

Vermont Blueprint for Health

Brattleboro Area Community Network Report

Network Analysis and Team Based Care

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Objective

Describe the network of organizations that has emerged in each Blueprint Health Service Area (HSA) to support population and individual health, focusing on modes of collaboration and relationships between organizations.

Background and Key Questions

The Vermont Blueprint for Health is a state-led, nationally-recognized initiative transforming the way primary care and comprehensive health services are delivered and paid for. The Blueprint encourages the growth of regionally-based multi-disciplinary networks of health, social and economic service providers. These networks are intended to bring a diverse group of service providers closer together, to deliver more seamless and holistic care to the people of their regions. This study is the first step towards answering key questions about the networks that are active in Blueprint communities: *What role did investment in core Community Health Teams have in seeding these larger networks? How are the participating organizations connected to each other? How are these relationships maintained and reinforced – how durable are they? What characteristics do the most successful networks share? And, ultimately, what impact do they have on individual and population health?*

Approach

This study used a combination of network analysis, investigating connections between organizations, and traditional polling methodology, addressing the experience of working together as a team.

Network Analysis

Network analysis was the central methodology in this study, used for its ability to characterize and quantify relationships in a complex system. Network analysis creates graphs that show the connections between individuals or (as in this case) organizations. With these graphs and quantitative network data, researchers and community members can explore the relationships that make up the network and start to look for patterns as well as changes over time. Observations of network data and network graphs can lead to smarter, better questions about how community-based teams coalesce and how they create change.

The data used in this study are responses to a survey question that asked representatives of organizations to report whether their organization interacted with other organizations in their area in any (or all) of six ways, stated as follows:

1. “My organization sends referrals to this organization”
2. “My organization receives referrals from this organization”
3. “Our organizations have clients/patients in common”
4. “Our organizations share information about specific clients/patients”
5. “Our organizations share information about programs, services and/or policy”
6. “Our organizations share resources (e.g. joint funding, shared equipment, personnel or facilities)”

Additionally, several questions were included in the study that were not intended for network analysis. These included demographic questions and a set of questions about whether respondents perceived their communities to be acting as teams.

Team Based Care

In 2012 The Institute of Medicine (IOM) published the discussion paper [“Core Principles & Values of Effective Team-Based Health Care.”](#) The Vermont Blueprint for Health embraces this paper’s model, of how a team should function and feel, as a goal for both direct clinical care and multidisciplinary community health improvement. The five hallmarks of effective team based care given by the IOM are Shared Goals, Mutual Trust, Clear Roles, Effective Communication, and Measureable Processes and Outcomes. In the FY2015 survey, respondents were asked to think about how all of the organizations listed work together as group, and agree or disagree with statements about whether they exhibit each of those hallmarks of team-based care.

List Development

Over the course of the 2015 network survey, the list development methodology used for this study was adjusted twice in response to findings from the research, which was conducted in waves. Each adjustment pushed the network bounding towards greater consistency across HSAs and towards smaller network membership lists and shorter survey instruments.

This HSA was in the first wave of communities surveyed, using the Hybrid Network List Development approach. With this methodology, the network lists began with the lists used in a prior year's network analysis study. These lists were provided by the area's Project Manager. The previous survey instrument included an option for respondents to write-in organizations they believed were part of their area's network, but that weren't already listed. Some of these organizations were included in the latest network list, depending on the whether contact information was readily available for an appropriate potential respondent at the organization.

Additionally, the Blueprint team determined it would be helpful to have a core group of types of organizations consistently included in each HSA's network survey. The list of those types of organizations is given below.

Types of Organizations Included in Hybrid Network List Development	
Key	Organization
<i>Green means mandatory</i>	CHT
	Primary Care Practices
	Hospital
	Hospital - Emergency Department
	Hospital - Case Management/Social Work
<i>Yellow means optional</i>	Other Hospital Departments
	FQHC Dental
	Private or Hospital Dental
	Pharmacies
	Designated Mental Health Agency
	Designated Mental Health Agency - Developmental Services
	Designated Mental Health Agency - Emergency Services
	Designated Mental Health Agency - Adult Outpatient Services
	Designated Mental Health Agency - Community Rehabilitation and Treatment
	Designated Mental Health Agency - Children's Services
	"Hub" of Hub/Spoke Program
	Other mental health/substance abuse agencies/organizations
	VNA
	Area agency on aging
	Home care providers
	Nursing homes
	Designated Regional Housing Organizations / SASH Program
	Law enforcement
	Schools k-12

