

Vermont Blueprint for Health

# Barre 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 included in the third wave of data collection, using the Core Network List Development methodology. With this methodology, the network list was a core group of organizations similar to the organizations represented in the area's Unified Community Collaborative, as shown below. No additional organizations were included.

<b>Types of Organizations Included in Core Network Methodology</b>
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)
area United Way

## Survey Participation

Invitations Sent	27
Surveys Started	18
Response Rate	67%
Completed Surveys	15
Completion Rate	83%

Core Organizations	Completed Survey
BAART/Central Vermont Addiction Medicine	
Central Vermont Council on Aging	Y
Central Vermont Home Health & Hospice	Y
Downstreet Housing & Community Development - SASH Program	Y
Granite City Medical Associates	
Green Mountain Natural Health	
Green Mountain United Way	Y
Practice of Carol Vassar, M.D.	
Practice of Roger Kellogg, M.D.	
State of VT - Agency of Human Services (AHS)	Y
State of VT - Vermont Chronic Care Initiative (VCCI)	Y
State of VT - Vermont Department of Health (VDH)	Y
The Health Center, Plainfield	
UVMHN - Central Vermont Medical Center (CVMC)	Y
UVMHN - CVMC - Adult Primary Care - Barre at Barre Health Center	Y
UVMHN - CVMC - Adult Primary Care, Hematology & Oncology at Mountainview Medical	Y
UVMHN - CVMC - Care Management Department	Y
UVMHN - CVMC - Community Health Team	
UVMHN - CVMC - Emergency Department	
UVMHN - CVMC - Family Medicine - Berlin	
UVMHN - CVMC - Family Medicine - Mad River	
UVMHN - CVMC - Family Medicine - Waterbury at Waterbury Medical Center	Y
UVMHN - CVMC - Green Mountain Family Practice	Y
UVMHN - CVMC - Pediatric Primary Care at Barre Health Center	
UVMHN - CVMC - Pediatric Primary Care at Berlin Health Center	Y
UVMHC - Family Medicine Berlin	
Washington County Mental Health Services	
UVMHN-CVMC-Integrative Family Medicine-Montpelier*	Y

\*Respondent write-in

## 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

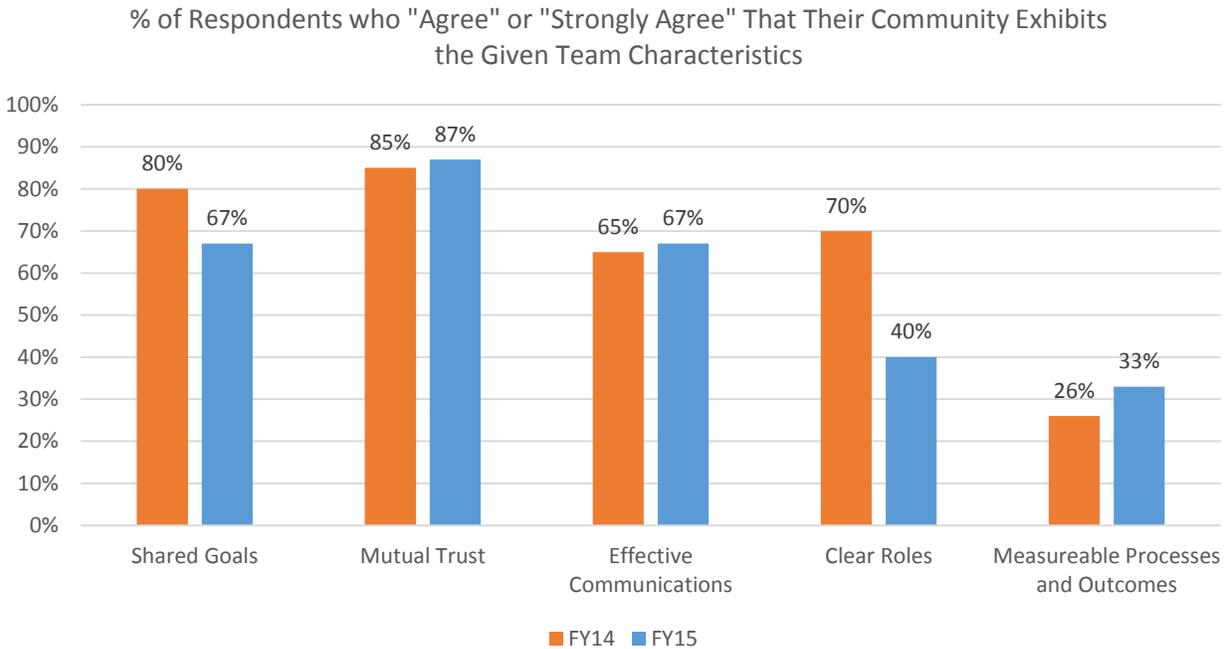
	Common Patients	Info – Patients	Info – Programs	Resources	Referrals	Full Network
Avg. Degree	8.036	6.107	7.75	1.857	9.536	13.821
Avg. Weighted Degree	8.036	6.107	7.75	1.857	11.071	34.821
Network Diameter	2	3	3	3	4	3
Graph Density	0.298	0.226	0.287	0.069	0.353	0.512
Modularity	0.063	0.087	0.06	0.356	0.073	0.055
Avg. Clustering Coefficient	0.53	0.506	0.542	0.272	0.597	0.718
Avg. Path Length	1.343	1.505	1.425	1.432	1.719	1.508

