Vermont Blueprint for Health

Middlebury 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 and 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 that 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.

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7. “My organization sends referrals to this organization”
8. “My organization receives referrals from this organization”
9. “Our organizations have clients/patients in common”
10. “Our organizations share information about specific clients/patients”
11. “Our organizations share information about programs, services and/or policy”
12. “Our organizations share resources (e.g. joint funding, shared equipment, personnel or facilities)”

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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 second wave of communities surveyed, using the Community Network List Development approach.

With this methodology, the network list began with a core group of organizations similar to the organizations represented in the area's Unified Community Collaborative, as shown below.

Types of Organizations Included in Seed List for Community Network List Development
Community Health Team
Each Blueprint PCMH primary care practice
Known non-Blueprint primary care practices
FQHC dental clinic
Hospital
Hospital – Emergency Department
Hospital – Case Management/Social Work Department
Designated Mental Health Agency
"Hub" of Hub/Spoke Program
VNA
Area Agency on Aging
Designated Regional Housing Organization – SASH Program
State of VT – Agency of Human Services (AHS)
State of VT – Vermont Chronic Care Initiative (VCCI)
State of VT – Vermont Department of Health (VDH)

Contacts at each of the corresponding organizations in an HSA were emailed a request to review the list of organizations and add to it any organization not already included, that their organization works with on an ongoing basis to provide medical, health and wellness, or health support services. Sample email text is given below. Non-respondents were emailed a reminder request.

Sample email text inviting participation in Community Network List Development:

Hello,

The Vermont Blueprint for Health is requesting your help. We are launching the 2nd year of a study of Vermont's community health networks, including the network that is active in your area. We want to know who the players are, how they work together, and what impact they are having on individual and population health. Our first step is to create a community-generated list of network members. We have a partial list of organizations (below) and would like your help completing it.

Please review the list below and add to it any organization that your organization works with on an ongoing basis to provide medical, health and wellness, or health support services. Please add as many additional organizations as fit this description and serve the _____ Health Service Area (which encompasses _____ County). Departments of the State of VT or other large organizations may be entered on separate lines.

SEED LIST:

1.
2.
3.
4.

Responses were compiled, sorted and tallied. Organizations receiving at least two mentions were included in the final survey list in cases where the resulting list would be less than or equal to forty organizations, organizations receiving at least three mentions were included in the final survey list in cases where the resulting list would be more than forty organizations. This approach limited the number of organizations in the survey, so that the survey would be a manageable length. Representatives of all organizations included in the final list – core members and community additions – were invited to take the survey themselves.

Survey Participation

Invitations Sent	37
Surveys Started	25
Response Rate	68%
Completed Surveys	22
Completion Rate	88%

Seed List Organizations	Completed Survey
Addison County Home Health & Hospice	Y
Cathedral Square – SASH Program	Y
Champlain Valley Aging on Aging (CVAA)	Y
Counseling Services of Addison County (CSAC)	Y
Middlebury Family Health Center	
Mountain Health Center	Y
Porter Medical Center	Y
Porter Medical Center – Addison Family Medicine	Y
Porter Medical Center – Bristol Internal Medicine	
Porter Medical Center – Community Health Team	Y
Porter Medical Center – Emergency Department	Y
Porter Medical Center – Little City Family Practice	
Porter Medical Center – Middlebury Pediatric and Adolescent Medicine	Y
Porter Medical Center – Neshobe Family Health	
Porter Medical Center – Porter Internal Medicine	
Rainbow Pediatrics	Y
State of VT – Agency of Human Services (AHS)	Y
State of VT – Vermont Chronic Care Initiative (VCCI)	
State of VT – Vermont Department of Health (VDH)	Y
The Counseling Service of Addison County	
The Howard Center – Chittenden Clinic “Hub”	
The Open Door Clinic	Y
United Way of Addison County	
Community Additions	
Addison County Parent Child Center	Y
Champlain Valley Office of Economic Opportunity (CVOEO)	Y
Elderly Services	Y
HOPE	
State of VT – VocRehab	

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. Betweeness 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