	Colleges
	Vocational programs
	Health/Medical Training programs
	AHEC
	Children's Integrated Services
	Parent child center(s)
	State of VT - Agency of Human Services (AHS)
	State of VT - AHS - Children with Special Health Needs (CSHN)
	State of VT - AHS - Department of Children and Families (DCF)
	State of VT - AHS - Department of Corrections
	State of VT - Department of Vermont Health Access (DVHA)
	State of VT - DVHA - Vermont Chronic Care Initiative (VCCI)
	State of VT - Vermont Department of Health (VDH)
	State of VT - VDH - Children with Special Health Needs (CSHN)
	Transit
	Food shelf
	Employment services
	United Way
	Vermont 2-1-1

Survey Participation

Invitations Sent	84
Surveys Started	29
Response Rate	35%
Completed Surveys	21
Completion Rate	72%

Organizations	Completed Survey
AIDS Project of Southern Vermont	
Alzheimer's Association	
Bayada	
Bill Pelz-Walsh	
Brattleboro Memorial Hospital (BMH)	Y
BMH – Care Management	
BMH - Center for Wound Healing	Y
BMH - Community Health Team	Y
BMH - Emergency Department	
BMH - Post-Acute Care	
BMH Physician Group	
BMH Physician Group - Brattleboro Family Medicine	
BMH Physician Group - Brattleboro Internal Medicine	
BMH Physician Group - Cornerstone Pediatrics	
BMH Physician Group - Just So Pediatrics	
BMH Physician Group - Maplewood Family Practice	
BMH Physician Group - Putney Family Healthcare	
BMH Physician Group - Windham Family Practice	
Boys & Girls Clubs of Brattleboro	
Brattleboro Area Prevention Colition (BAPC)	
Brattleboro Food Coop	Y
Brattleboro Housing Authority - SASH	
Brattleboro Pastoral Counseling Center	
Brattleboro Police Department	Y
Brattleboro Primary Care	
Brattleboro Retreat	
Brattleboro Senior Meals	Y
Brattleboro Union High School	Y
Craig Goldberg, DO	
Early Education Services of Windham County	Y
Fit and Healthy Kids Coalition	
Grace Cottage Hospital	Y
Grace Cottage Hospital - Grace Cottage Family Health	Y
Habit OPCO	
Halifax Elementary School	
Health Care and Rehabilitation Services (HCRS)	
HCRS - Elder Care Program	
Home Healthcare, Hospice & Community Services (HCS)	
HeartSong Health in Community	
Helen Schepartz	

Hunger Free Vermont	
Keene YMCA	
Maple Leaf Farm	
Morningside Shelter	
Parks Place	
Pine Heights at Brattleboro Center for Nursing and Rehabilitation	
Post Oil Farm to School	
Green Mountain RSVP & Volunteer Center	
Senior Solutions	Y
Southeastern Vermont Community Action (SEVCA)	
Southern Vermont AHEC	Y
State of VT - Agency of Human Services (AHS)	Y
State of VT - DVHA - Vermont Chronic Care Initiative (VCCI)	Y
State of VT - Vermont Department of Health (VDH)	Y
Sustainable Aging	
The Current Bus Service	
The Gathering Place	
Turning Point	Y
United Way of Windham County	Y
Visiting Nurse and Hospice for Vermont and New Hampshire (VNH)	
VT Wellness Education	Y
West River Valley Thrives	
Windham & Windsor Housing Trust	Y
Windham County Sheriff's Department	
Winston Prouty Center for Child Development - Children's Integrated Services	Y

Data Analysis

Non-network data analysis was conducted in Survey Monkey and Excel.

Network analysis was conducted using Gephi. Data is input into Gephi in node lists and edge lists. Node lists are lists of the names/labels of the organizations included in the study and a corresponding number. Edge lists are lists of the connections between organizations. In this study each edge list represented all the instances of a single type of connection (sharing resources, for instance) in a single HSA. The edge lists began with an extract of data from Survey Monkey, a grid format recording each connection between organizations. The grids were transformed in a series of steps into the edge lists, which code connections in pairs of numbers giving the “Source” and “Target” of each connection. The edge lists used in this study have been de-duplicated – in cases where multiple respondents answered on behalf of a single organization the connection between that organization and any other organization will appear only once per list. This choice was made to prevent over representing the role in the network of organizations fielding multiple respondents.