## Organization Statistics

Organizations Ranked by Betweenness Centrality	
1	Central Vermont Home Health & Hospice
2	UVMHN – CVMC – Care Management Department
3	State of VT – Vermont Chronic Care Initiative (VCCI)
4	Downstreet Housing & Community Development – SASH Program
5	State of VT – Agency of Human Services (AHS)

Organizations with Highest In-Degree	
Central Vermont Home Health & Hospice	25
UVMHN – CVMC – Care Management Department	25
Downstreet Housing & Community Development – SASH Program	25
State of VT – Vermont Chronic Care Initiative (VCCI)	23
State of VT – Agency of Human Services (AHS)	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.

- In the full network several organizations have similarly high Betweenness Centrality, there is no one clear leader
- The UVMHN-CVMC Care Management Department is one of several central organizations in the full network and is also central in the sub-networks for referrals, having patients/clients in common, and sharing information about specific clients/patients
- In the full network one network neighborhood is dominated by primary care practices and includes the UVMHN-CVMC Emergency Department and Care Management Department as well. Does this network neighborhood have anything to share regarding effective communication and transfer of patients from one setting to another? How are ED utilization and hospital readmission rates in this HSA?
- The SASH Program (Downstreet Housing & Community Development – SASH Program) is more prominent in this network than in many other communities.
- While most team based care measures have remained steady since the last survey, Clear Roles dropped 30% (40% vs. 70% "agree" or "strongly agree"). What has changed in the community that could account for this and how can it be remedied?