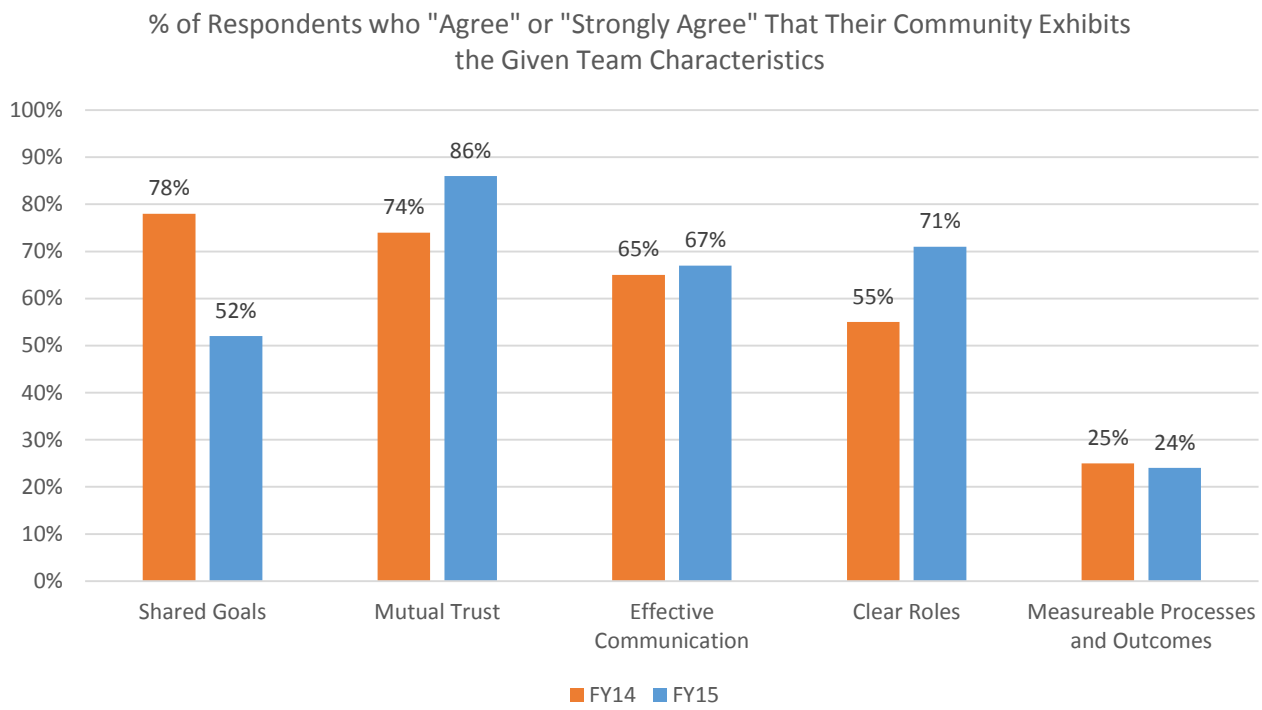
	Common Patients	Info – Patients	Info – Programs	Resources	Referrals	Full Network
Avg. Degree	9.815	6.0	6.926	2.259	11.963	14.593
Avg. Weighted Degree	9.815	6.0	6.926	2.259	15.296	40.296
Network Diameter	3	3	3	5	3	2
Graph Density	0.377	0.231	0.266	0.087	0.46	0.561
Modularity	0.046	0.159	0.089	0.305	0.067	0.09
Avg. Clustering Coefficient	0.627	0.53	0.608	0.299	0.639	0.71
Avg. Path Length	1.414	1.692	1.608	2.04	1.558	1.444

Organization Statistics

Organizations Ranked by Betweeness Centrality	
1	State of VT – Agency of Human Services (AHS)
2	Porter Medical Center – Community Health Team
3	Counseling Services of Addison County (CSAC)
4	State of VT – Vermont Department of Health (VDH)
5	Porter Medical Center – Emergency Department

Organizations with Highest In-Degree	
State of VT – Agency of Human Services (AHS)	25
Counseling Services of Addison County (CSAC)	25
Porter Medical Center – Community Health Team	24
State of VT – Vermont Department of Health (VDH)	24
Porter Medical Center – Emergency Department	22

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.