Results

Network Analysis Glossary

The following are brief definitions of network terminology that will be used throughout the Results section.

Node

The “nodes” on these graphs are the dots that represent organizations

Edge

The “edges” on these graphs are the lines representing connections between organizations (connections of any sort, whether they represent sharing information, resources, or referrals)

Centrality

Importance or prominence of an actor in a network

Betweenness Centrality

A measure of how often a given node appears on the shortest paths between pairs of nodes in the network. Betweenness Centrality takes the entire network into consideration when calculating a score for an individual node, and is therefore considered one of the most powerful centrality measures.

Average Degree

The average number of edges connected to each node in the network

Average Shortest Path Length

The average number of edges on the shortest path between each pair of nodes in the network

Graph Density

The proportion of all possible connections (represented as edges) that are present

Modularity

A measure of how readily a network decomposes into modular communities or sub-networks. The modularity numbers given here are based on the modularity function used in the Gephi software program (there are many other “modularity” or “community detection” functions that may be used in network analysis).

Network Maps

See Appendix A for the Network Maps

Network Statistics

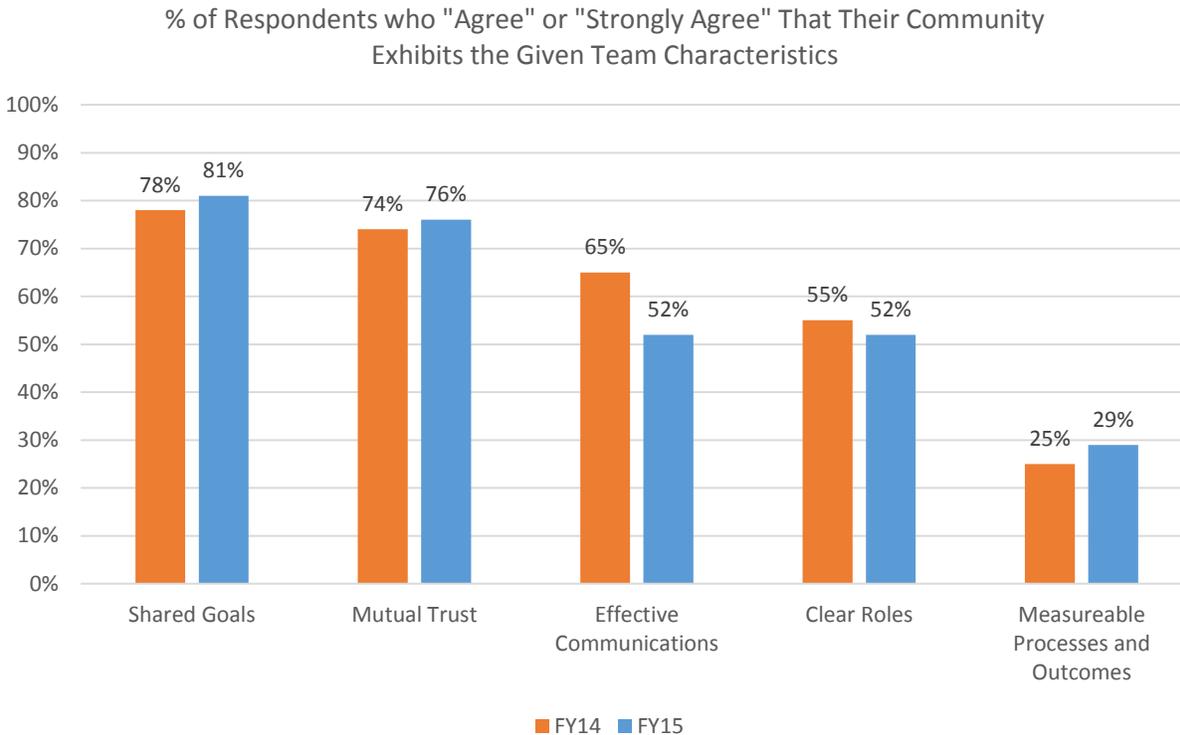
	Common Patients	Info – Patients	Info – Programs	Resources	Referrals	Full Network
Avg. Degree	6.846	4.092	7.538	1.738	8.554	13.954
Avg. Weighted Degree	7.154	4.338	8.169	1.938	9.815	31.415
Network Diameter	3	6	3	6	4	4
Graph Density	0.107	0.064	0.118	0.027	0.134	0.218
Modularity	0.163	0.188	0.15	0.353	0.147	0.101
Avg. Clustering Coefficient	0.49	0.371	0.593	0.243	0.66	0.668
Avg. Path Length	1.661	2.01	1.596	2.411	1.996	1.812