# Appendix A

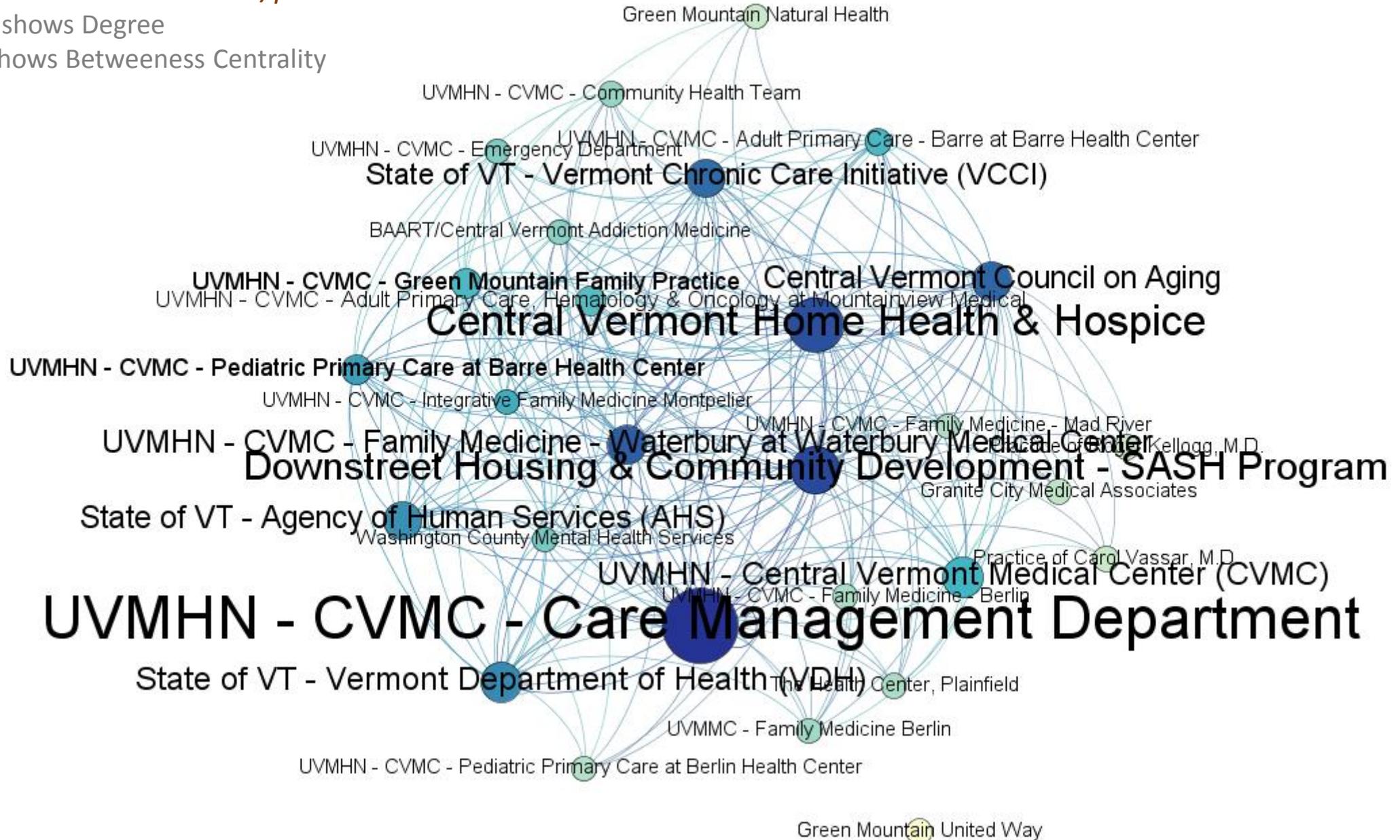
Barre Network Maps

# Barre Common Clients Network

*Our organizations have clients/patients in common*

Node color shows Degree

Node size shows Betweenness Centrality

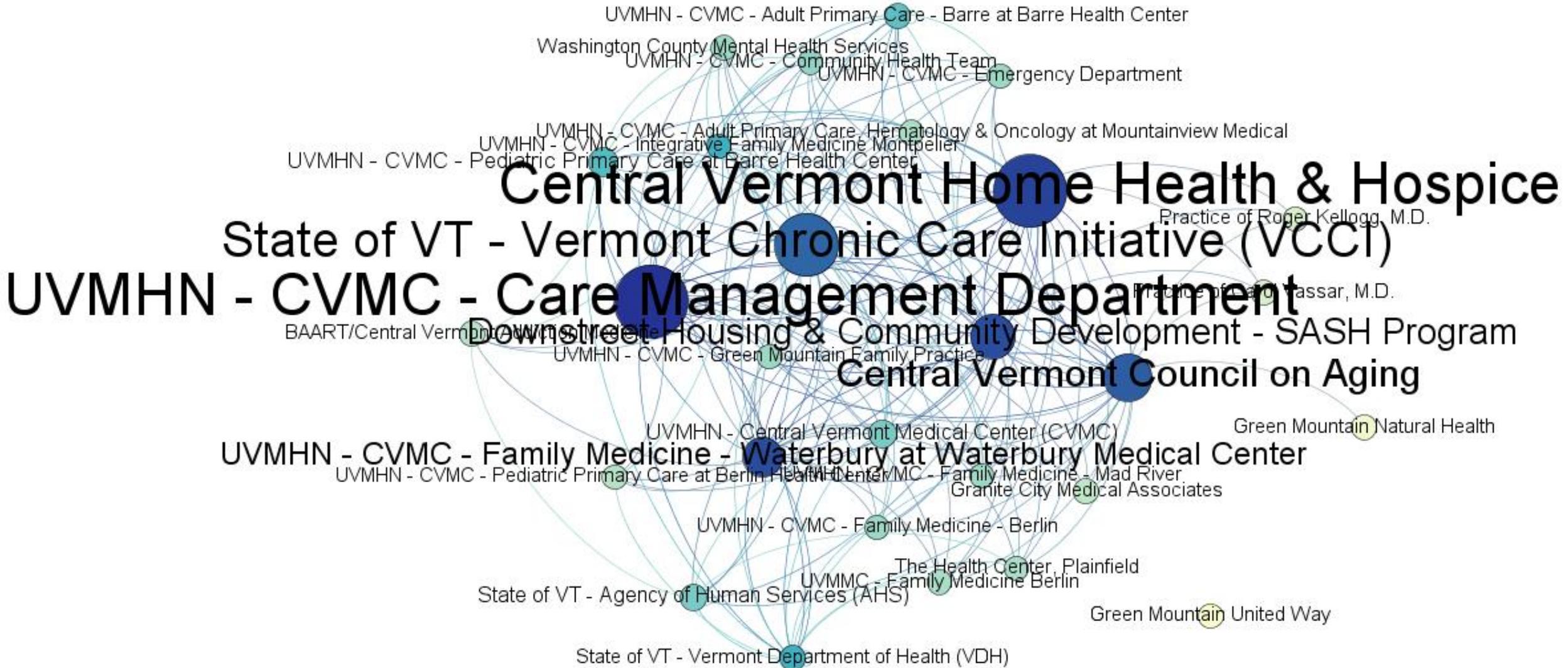