- The biggest change in the Team Based Care measures is a 26% drop in respondents agreeing that organizations in the network have established shared goals. How do community members explain this change?
- The measures of Mutual Trust and Clear Roles have both improved since the last survey (12% and 16% respectively).
- Addison County Home Health & Hospice, Cathedral Square – SASH Program, Elderly Services, State of VT – Vermont Chronic Care Initiative (VCCI), and the Champlain Valley Agency on Aging are all part of the green network neighborhood, brought together in service of the aging and elderly population.
- Both the Champlain Valley Office of Economic Opportunity (CVOEO) and State of VT – Voc Rehab were community additions to the network, suggesting employment may be a key lever this network uses to improve client/patient wellbeing.

Appendix A

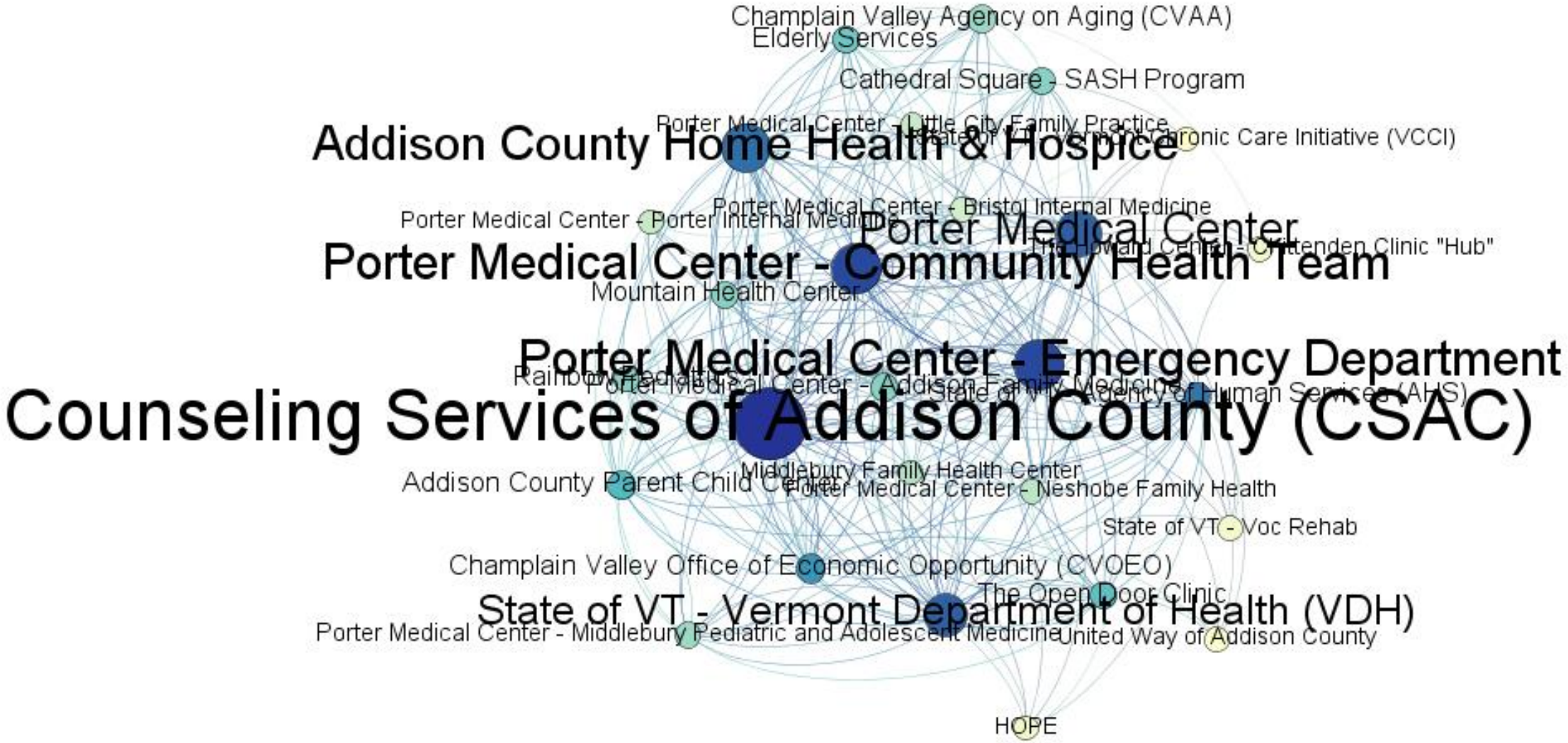
Middlebury Network Maps

Middlebury Common Clients Network

Our organizations have clients/patients in common

