



Primary Cardiovascular Disease Prevention is Leaving the Office: Early Results from the HeartBeat Connections Integrated Telemedicine Program

Gretchen Benson¹, Abbey Sidebottom², Arthur Sillah², Jackie Boucher¹, Thomas Knickelbine³, Jeff VanWormer⁴

¹Minneapolis Heart Institute Foundation, Minneapolis, MN ; ²Division of Applied Research, Allina Health, Minneapolis, MN; ³Minneapolis Heart Institute, Minneapolis, MN ; ⁴Center for Clinical Epidemiology & Population Health, Marshfield Clinic Research Foundation, Marshfield, WI

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PROGRAM DESCRIPTION

- HeartBeat Connections (HBC) is a telemedicine program that integrates with and complements primary care. Dietitian and nurse-led telephonic coaching focuses on controlling key cardiovascular (CVD) risk factors, and includes initiation/titration of dyslipidemia and hypertension medications.
- Patients eligible for HBC program are identified proactively through data from the electronic health record (EHR). Eligibility criteria: age 40-79, previous visit at clinic in past five years, no active heart disease or diabetes, meet AHA metabolic syndrome criteria or high ($\geq 15\%$) Framingham risk.
- All encounters are documented within the EHR for seamless coordination of care with primary care providers.
- Program objectives focus on improving CVD risk factors, such as increasing the proportion of participants taking preventive medications and achieving optimal levels for lipids, blood pressure, nutrition, exercise and stress.
- HBC is part of a broader initiative, The Heart of New Ulm Project (HONU), which is a 10-year demonstration project aimed at reducing heart attacks and CHD in a rural Minnesota community (New Ulm, MN).

METHODS

- Patients were included in study if they had all recruitment activities completed resulting in a program order status (i.e., opt-in or opt out) between August 2010 and March 2012.
- Over the first six months following this order status, EHR-derived changes in LDL cholesterol, blood pressure, body mass index (BMI), and smoking were compared between those who did and did not participate.
- Baseline biometric/smoking values were the most recent available measure prior to the program order date. Follow-up biometric/smoking values were the measure closest to 6 months after the program order date (within range of 2-12 months).
- Behavioral measures other than smoking were only available for enrollees. Baseline measures are those from their first phone encounter and follow up measures are from the phone encounter closest to 6 months after enrollment.
- Study design compares participants to eligible non-participants (i.e., opt-outs or unresponsive to mail/phone outreach attempts) for changes in biometric values.
- Mixed model analysis of variance was used to compare changes in measures for non-enrollees, enrollees with 1-4 encounters, and enrollees with ≥ 5 encounters.

Table 1: Model-based changes in targeted risk factors among adults at high CVD risk who were invited to participate in the HBC program, stratified by level of program engagement

	Enrolled with ≥ 5 Encounters (n = 153)			Enrolled with 1-4 Encounters (n = 180)			Did Not Enroll (n = 702)		
	Baseline	Follow-up	Change	Baseline	Follow-up	Change	Baseline	Follow-up	Change
LDL (mg/dL)									
Controlled (LDL <100)	126.9 \pm 3.8	110.9 \pm 3.1	-16.1 \pm 3.4**	115.3 \pm 2.6	110.8 \pm 3.1	-4.5 \pm 3.4 ^b	121.5 \pm 1.6	115.0 \pm 2.3	-6.5 \pm 2.9**
	18.0	37.3	19.3**	28.3	42.1	13.8*	24.6	30.3	5.7 ^a
Systolic BP (mmHg)	128.3 \pm 1.3	128.0 \pm 1.4	-0.3 \pm 1.7*	129.5 \pm 1.3	129.1 \pm 1.3	-0.4 \pm 1.7*	130.1 \pm 0.8	129.0 \pm 0.9	-1.1 \pm 1.3*
Diastolic BP (mmHg)	77.4 \pm 0.8	76.5 \pm 0.9	-0.8 \pm 1.1*	77.9 \pm 0.8	76.2 \pm 0.8	-1.7 \pm 1.1*	78.2 \pm 0.5	75.8 \pm 0.6	-2.4 \pm 0.8**
Controlled BP (<140/90)	78.9	74.5	-4.4*	75.1	79.4	4.3*	71.7	74.3	3.4*
BMI (kg/m²)	33.2 \pm 0.5	32.9 \pm 0.5	-0.3 \pm 0.2*	33.7 \pm 0.5	33.6 \pm 0.5	-0.1 \pm 0.2*	32.9 \pm 0.2	32.8 \pm 0.3	-0.1 \pm 0.2*
Smoker	11.6	7.8	-3.8*	17.1	5.6	-11.5**	19.6	15.4	-4.2*

All participants were included in the analyses and all outcomes were adjusted for age, sex, and days between baseline and follow-up measurements.

