implemented and attended by most participants.

4. Participants were trained in home self-blood pressure monitoring; 90% conducted monitoring through the first month, and 70% continued to month 5 or 6, despite the challenges of the pandemic. Participants took their BP at home a little more than 3 times/week.

5. For the group overall, systolic blood pressure as measured by Vital Care for the primary endpoint was reduced **by 4 mmHg** at Month 1; however, the subgroup at Luncheon club who were assessed before the pandemic interrupted the protocol, reduced blood pressure significantly, by **8 mmHg**. In support of this trend, the individuals at Luncheon Club who completed home blood pressure monitoring through the end of the study, lowered their home measured systolic blood pressure by **10mmHg (statistically significant).** All BP reductions (i.e., 4mmHg, 8mmHg, and 10mmHg) are clinically meaningful reductions in blood pressure and cardiovascular risk.

ACKNOWLEDGMENTS:

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In Memory of Schuyler Antonio, Head Chef and colleague at the CBN. A valued member of the DASH study team and loved by colleagues and seniors alike, he will be sorely missed

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Other disclosures: None

RESULTS:

Characteristics of the study population

Table 1: Participant Demographics at Baseline

Characteristics – Baseline	Covello (n=45)	Luncheon (n=39)	Overall (n=84)
Race			
American Indian/Alaskan Native	1 (2%)	0 (0%)	1 (1%)
Asian	0 (0%)	3 (8%)	3 (4%)
Black	24 (53%)	3 (8%)	27 (32%)
Native Hawaiian or other Pacific Islander	0 (0%)	0 (0%)	0 (0%)
Multiple Races	3 (7%)	0 (0%)	0 (0%)
Other	6 (13%)	2 (5%)	8 (10%)
Unknown	3 (7%)	0 (0%)	3 (4%)
White	12 (27%)	30 (77%)	42 (50%)
Hispanic Ethnicity	24 (53%)	3 (8%)	27 (32%)
Survey Language (Spanish)	10 (22%)	4 (10%)	10 (12%)
Age (Mean ± SD)	70.6 ± 7.7	76.1 ± 8	73.2 ± 8.3
Annual Income (dollars)			
Less than $20,000	20 (44%)	16 (41%)	36 (43%)
$20,000 to less than $35,000	10 (22%)	9 (23%)	19 (23%)
$35,000 or more	8 (18%)	7 (18%)	15 (18%)
Unknown	7 (16%)	7 (18%)	14 (17%)
Sex (Female)	34 (76%)	21 (54%)	55 (65%)
Education			
Less than high school	5 (11%)	2 (5%)	7 (8%)
Some high school	3 (7%)	2 (5%)	5 (6%)
High school graduate	13 (29%)	6 (15%)	19 (23%)
At least some college	12 (27%)	3 (8%)	15 (18%)
College graduate	12 (27)	24 (62%)	36 (43%)
Unknown	0 (0%)	1 (3%)	1 (1%)
Retired/Not currently employed	45 (100%)	30 (77%)	75 (89%)
Marital Status			
Married/member of a couple	7 (16%)	6 (15%)	13 (15%)
Divorced/Widowed/Separated	30 (67%)	20 (51%)	50 (60%)
Never married	6 (13%)	11 (28%)	17 (20%)
Unknown	1 (2%)	1 (3%)	2 (2%)
BMI			
Underweight	0 (0%)	0 (0%)	0 (0%)
Normal weight	13 (29%)	14 (36%)	27 (32%)
Overweight	11 (24%)	14 (36%)	25 (30%)
Obese	20 (44%)	7 (18%)	27 (32%)
Blood Pressure Group			
Normal	6 (13%)	7 (18%)	12 (14%)
Elevated	6 (13%)	1 (3%)	7 (8%)
Hypertension Stage 1	10 (22%)	14 (38%)	24 (29%)
Hypertension Stage 2	16 (36%)	17 (54%)	33 (39%)
Hypertensive Crisis	3 (7%)	0 (0%)	3 (4%)
Unknown	3 (7%)	2 (5%)	5 (6%)

Delivering Interventions: Meal Concordance and Meal Satisfaction

Table 2: Concordance Between DASH Planned vs. DASH Served, Week 3 Lunch

ACTUAL DASH DIET SERVINGS AT COVELLO Week 3					ACTUAL DASH DIET SERVINGS AT LUNCHEON CLUB Week 3				
M	T	W	TH	F	M	T	W	TH	F
3	3	3	3	3	3	3	3	3	3
2	2	1	2	2	2	2	2	2	2
2	2	2	3	2	2	2	2	3	1
2	2	2	2	2	2	2	2	3	2
1	1	1	1	1	1	1	1	1	1
1	1	1.5	1	1	1	1	1	1	1
						1			
			1	1			1	1	1