Organization Statistics

Organizations Ranked by Betweenness Centrality	
1	Brattleboro Memorial Hospital (BMH)
2	BMH – Community Health Team
3	Early Education Services of Windham County
4	State of VT – Agency of Human Services (AHS)
5	State of VT – Vermont Department of Health (VDH)

Organizations with Highest In-Degree	
Brattleboro Memorial Hospital (BMH)	54
BMH – Community Health Team	44
Early Education Services of Windham County	41
State of VT – Agency of Human Services (AHS)	33
State of VT – Vermont Department of Health (VDH)	33

Team-Based Care



Observations and Opportunities

The following are the researcher's observations of the network graphs and team based care results, and related questions. Additional observations, questions, and ideas for improving network relationships and effectiveness will be solicited when these findings are presented in the community.

- Primary care practices, Brattleboro Memorial Hospital and its physician group services are clustered tightly together in a network neighborhood that includes the Community Health Team
- Another network neighborhood primarily serves seniors, with a range of offerings from home health and hospice, to meals, to transportation, to advocacy.
- Team Based Care measures were steady from the previous survey to this one, the only notable change being a drop of 13% in agreement that organizations in the network communicate with each other effectively. How have communication practices changed in the past year?
- Early Education Services of Windham County is among the most central organizations in this network – few other HSAs have either education or youth services in a central position.

