Networks: A Knowledge Synthesis

Existing healthcare networks provide a promising model for building interdisciplinary partnerships and implementing healthcare improvements and innovations. This brief synthesis discusses the network approach and its potential for supporting reform of the healthcare system.

Network Types, Models and Key Concepts

Generally, the study of networks applies to the relationships and coordination mechanisms among individual actors. There are many network theories, each with its own typology, terminology and illustrative models. This introduction summarizes common themes in the literature.

Network Terminology

- **Boundary spanners:** Nodes that connect to external stakeholders

- **Emergent networks:** Bottom-up or member-driven origin

- **Hubs:** Points of convergence; usually organizations or key individuals

- **Interorganizational networks:** Nodes consist of formal organizations rather than individuals or stakeholder groups

- **Mandated networks:** Top-down origin, usually more hierarchical in structure

- **Nodes:** Individual actors or members

Common Network Functions and Types

There are many different, sometimes conflicting and often overlapping network typologies. Table 1 provides a brief overview of common functions and associated network types or titles.
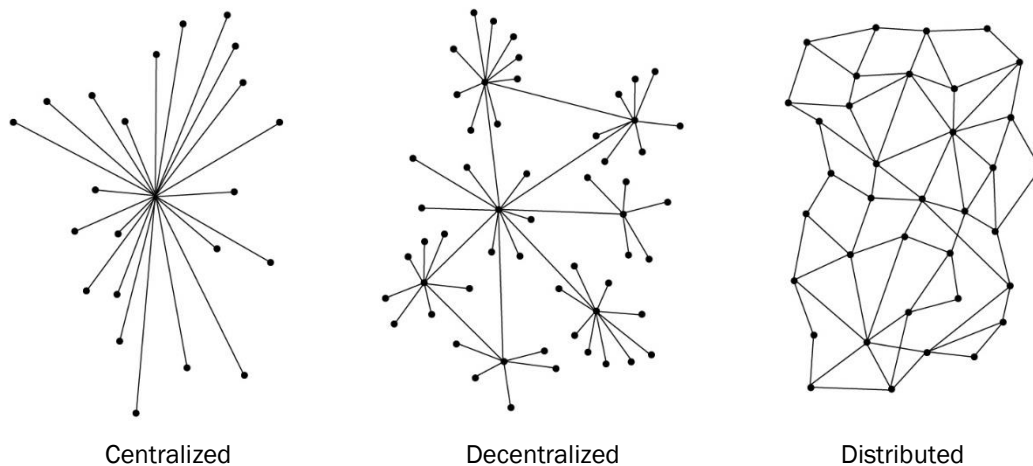
Table 1: Network Types and Functions

Network Focus or Function	Network Type
Decision making, agenda setting	Policy
Service delivery	Implementation, action
Policy and service integration	Implementation, management, knowledge exchange
Coordination of agencies or stakeholders	Implementation, management, collaboration
Resource allocation and distribution	Policy, action, collaboration
Information sharing	Knowledge exchange, learning, innovation

Network Models

Similarly, there are many different names for and presentations of network models. Figure 1 provides basic illustrations of fundamental network structures. Each model has its own strengths, weaknesses and suitability to different functions or contexts. Evidence indicates that form should follow function as a network develops and evolves. Network structure should therefore be dynamic and responsive to change rather than fixed or static.

Figure 1: Illustrated Network Models[1]

Centralized   Decentralized   Distributed

The centralized network is often referred to as the "Hub and Spoke" model, in which relationships and communications are mediated via a central hub rather than extending between members. This model's hierarchical structure provides greater stability than other models, but hierarchy and lack of connectivity between nodes are barriers to achieving many of the advantages of a network approach, such as collaboration, information sharing and resiliency. Evidence indicates that mandated, hierarchical networks are least likely to be sustainable. Centralized models are therefore best suited to a short-term objective and to contexts where there are low levels of trust and reciprocity among members.

In the decentralized model, also referred to as a "Branched" network, a number of hubs, each with its own network of nodes, connect with one another, but there are limited connections between the diverse members of each hub. This model retains a somewhat hierarchical structure, but also includes the relationships between nodes that are the foundation for network functionality and benefits such as shared risk, coordination and reciprocity. This model is common in larger networks that have sub-groups targeting certain topics or specializations.

In a distributed network, nodes connect to one another with various levels of density (referring to the number of connections). This model is suited to networks with high levels of trust and reciprocity among members. The level of engagement and flow of information within a network are mediated by the density of connections among members. Density can provide resiliency by distributing accountability and risk, and rapid diffusion of information through multiple connections. However, density should not be an independent and absolute goal. Rather, density is most effective and

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1 Based on a graphic in Hoelscher, J. (2014). Diffused art and diffracted objecthood: Painting in the distributed field. Conference Paper: College Art Association, Chicago, IL.

provides greatest efficiency when it is targeted and appropriate; not every node in a network needs to work closely with all other nodes.