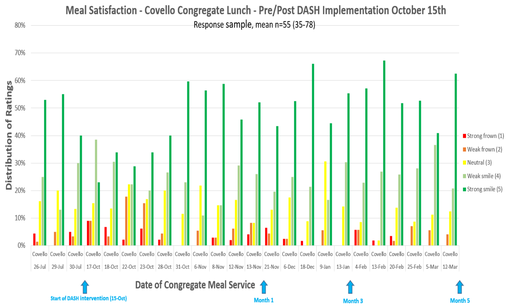
Footnotes:
* (1) Protein goals were maintained as previously planned at CBN
* (2) Sweets – the goal set was as a maximum, not minimum
* (3) Recommended Dash Diet Servings at 1800 kcals were the minimum servings, if there was a range.

Legend:

RED cell = over or under the goal, and unacceptable

GREEN cell = over goal planned and acceptable

Figure 3: Meal Satisfaction at Covello Lunch



CBN Client Meal Feedback Cards

Primary Outcome:

Table 3: Change in Blood Pressure at Month 1 of DASH Intervention

	Covello	Luncheon Club	All
Systolic Blood Pressure M0 Mean	**M=137.62 (98, 191)** SD=20.5 n=45	**M=138.15 (101, 175)** SD=16.97 n=39	**M=137.87 (98, 191)** SD=18.8 n=84
Systolic Blood Pressure M1 Mean	**M=135.29 (98, 191)** SD=17.09 n=41	**M=129.65 (100, 156)** SD=16.24 n=20	**M=133.44 (98, 191)** SD=16.9 n=61
Mean Change	**-2.66** n=41 SD=19.56	**-8.0** n=20 SD=16.90	**-4.41** n=61 SD=18.76
P-value	t=-0.87 p=.3893	**t=-2.12 p=.0478***	t=-1.84 p=.0713
JNC-8 Controlled M0	71.1%	64.1%	67.9%
JNC-8 Controlled M1	80.5% (χ^2=2.67, p=.1025)	90% (χ^2=0.33, p=.5637)	83.6% (χ^2=2.78, p=.0956)
Systolic Blood Pressure M3 Mean	**M=134.79 (105, 165)** SD=13.99 n=34		
JNC-8 Controlled M3	79.4%		

Intervention Compliance:

Consumption of DASH-aligned meals: Before and during the DASH intervention, participants attended congregate meals **3-4 days a week**

Frequency of Home Blood Pressure Measurement:

- 90% of participants conducted monitoring through the first month, and 70% continued to month 5 or 6.
- Participants measured their home BP slightly more often than 3 days/week. This mean remained steady through the end of Month 6.

Educational Programs:

- Thirty-four (73%) Covello participants and 39 (90%) Luncheon Club participants attended at least one nutrition class
- Twenty-nine (64%) Covello participants and 38 (98%) Luncheon Club participants attended the BP and Medication Adherence class.
- Forty-four (98%) Covello participants and 38 (98%) Luncheon Club participants received training in the use of the Omron 10 home BP monitor.

Table 4: Mean Change in Home-Self-Monitored Systolic BP, Covello

Covello Home- Self-Monitored Blood Pressure (HSBP) Mean Change		
Time Periods	**Mean Change**	**T-value (p-value, n)**
Week 3 – Week 2	0.18	0.11 (p = 0.91, n=27)
Week 4 – Week 2	-1.17	-0.54 (p = 0.59, n=31)
End of Month 3 – Week 2	-0.99	-0.41 (p = 0.68, n=23)
End of Month 6 – Week 2	-5.08	-1.95 (p = .06, n=17)

Table 5: Mean Change in Home-Self-Monitored Systolic BP, Luncheon Club

Luncheon Club Home- Self-Monitored Blood Pressure (HSBP) Mean Change		
Time Periods	**Mean Change**	**T-value (p-value)**
Week 3 – Week 1	-1.26	-0.76 (p = 0.45, n=17)
Week 4 – Week 1	-0.35	-0.22 (p = 0.82, n=16)
End of Month 3 – Week 1	3.41	0.60 (p = 0.56, n=11)
End of Month 5/6 – Week 1	**-10.78**	**-3.01 (p = 0.01, n=8)***

Participants received the Omron 10 Home BP Monitor and a Home BP Diary