Appendix A

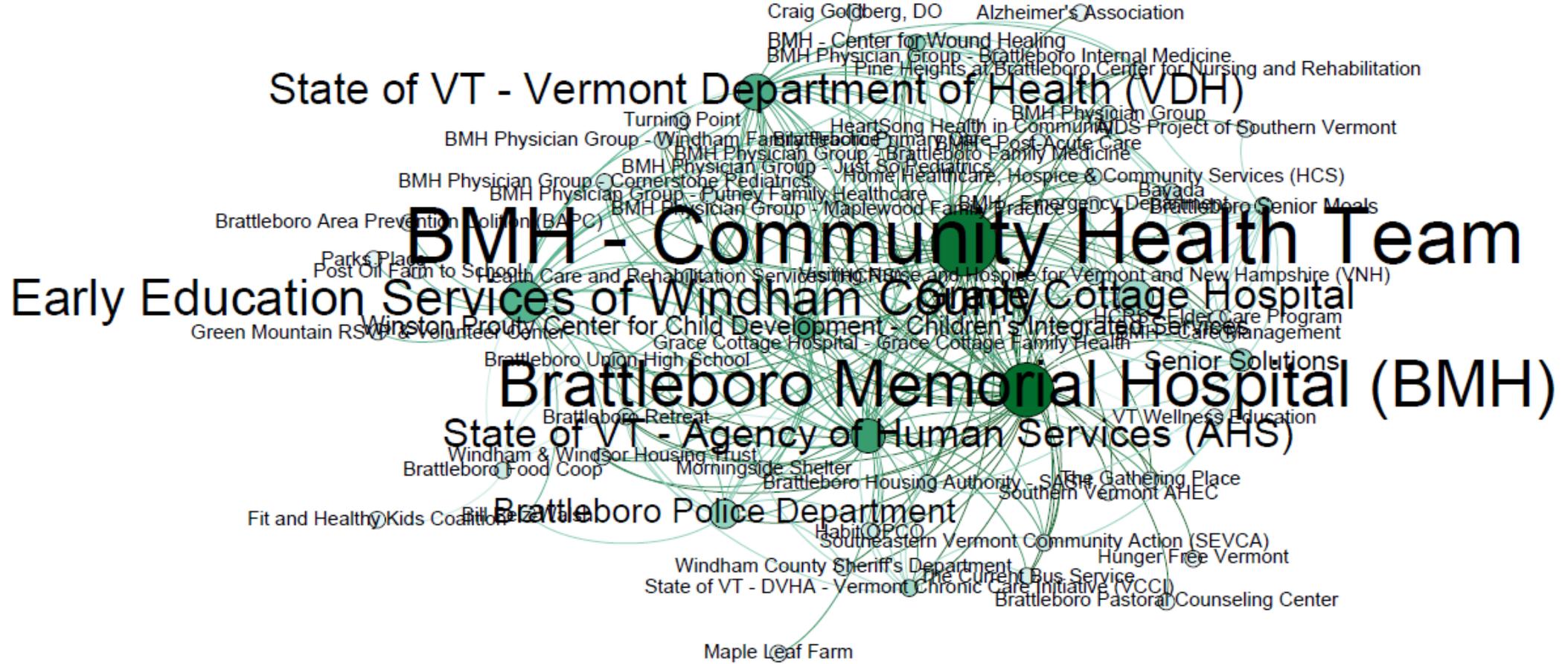
Brattleboro Network Maps

Brattleboro Info-Patients Network

Our organizations share information about specific patients/clients

Node color shows Degree

Node size shows Betweenness Centrality

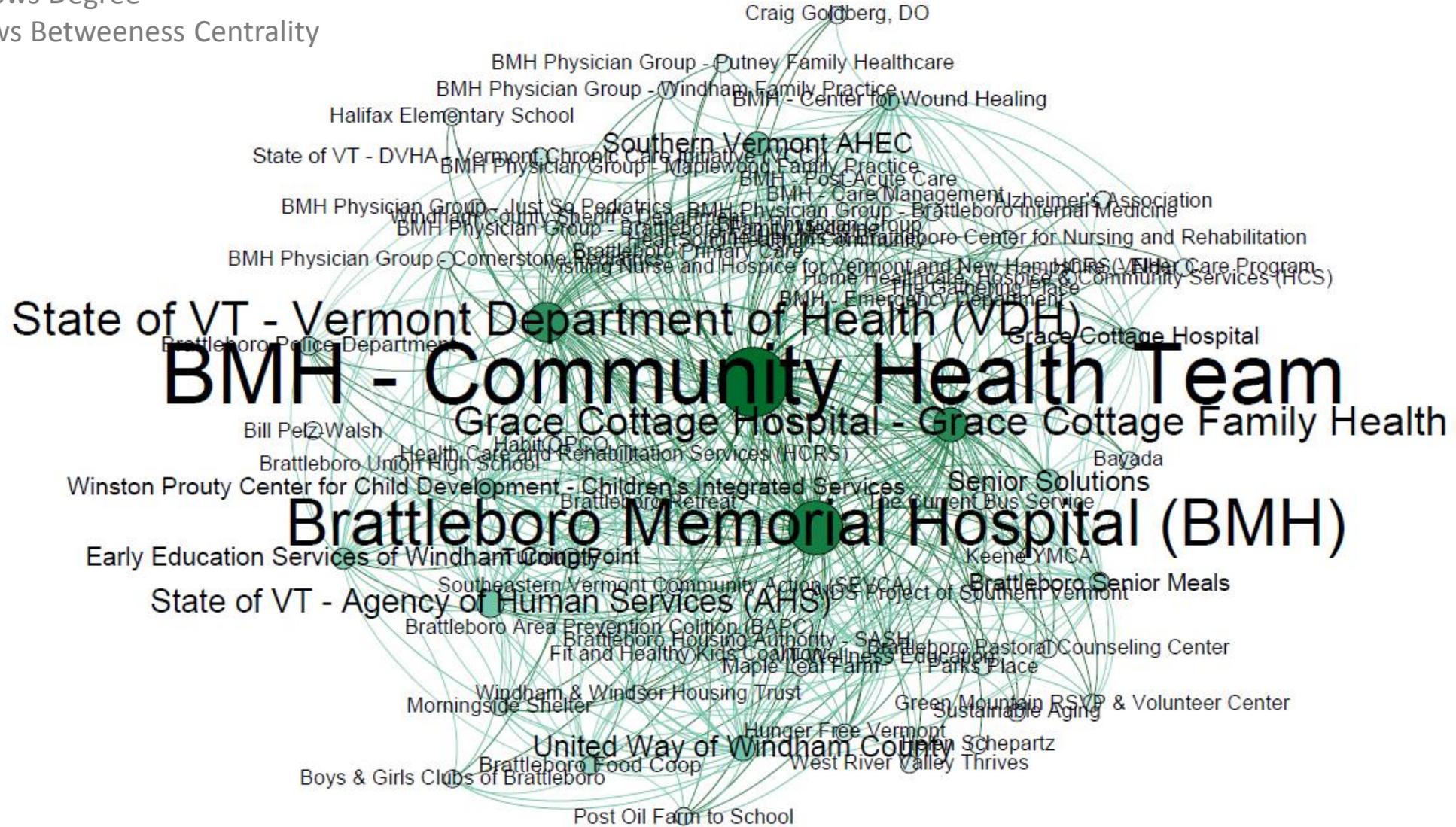


Brattleboro Info-Programs Network