Continuous outcomes are reported as mean \pm standard error, and categorical outcomes are reported as percent of sample.

* Significant (within-group) change between baseline and follow-up (p<0.05)

Change scores with different superscript letters are significantly different from one another (p<0.05)

Table 2: Comparison of behavioral measure changes among participants in the HBC program by number of encounters

	Total = 333			Enrollees with 1-4 encounters (n = 180)			Enrollees with ≥ 5 encounters (n = 153)			p-value between groups
	Baseline	Follow-up	Change	Baseline	Follow-up	Change	Baseline	Follow-up	Change	
Daily Aspirin use	47.2	69.9	22.7*	42.4	68	25.6*	51.4	71.5	20.1*	0.283
Use of cholesterol medication	37.8	39.9	2.1	40.6	29.4	-11.2*	34.6	52.3	17.7*	<0.001
	n = 225			n = 113			n = 112			
Use of cholesterol medication among those with ldl 100+mg/dl at baseline	30.2	38.7	8.5*	33.6	30.1	-3.5	26.8	47.3	20.5*	<0.001
100% medication adherence among those using cholesterol medication and with ldl 100+ at baseline	75.0	91.1	16.1*	85.7	92.9	7.2	64.3	89.3	25*	<0.001
Use of hypertension medication	48.3	47.1	-1.2	48.3	38.3	-10.0*	48.4	57.5	9.1*	0.018
	n = 76			n = 44			n = 32			
Use of hypertension medication among hypertensives (140/90 mmHg) at baseline	50	51.3	1.3	47.7	38.6	-9.1	53.1	68.8	15.7	0.007
100% medication adherence among those using hypertension medication and hypertensive at baseline	96.7	96.7	0.0	92.3	92.3	0.0	100	100	0	n/a
Low Stress Level	82.4	88	5.6*	86.4	88.2	1.8	79.3	87.9	8.6*	0.020
Fruit and Vegetable Servings $\geq 5/d$	31.8	64.3	32.5*	31.2	59.2	28.0*	32.2	68.4	36.2*	0.147
Physical Activity > 150 min/wk	32.7	44.4	11.7*	31.2	41.6	10.4*	34	46.7	12.7*	0.554

* Significant (within-group) change between baseline and follow-up (p<0.05)

RESULTS

- 1035 patients who were eligible for the HBC program were included in the study sample. Of these, 333 (32%) enrolled.
- Among enrollees, 82% were still engaged in the program after six months.
- Enrollees and non-enrollees were comparable at baseline on age, marital status, blood pressure, cholesterol (total, HDL, LDL, triglycerides) and BMI. The groups differed on gender (non-enrollees were more likely to be male 55.4% vs. 47.1%) and smoking (23% smokers among non-enrollees vs. 16.8% among enrollees).
- Mixed model analyses indicated a significant group-by-time interaction for LDL cholesterol (p=0.001). Over six months, non-enrollees lowered their LDL by 6.5 mg/dL, whereas HBC enrollees who completed 1-4 and ≥ 5 telephone encounters lowered their LDL by 4.5 and 16.1 mg/dL, respectively. The proportion who met the program goal of LDL <100 mg/dL increased by 69% in enrollees (vs. 24% in non-enrollees).
- Smoking decreased significantly among enrollees; it was the only measure that saw the most improvement among those with fewer encounters. Among enrollees, smoking decreased by 67% in those with 1-4 encounters compared to 33% in those with ≥ 5 encounters and 21% in non-enrollees.
- Enrollees saw improvements in behavioral risk factors with increased improvement for those with more encounters for stress, medication use, and medication adherence.

CONCLUSIONS

- HBC enrollees significantly improved LDL and smoking status in high CVD risk adults compared to non-enrollees.
- Enrollees saw increased improvement in fruit and vegetable consumption, physical activity, stress level, aspirin use, medication use/adherence.
- Increased encounters were associated with larger magnitude of changes in LDL, medication use, and stress.
- Positive changes in the non-participant group may be attributed to the broader HONU project and the interventions available in worksites and throughout the community. Additionally, bi-annual provider trainings are conducted to provide physicians and mid-level providers with an opportunity to learn about the role of the medical provider in the project and available treatment options for the management of all individuals at high risk for CHD.
- Such real-world, systems-based innovations can serve as a platform to target and engage at-risk populations, thereby enhancing primary CVD care in rural and other underserved areas.