Node color shows Degree

Node size shows Betweeness Centrality



Middlebury Info-Patients Network

Our organizations share information about specific patients/clients

Node color shows Degree

Node size shows Betweeness Centrality

Middlebury Info-Programs Network

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

Node color shows Degree

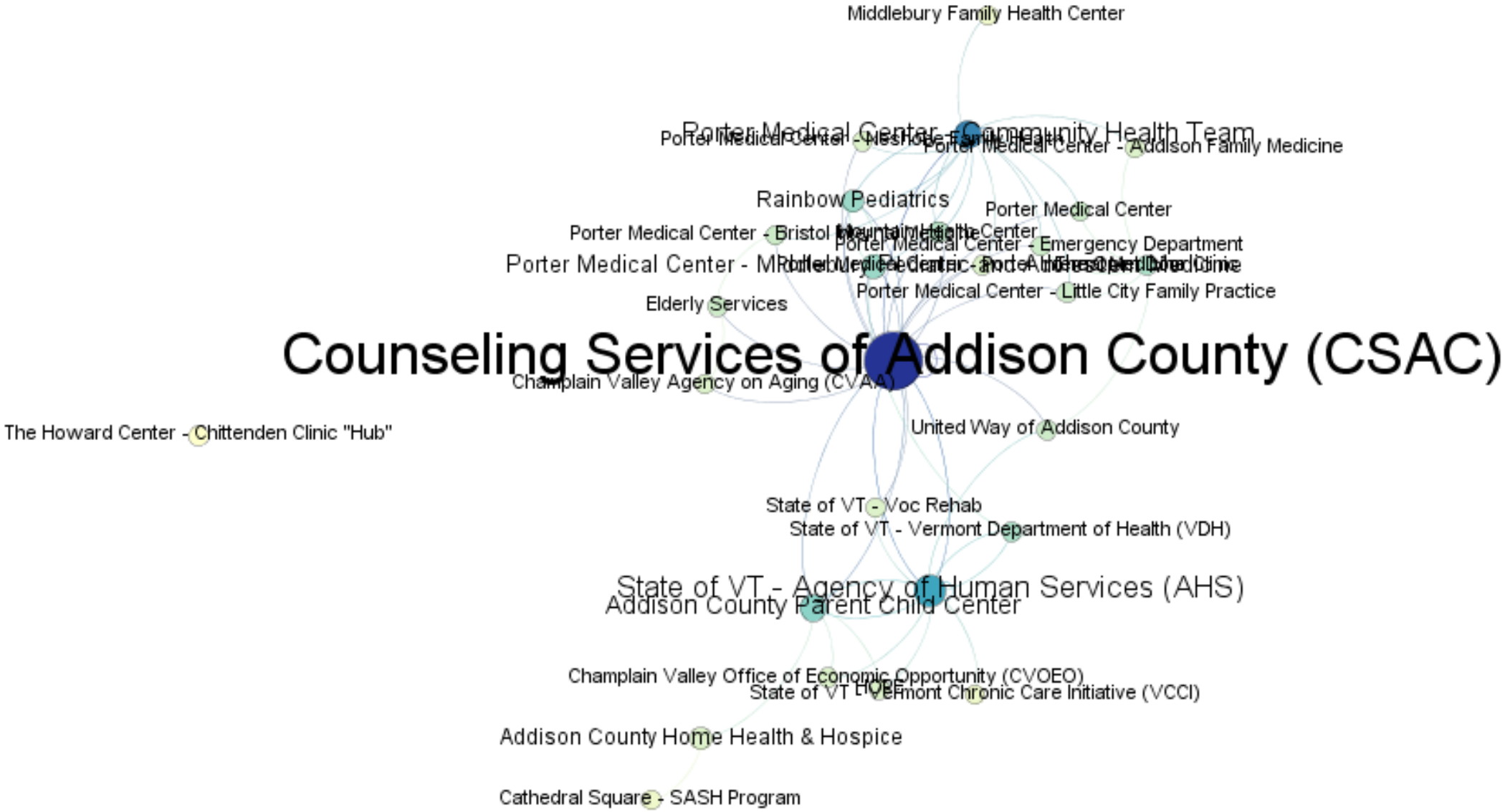
Node size shows Betweeness Centrality

Middlebury Resources Network