In application, networks are usually some combination of these models. Within a distributed model, for example, there are often several key hubs playing governance or broker roles. Network structure can also evolve over time; for example, increasing trust and opportunities for engagement can move a centralized model toward a more decentralized one. There can also be designated roles within networks to support key functions; for example, **knowledge brokers** to support exchange of information or **boundary spanners** to strengthen relationships across disciplines.

Network Governance

Provan and Kenis identify three types of network governance models that recur frequently in the literature:

- **Shared Governance:** No central administration, equal contribution across members.

- **Lead Organization:** Leadership and administrative capacity rests in one member of the network.

- **Network Administration Organization (NAO):** Management and administrative capacity rest in an entity external to the network. This role can be contracted by the network or can be a funder or other entity to which the network is accountable.

There is no one ideal governance model. The models fall along a continuum in terms of function and fit with network characteristics, as illustrated in Figure 2. There is a natural trajectory to move from a shared governance approach to a lead organization or NAO approach as networks evolve, become more complex, and require additional expertise and capacity in leadership and administration. In the networks reviewed, a common theme in this trajectory is a grassroots network or strategic initiative adopting a more formal structure as part of receiving funding or secretariat support from a government or foundation.

Figure 2: Governance Model Characteristics

Network Examples

Table 2 provides brief descriptions of a selection of networks that illustrate the different network functions, types and models.[2]

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2 Note that this classification is based on a review of organization websites. Verification and additional information will require outreach to the respective networks.

Table 2: Network Examples

Network	Governance	Focus	Model and Members	Objective and Funding
N2 Network of Networks	NAO: HealthCareCAN (staff & board)	Capacity-building; tools, networking, advocacy	Decentralized: committees provide focused hubs and report to a central board Membership at individual and organizational levels	Enhancing national clinical research capability & capacity Established by HealthCareCAN
Frayme	NAO: Frayme (staff, board, advisory committees)	Knowledge exchange	Distributed: hubs form around projects International membership includes NGOs, service delivery organizations	Facilitate implementation of evidence-based integrated stepped care models across jurisdictions National Centre of Excellence
Foundry	NAO: Foundry (hosted by Providence Health Care)	Service delivery	Decentralized: local lead agencies act as hubs coordinated by a central office	Providing integrated health and social services for youth Co-funded by province and various foundations
Alberta Strategic Clinical Networks (SCNs)	NAO: dedicated business intelligence unit for each SCN	Service delivery, research, collaboration, innovation	Decentralized: 16 issue-specific SCNs Each SCN is multidisciplinary, with 50% practicing clinicians, as well as patients, administrators, etc.	Improve health system quality, outcomes and value. Provincial funding from Alberta Health Services
Alberta FASD Service Networks	NAO: FASD Cross-Ministry-Committee, supported by sub-committees and councils	Service delivery, collaboration	Distributed: collection of 12 community-based networks Members are primarily service providers	Provincially funded through 10-year strategic plan
SPOR Networks	NAO: CIHR (staff, steering committee)	Research	Centralized at national level with CIHR as core, with decentralized project & network branches	Advancing research in areas identified as priorities in multiple provinces and territories Funded by CIHR
Canadian Partnership Against Cancer (CPAC)	NAO: CPAC (staff, board, expert advisors)	Service delivery, collaboration	Decentralized: committees and issue-specific sub-networks	Improve cancer control in Canada Health Canada funded to advance Canadian Strategy for Cancer Control
Child & Youth Health Network for Eastern Ontario	Shared governance, secretariat support and member-based advisory committee	Service delivery, collaboration, innovation	Distributed with increased areas of density for project working groups Members are primarily service providers and can be individuals or organizations	Improve the health and health services of children and youth Secretariat support from Children's Hospital of Eastern Ontario

Evidence

Most network evaluations have focused on community-level or direct service delivery networks. The evidence base on public health networks, networks as a form of inter-organizational governance and the long-term sustainability of such networks is relatively undeveloped. The available lessons learned, however, provide valuable guidance for considering a network approach to healthcare system issues.

Several key questions should guide consideration of a network approach:

1. What objective is a network approach intended to achieve?
2. What benefit does a network approach provide and what are the anticipated costs?
3. Who needs to be involved in informing, making and implementing decisions about the network?
4. What network structure and governance is the best fit?

Answering these questions will set the parameters to developing a network, including leadership, membership, communication mechanisms, activities and performance measurement.

Objective

The literature suggests that, while complete consensus might not be necessary, a clearly defined and specific objective that rallies members toward a common cause is fundamental to network success.

