Vermont Blueprint for Health

St. Johnsbury 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.

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
Green means mandatory	CHT
	Primary Care Practices
	Hospital
	Hospital - Emergency Department
	Hospital - Case Management/Social Work
Yellow means optional	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	97
Surveys Started	37
Response Rate	38%
Completed Surveys	33
Completion Rate	89%

Organizations	Completed Survey
Acupuncture Works	Y
BAART Behavioral Health Services	Y
Dartmouth-Hitchcock - Norris Cotton Cancer Center North	Y
Dartmouth-Hitchcock - Office of Care Management	
Gauthier's Pharmacy	
Good Living Senior Center	
Green Mountain United Way	Y
Jay-Lyn Jitney	
Kingdom Community Services	
Kingdom Recovery Center	Y
Lin Care	
Love Is . . . Homecare	Y
Northern Counties Health Care (NCHC)	
NCHC - Caledonia Home Health Care & Hospice	Y
NCHC - Concord Health Center	
NCHC - Danville Health Center	Y
NCHC - Northern Counties Dental Center	
NCHC - St. Johnsbury Community Health Center	Y
Northeast Kingdom Learning Services (NEKLS)	Y
NEKLS - Children's Integrated Services	
Northeast Kingdom Community Action (NEKCA) including Head Start and Parent Child Centers	Y
Northeast Kingdom Homecare (NEKHC)	Y
Northeast Kingdom Human Services	Y
Northeast Kingdom Youth Services (NEKYS)	
Northeastern Vermont Area Agency on Aging (NEVAAA)	
Northeastern Vermont Area Health Education Center (NEVAHEC)	
Northern Family Home Care & Transportation	
Northeastern Vermont Regional Hospital (NVRH)	Y
NVRH - Alcohol, Tobacco and Other Drugs Prevention Task Force	
NVRH - Behavioral Health	Y
NVRH - Care Management	

NVRH - Chaplin and Palliative Care	
NVRH - Community Connections	Y
NVRH - Corner Medical Internal Medicine	Y
NVRH - Emergency Department	
NVRH - Kingdom Internal Medicine	Y
NVRH - Medical Library and Community Health Resource Center	
NVRH - St. Johnsbury Pediatrics	Y
NVRH - Tobacco Cessation	
NVRH - Women's Wellness Center and Midwifes	
Rural Community Transportation	
Rural Edge	Y
Rural Edge - SASH	
Springfield College	
St. Johnsbury Academy	
St. Johnsbury Health & Rehab	
St. Johnsbury Police Department	
St. Johnsbury School	
State of VT - Agency of Human Services (AHS)	
State of VT - AHS - Department for Children and Families (DCF)	
State of VT - AHS - Department of Corrections	Y
State of VT - AHS - VocRehab Vermont	
State of VT - DVHA - Vermont Chronic Care Initiative (VCCI)	Y
State of VT - Vermont Department of Health (VDH)	Y
The Caledonia School	
The Community Restorative Justice Center	Y
The Pines Rehabilitation and Health Center	
U.S. Department of Veterans Affairs (VA) - Littleton, NH Clinic	
Umbrella	Y
UVM Extension - St. Johnsbury Office	Y
Vermont 2-1-1	Y
Vermont Cares	
Vermont Technical College	
State of VT - AHS - Department of Disabilities, Aging & Independent Living*	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. 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	11.5	6.75	9.25	2.938	12.203	15.578
Avg. Weighted Degree	11.5	6.75	9.25	2.938	18.578	49.016
Network Diameter	3	4	3	4	3	3
Graph Density	0.183	0.107	0.147	0.047	0.183	0.247
Modularity	0.121	0.151	0.145	0.227	0.121	0.099
Avg. Clustering Coefficient	0.596	0.508	0.594	0.384	0.557	0.611
Avg. Path Length	1.581	1.74	1.613	1.889	1.541	1.431

Organization Statistics

Organizations Ranked by Betweeness Centrality	
1	Northeastern Vermont Regional Hospital (NVRH)
2	Northeast Kingdom Human Services
3	NVRH – Community Connections
4	NCHC – Caledonia Home Health Care & Hospice
5	State of VT – Vermont Department of Health

Organizations with Highest In-Degree	
Northeastern Vermont Regional Hospital (NVRH)	24
Northeast Kingdom Human Services	24
NCHC – Caledonia Home Health Care & Hospice	23
Rural Community Transportation	23
NVRH – Community Connections	22

