

Vermont Blueprint for Health

Burlington Area Community Network Report

Network Analysis and Team Based Care

Maurine Gilbert, contracted Community Facilitator
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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.

Types of Organizations Included in Core Network Methodology
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	51
Surveys Started	31
Response Rate	61%
Completed Surveys	26
Completion Rate	84%

Organizations	Completed Survey
Alder Brook Family Health	Y
Burlington Primary Care	
Cathedral Square - SASH Program	Y
Champlain Center for Natural Medicine	
Champlain Valley Agency on Aging (CVAA)	Y
Charlotte Health Center	
Community Health Centers of Burlington	Y
Community Health Centers of Burlington - Dental Clinic	
Essex Pediatrics	Y
Evergreen Family Health	Y
Good Health	Y
Hagan, Rinehart and Connolly Pediatricians	Y
Howard Center	Y
Howard Center - The Chittenden Clinic "Hub"	
Mountain View Natural Medicine	Y
Practice of Frank Landry, MD PLC	
Practice of Gene Moore, MD	
Practice of James Hebert, MD	
Richmond Family Medicine	
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
Thomas Chittenden Health Center	
Timber Lane North Pediatrics	
Timber Lane Pediatrics	Y
United Way of Chittenden County	Y
University of Vermont Medical Center (UVMMC)	Y
UVMMC - Adult Primary Care - Burlington	Y
UVMMC - Adult Primary Care - Essex	
UVMMC - Adult Primary Care - South Burlington	
UVMMC - Adult Primary Care - Williston	Y
UVMMC - Case Management and Social Work Department	Y
UVMMC - Community Health Team	Y
UVMMC - Emergency Department	Y
UVMMC - Family Medicine - Colchester	Y
UVMMC - Family Medicine - Hinesburg	
UVMMC - Family Medicine - Milton	Y
UVMMC - Family Medicine - South Burlington	Y
UVMMC - Pediatric Primary Care - Burlington	Y
UVMMC - Pediatric Primary Care - Williston	
Visiting Nurse Association of Chittenden and Grande Isle Counties (VNA)	Y
Winooski Family Health	

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

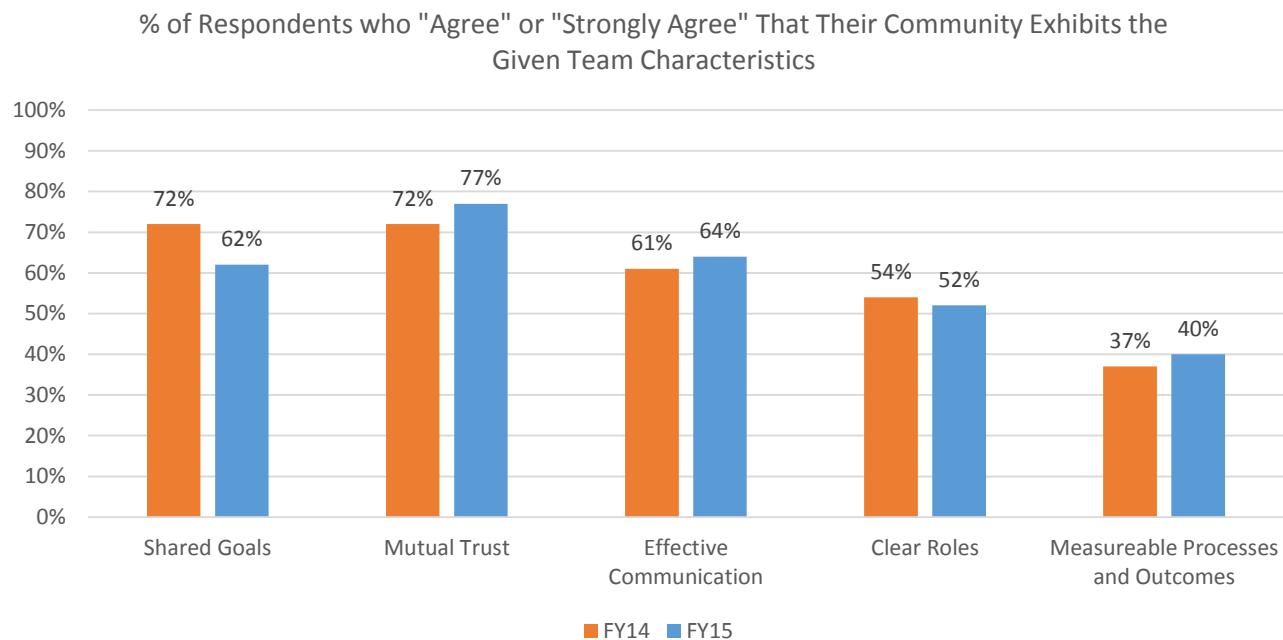
	Common Patients	Info – Patients	Info – Programs	Resources	Referrals	Full Network
Avg. Degree	10.143	7.095	5.167	3.571	10.19	16.048
Avg. Weighted Degree	10.413	7.095	5.167	3.571	12.786	38.762
Network Diameter	3	3	3	4	3	2
Graph Density	0.247	0.173	0.126	0.087	0.249	0.391
Modularity	0.092	0.142	0.188	0.351	0.095	0.083
Avg. Clustering Coefficient	0.619	0.702	0.702	0.619	0.693	0.745
Avg. Path Length	1.517	1.715	1.858	1.877	1.781	1.613