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

Node color shows Degree

Node size shows Betweeness Centrality



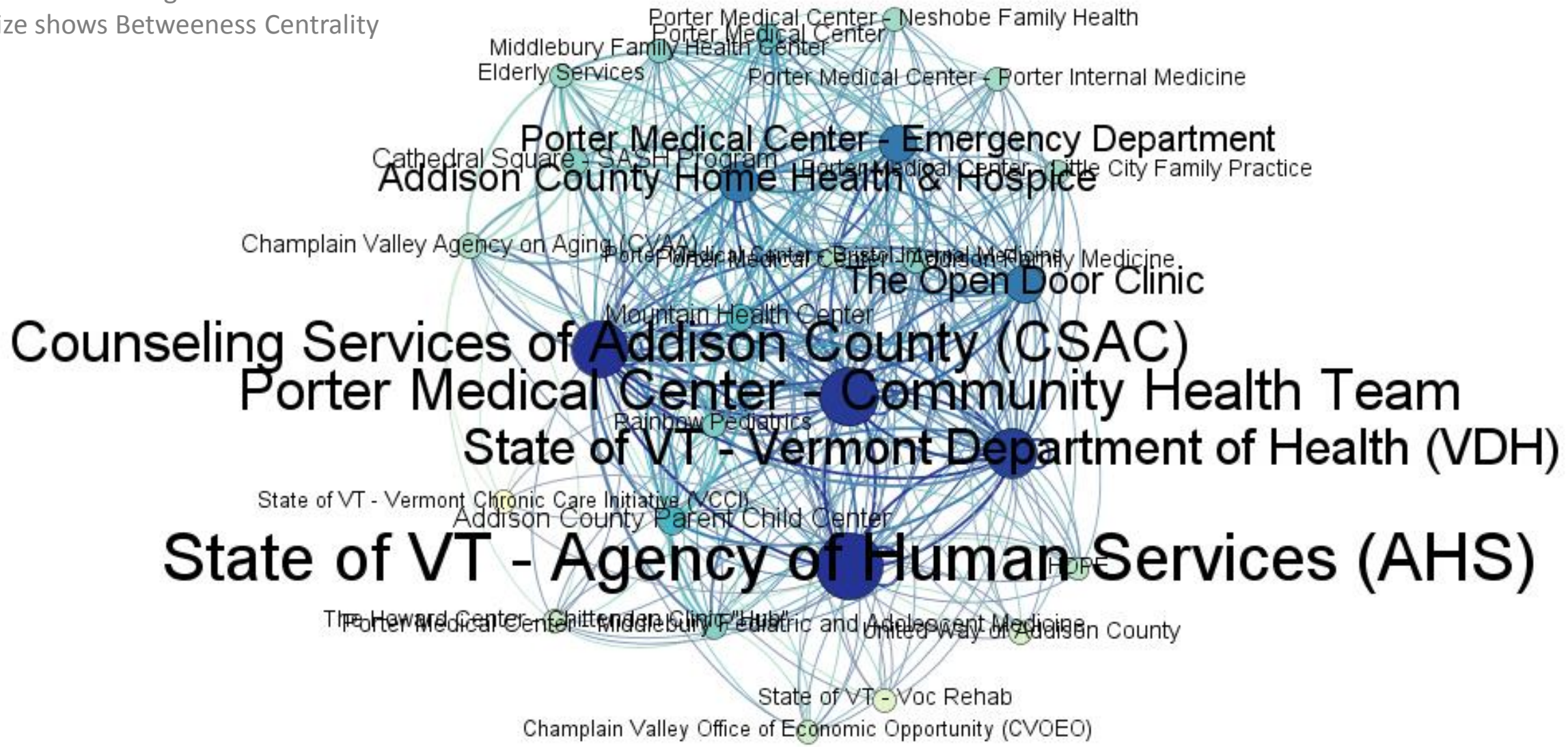
Middlebury Referrals Network

My organization sends referrals to this organization +

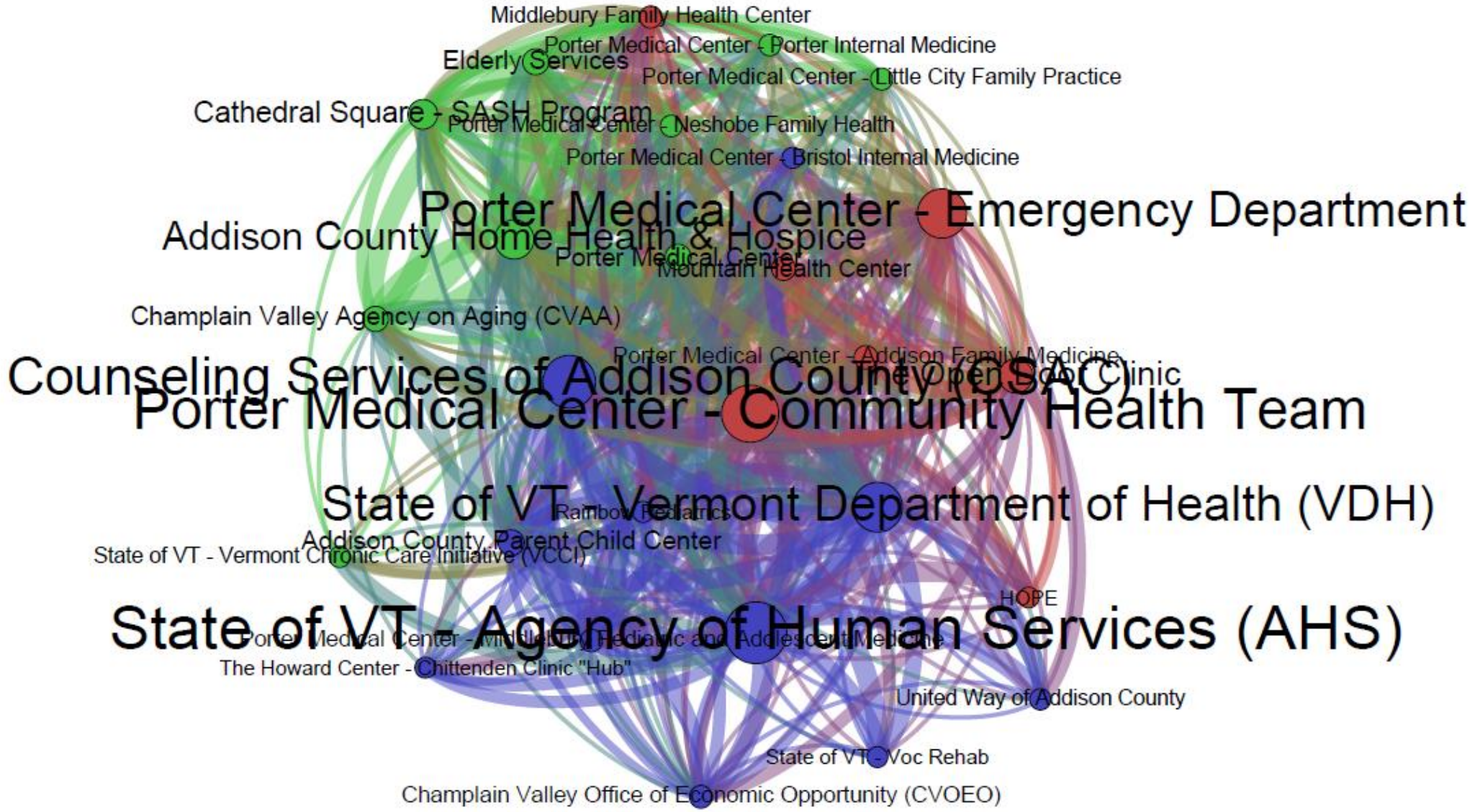
My organization receives referrals from this organization

Node color shows Degree

Node size shows Betweeness Centrality



Middlebury Full Network

Node color shows Network Neighborhood

Node size shows Betweeness Centrality