Benefits and Challenges

Networks can provide great benefits, but can also be resource-intensive to establish and operate. The decision to pursue a network approach should be informed by evidence that it will provide unique advantages, and that the projected benefits will outweigh the associated risks and costs. Key factors in network success such as trust, relationships, reciprocity and shared goals are difficult to establish and maintain. Predictors of network disengagement and failure include micro-management and external direction, which are common to traditional approaches and easily become the default. Table 3 highlights some of the benefits and challenges associated with networks.

Table 3: Network Benefits and Challenges[3]

Benefits	Challenges
Leveraging combined resources	Varying levels of commitment, power & resources
Magnifying impact	Attribution of impact (positive or negative)
Bringing together diverse perspectives & disciplines	Achieving consensus
Shared risk	Shared impact of realized risk
Efficiency	Cost of building & maintaining collaboration & trust
Service coordination	Clashes between cultures & approaches
Capacity building & knowledge mobilization	Internal capacity building for collaboration
Positive deviance & change agency	Heightened expectations
Innovation	Sustainability
Shared accountability	Lack of autonomy & individual recognition
Flexibility and agility	Complex management & governance models
Reciprocity	Negative event experienced by one can impact all
Rapid diffusion of information & learning	Accountability
Bridging gaps (knowledge, physical, etc.)	Evaluation
Resilience	Self-perpetuation beyond utility & impact

Evidence suggests a number of conditions and characteristics that support maximizing benefits and reducing or responding effectively to challenges. The following list provides a brief summary:

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3 This table draws on Popp, Milward, MacKean, Casebeer, & Lindstrom, 2014.

- The objective or problem is complex and beyond the capacity of a single entity to address;

- Trust and relationships, which must be allowed to develop over time;

- Reciprocity: members contribute to and receive benefit from participation, and see their participation as valuable;

- Interdependence: achievements require contributions from multiple nodes to extend beyond the capacity of individual members;

- Shared goals: not necessarily complete consensus, but agreement on objectives and a way forward;

- Resources, including funding as well as administrative and knowledge supports, reflect member needs and preferences;

- The structure and governance model is suited to the network's purpose and creates an environment conducive to collaboration, resource flow and knowledge exchange;

- The network has both internal legitimacy (among network members) and external legitimacy (between the network and external stakeholders);

- The network has the appropriate members who bring the expertise, authority, connections and motivation needed to achieve the objective;

- The network has the flexibility and agility in structure, governance and function to evolve;

- Allowance is made for emergent rules regulating network behaviour to reduce interaction costs;

- Depth of membership is sufficient to provide some redundancy to reduce the impact of personnel changes;

- Leadership is egalitarian and relationship-focused; and

- A performance measurement and evaluation strategy that allows the network to monitor progress toward objectives, celebrate successes along the way, and make course changes as required.

Structure and Governance

The literature supports allowing network characteristics such as membership, objectives, resources and timelines to determine network structure rather than imposing a structure externally. That is not to say, however, that an external organization cannot play a valuable role as an NAO. Benefits of such an organization include:

- Supplying expertise in network development and management;

- Developing tools and resources to support network function;[4]

- Acting as a convenor to support mechanisms and opportunities for communication;

- Promoting external legitimacy;

- Coordinating performance measurement and evaluation; and

- Providing an objective approach to the resolution of conflicts within the network.

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4 The Health Foundation in the U.K., for example, developed a toolkit to support service delivery organizations forming networks to respond to government direction to form "Accountable Care Systems." See The Health Foundation, 2014.

The degree to which an external organization or central authority determines network priorities, membership, structure and operations influences the degree to which supported networks reflect a mandated versus voluntary approach. Such an organization should therefore be prepared to mitigate the following challenges associated with mandated networks:

- Ensuring that administrative requirements and process (e.g., funding applications and reporting) do not restrict network flexibility;

- Navigating power differentials between different structural components;

- Building the trust needed to engage network members;

- Minimizing the degree of negative disruption when re-structuring existing bottom-up networks or network components; and

- Respecting the objectives and direction of the network members (i.e., bottom-up versus top-down functionality).

Conclusion

Health systems internationally are increasingly applying network approaches. Although networks hold great promise in responding to complex problems, and have become a field of study and expertise in their own right, evidence for best practice and network impact at the system level or as a governance structure is still emerging. There is general consensus among those with network experience that although they can be very rewarding, networks require hard work to develop and maintain, and the ability to work through "messiness" or uncertain structure and process.

The evidence indicates that thorough consultation with stakeholders and potential network members should inform the decision to take a network approach, as well as the selection of the most appropriate network structure and governance model. The objective that a network is formed to achieve and the key stakeholders involved should determine its form and function, ideally with minimal interference from an external authority. The starting point for further dialogue on the use of a network approach should therefore be clarification of the objective or problem to be solved.

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