Organization Statistics

Organizations Ranked by Betweenness Centrality	
1	University of Vermont Medical Center (UVMMC)
2	UVMMC – Community Health Team
3	Visiting Nurse Association of Chittenden and Grande Isle Counties (VNA)
4	UVMMC – Case Management and Social Work Department
5	Mountain View Natural Medicine

Organizations with Highest In-Degree	
University of Vermont Medical Center (UVMMC)	42
UVMMC – Community Health Team	41
Visiting Nurse Association of Chittenden and Grande Isle Counties (VNA)	40
UVMMC – Case Management and Social Work Department	40
State of VT – Vermont Chronic Care Initiative (VCCI)	29

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:
 - All of the most central organizations appear in the blue network neighborhood – these include UVMMC and its Community Health Team, Emergency Department, and Case Management and Social Work Department, as well as the VNA and Mountain View Natural Medicine.
 - State services are all clustered in the red network neighborhood.
 - The green network neighborhood may coalesce around the high-needs populations some of the organizations in that neighborhood serve. The Howard Center, its Chittenden Clinic “Hub,” and the Community Health Centers of Burlington likely have significant overlap in clientele.
- The sub-network of information sharing about specific clients/patients is dominated by UVMMC and the VNA – they are highly central as well as closely linked to each other. What systems or practices have these organizations put in place to facilitate this information sharing, do they feel effective to those utilizing them, and if so can they inform other HSAs? Note that these same organizations are similarly positioned in the referrals network.
- The Team Based Care measures show little change since the last survey, with the exception of a drop of 10% in agreement that the community has established shared goals, and a 5% increase in agreement that organizations trust each other.