Team-Based Care

% of Respondents who "Agree" or "Strongly Agree" That Their Community Exhibits the Given Team Characteristics

Legend: FY14 (orange), FY15 (blue)

Characteristic	FY14	FY15
Shared Goals	92%	76%
Mutual Trust	92%	67%
Effective Communication	71%	64%
Clear Roles	77%	73%
Measureable Processes and Outcomes	43%	30%
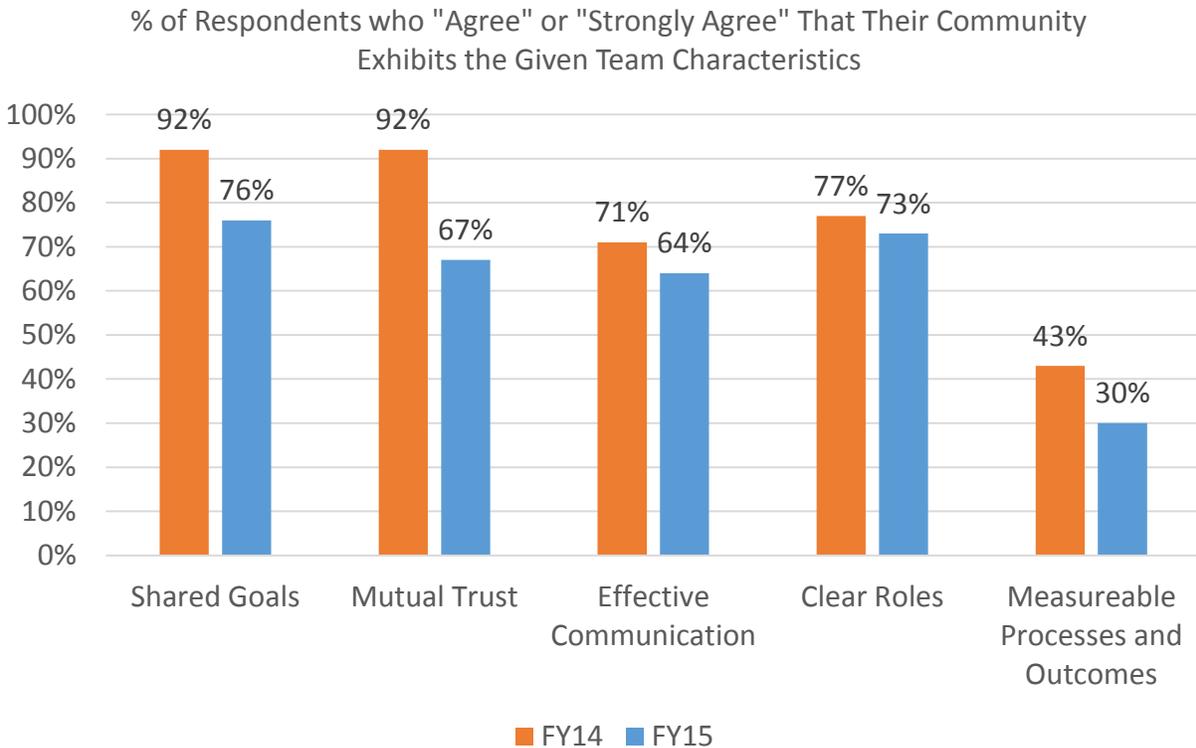
Observations and Opportunities

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, one network neighborhood includes mainly health care services and is well connected to network as a whole through NVRH – Community Connections as well as NCHC – Caledonia Home Health & Hospice.
- The other network neighborhoods coalesce around populations served – elder care (green) and youth and family services along with substance abuse recovery (blue).
- Rural Community Transportation is among the network's top 5 organizations in in-degree (connections directed in, reported by other organizations). Patient/client transportation is recognized as a need around the state, but the St. Johnsbury network is unique in having a transportation provider so well integrated.
- Team Based Care measures are less positive than in the previous survey. How does the community explain this change and what opportunities exist for rebuilding team feeling?