# Barre Info-Patients Network

*Our organizations share information about specific patients/clients*

Node color shows Degree

Node size shows Betweenness Centrality

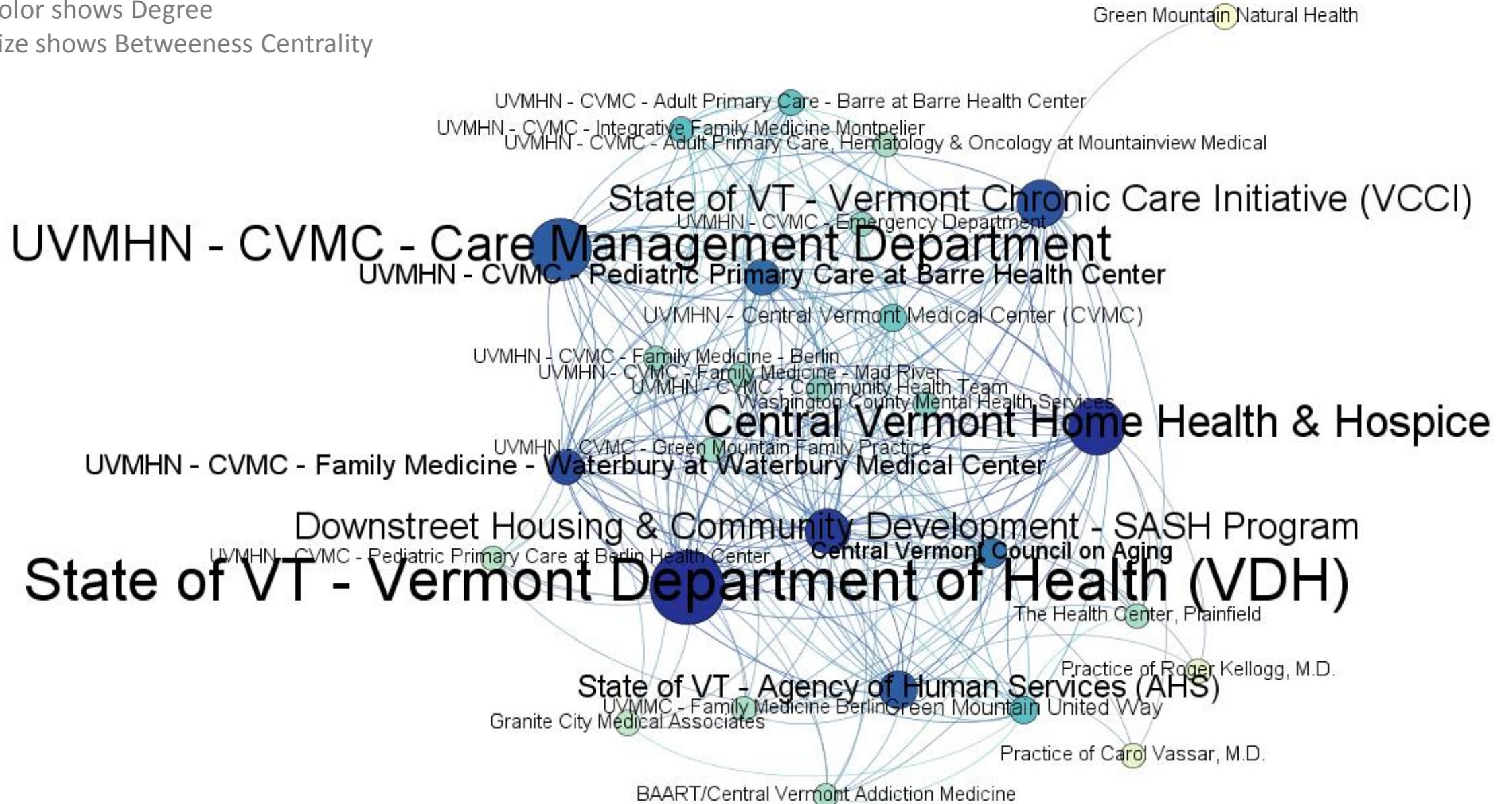


# Barre Info-Programs Network

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

Node color shows Degree