Appendix A

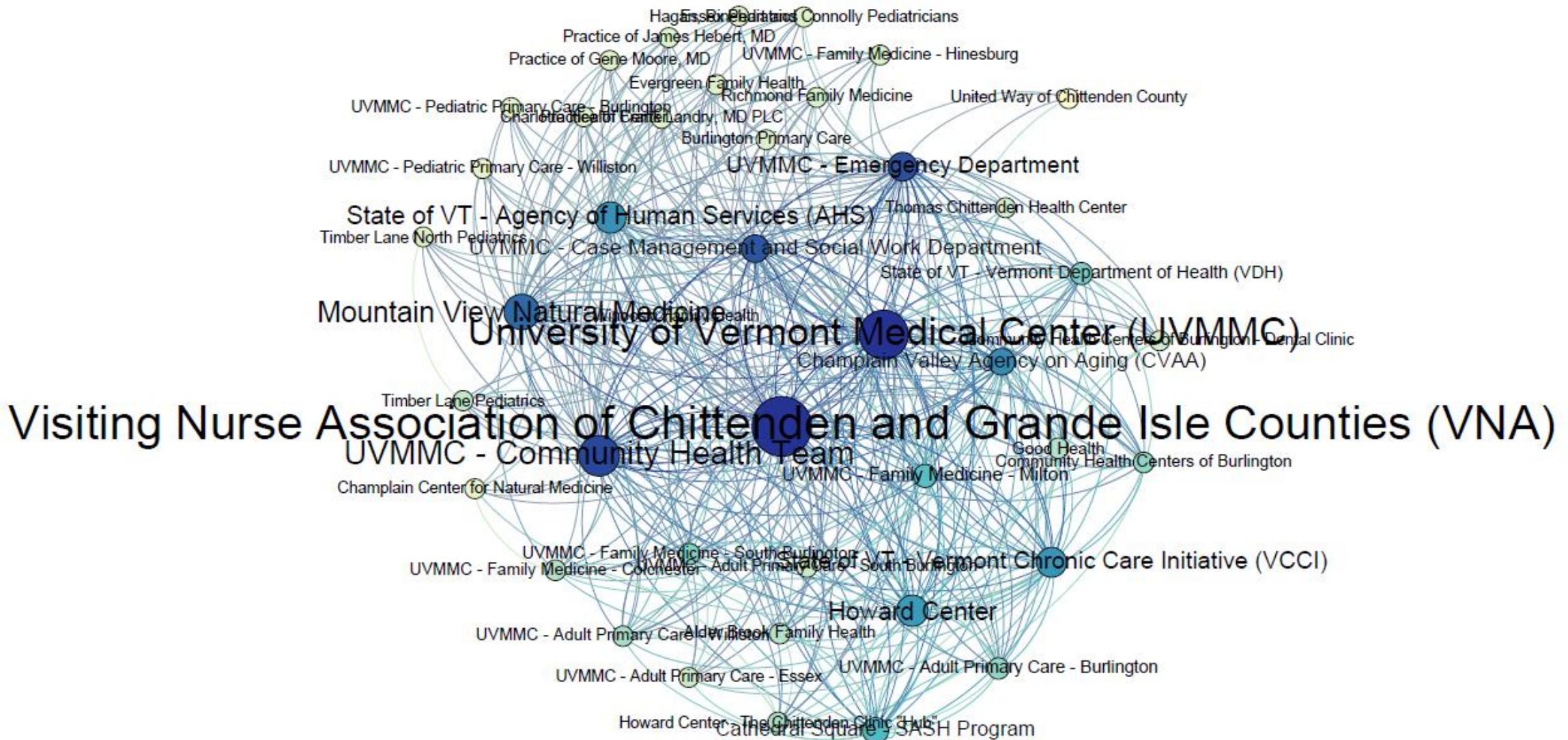
Burlington Network Maps

Burlington Common Clients Network

Our organizations have clients/patients in common

Node color shows Degree

Node size shows Betweenness Centrality



Burlington Info-Patients Network

Our organizations share information about specific patients/clients

Node color shows Degree

Node size shows Betweenness Centrality



Visiting Nurse Association of Chittenden and Grande Isle Counties (VNA)