Appendix A

St. Johnsbury Network Maps

St. Johnsbury Common Clients Network

Our organizations have clients/patients in common

Node color shows Degree

Node size shows Betweeness Centrality

St. Johnsbury Info-Patients Network

Our organizations share information about specific patients/clients

Node color shows Degree
Node size shows Betweeness Centrality

St. Johnsbury Info-Programs Network

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

Node color shows Degree
Node size shows Betweeness Centrality
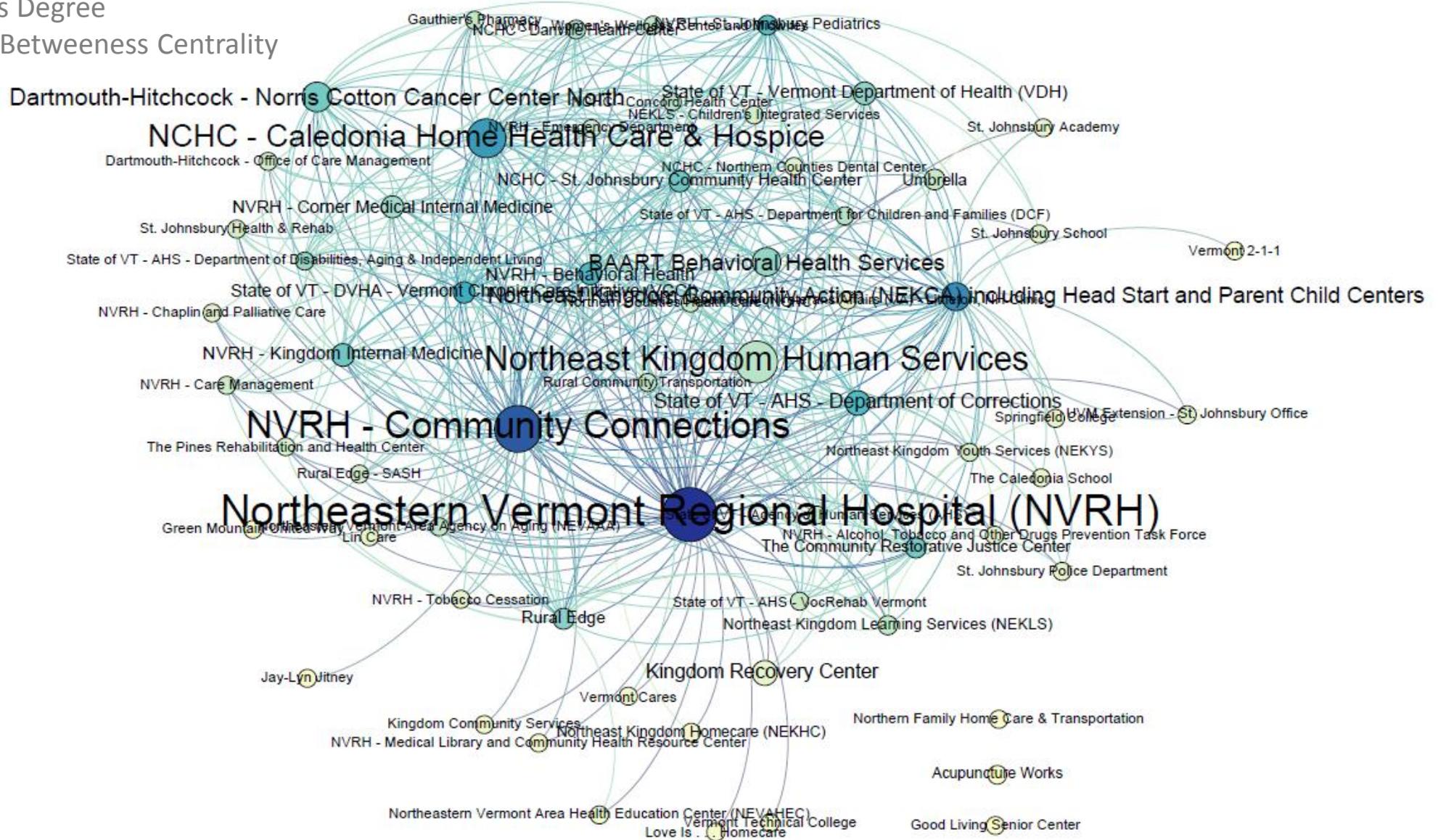
St. Johnsbury Resources Network

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

Node color shows Degree
Node size shows Betweeness Centrality

St. Johnsbury 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

St. Johnsbury Full Network

Node color shows Network Neighborhood
Node size shows Betweeness Centrality