Our organizations share information about programs, services and/or policy

Node color shows Degree

Node size shows Betweenness Centrality

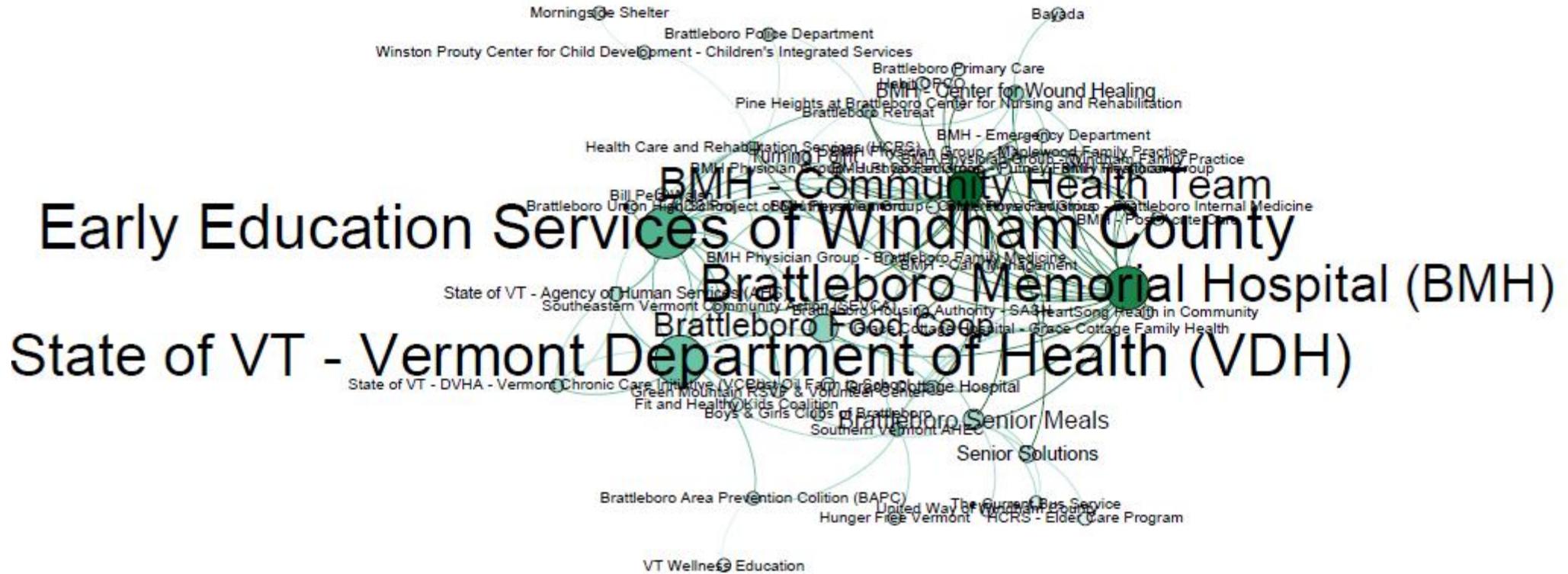


Brattleboro Resources Network

Our organizations share resources (e.g. joint funding, shared equipment, personnel or facilities)