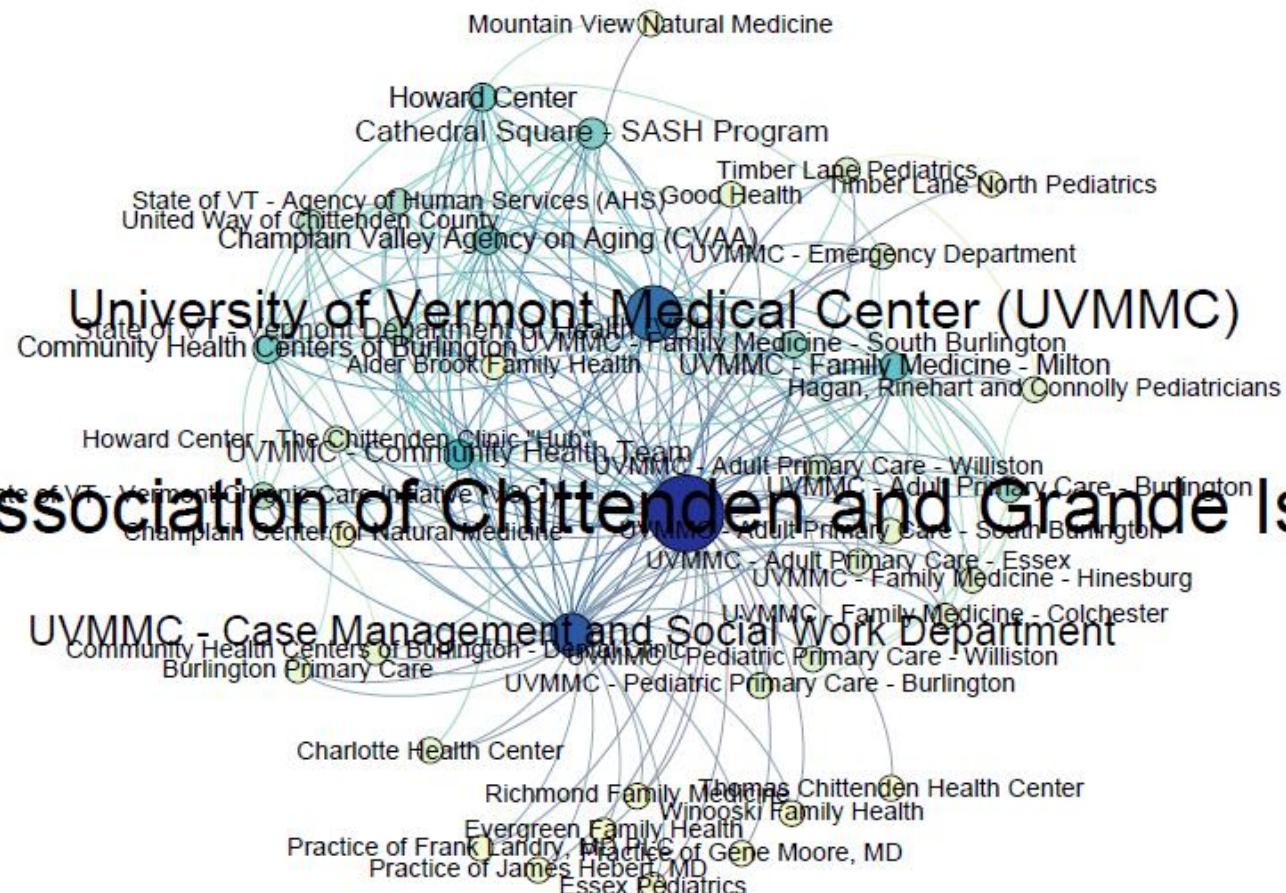
University of Vermont Medical Center (UVMMC)