Node size shows Betweenness Centrality

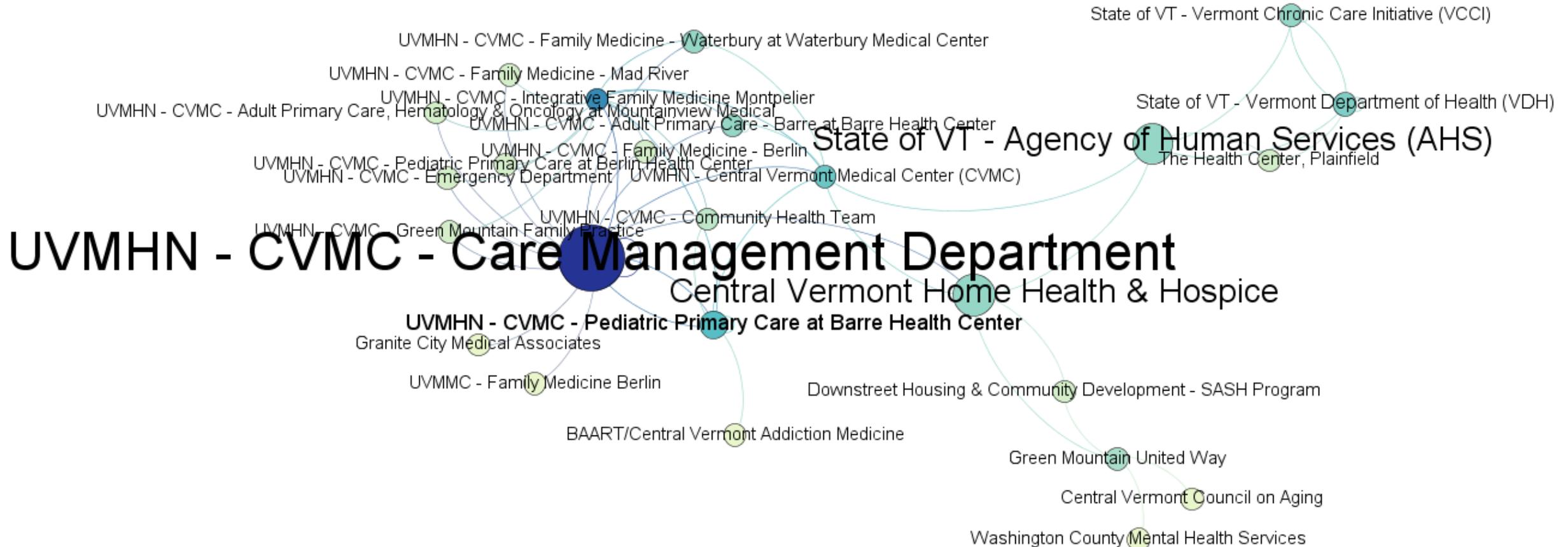


# Barre Resources Network

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

Node color shows Degree

Node size shows Betweenness Centrality



# Barre 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