Node color shows Degree

Node size shows Betweenness Centrality



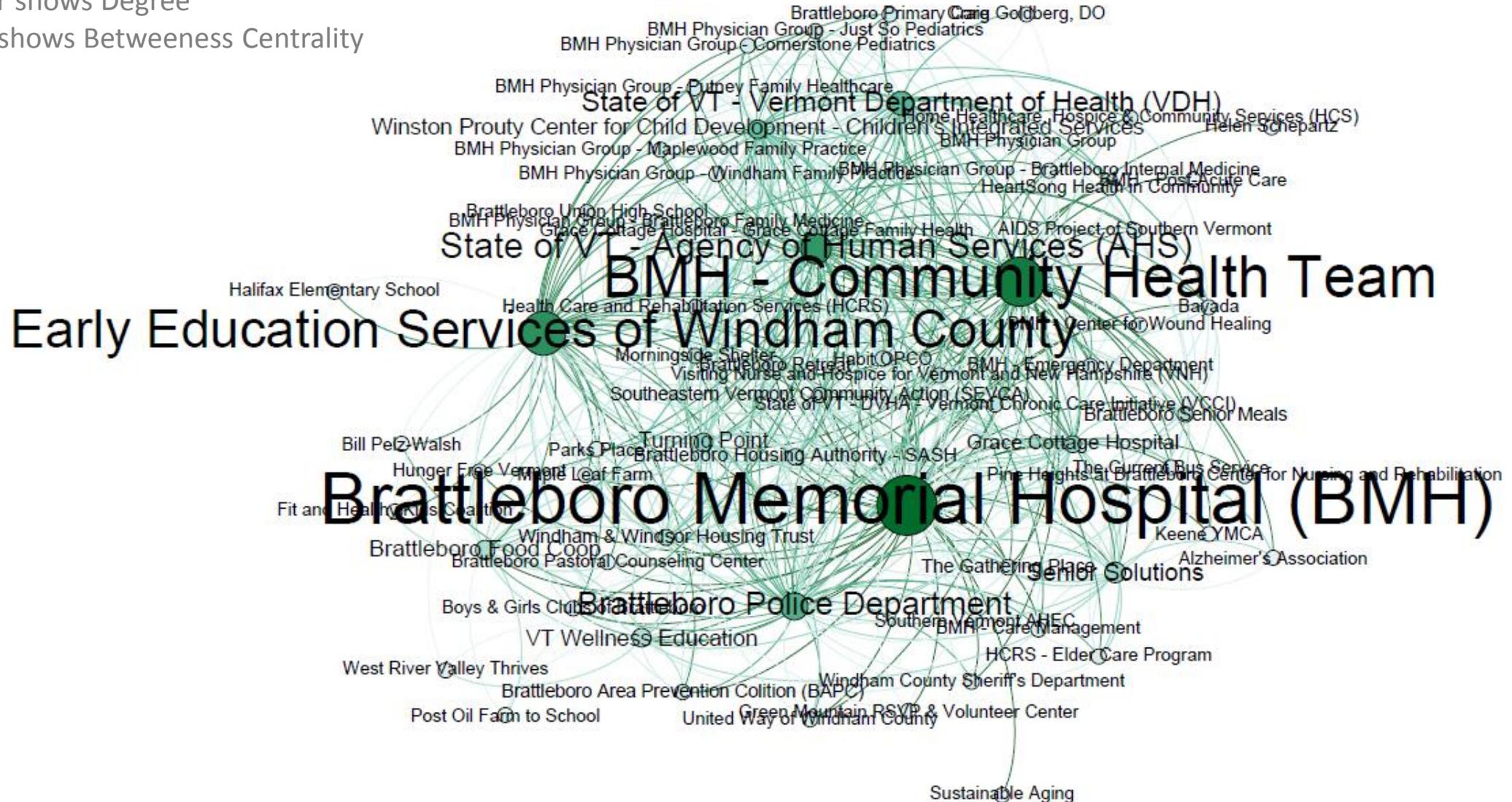
Brattleboro Referrals Network

My organization sends referrals to this organization +

My organization receives referrals from this organization

Node color shows Degree

Node size shows Betweenness Centrality



Brattleboro Full Network

Node color shows Network Neighborhood

Node size shows Betweenness Centrality