Burlington Info-Programs Network

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

Node color shows Degree

Node size shows Betweenness Centrality

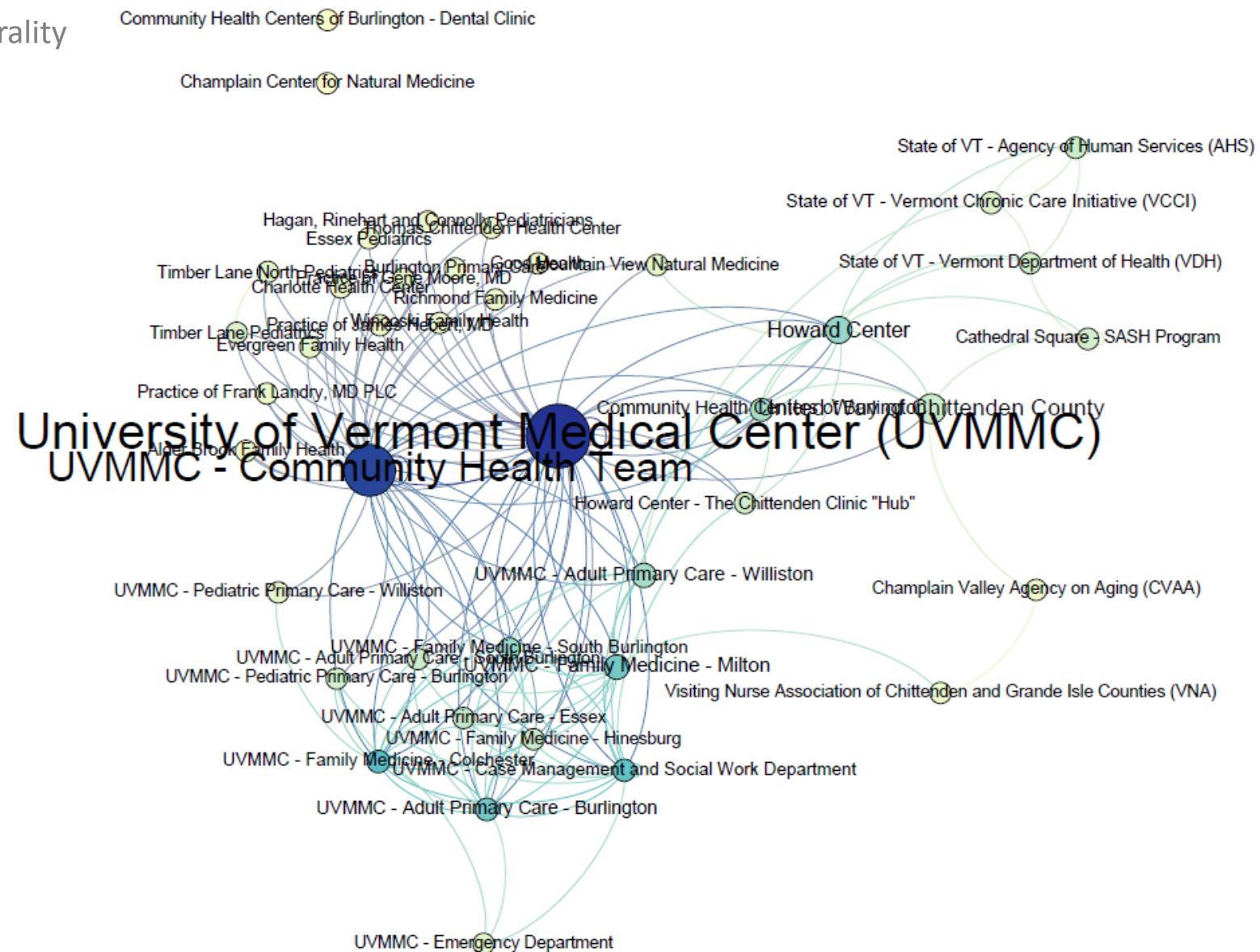


Burlington Resources Network

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

Node color shows Degree

Node size shows Betweenness Centrality



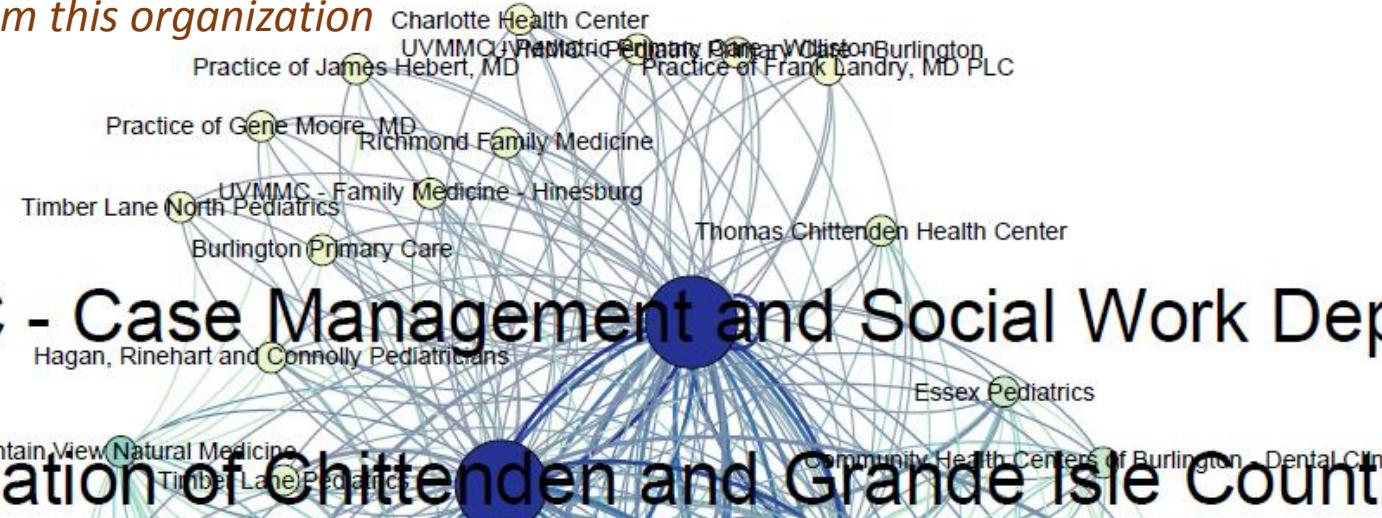
Burlington Referrals Network

My organization sends referrals to this organization +

My organization receives referrals from this organization

Node color shows Degree

Node size shows Betweenness Centrality



Visiting Nurse Association of Chittenden and Grande Isle Counties (VNA)

University of Vermont Medical Center (UVMMC)

Burlington Full Network

Node color shows Network Neighborhood

Node size shows Betweenness Centrality

