Development of a measure of network integration and its application to evaluate the success of mandated local health networks in Quebec

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Context: Quebec, Canada

Creation in 2004 of 95 geographically-delineated local health networks to better manage service access and coordination for population

- Single goverance structure per network, Health and Social Service Centre (CSSS)
- Each CSSS = a mandated merger of:
  1. Centres for local community services (CLSC)
  2. Long-term care institutions,
  3. general acute-care hospitals, if in the territory
- collaborative or contractual agreements between CSSS and other automonous providers in their territory, e.g. Medical clinics and community organizations

Research Objectives

Larger objective: To understand the pivotal factors and processes involved in the conception, implementation, and institutionalization of health care networks as new organizational forms.

Premise: integration as a measure of CSSS consolidation and network function

- Formal integration *within* the CSSS (lead organization)
- Virtual integration *between* the CSSS and the autonomous providers in the network;

Specific objective: to develop a method to measure health service integration within each lead organization and with autonomous providers

Integration

- The process of creating and maintaining a common structure between independent healthcare organizations for the purpose of coordinating their interdependent service deliveries to achieve a common objective.
  - **Functional:** administrative arrangements for strategic, informational and quality management.
  - **Clinical:** mechanisms to coordinate care including harmonization of tools, KT and training activities.
  - **Clinician:** mechanisms to commit (autonomous) clinicians to the overall functioning of the organization, collectively shared responsibility
  - **Normative:** shared values and norms implying a will to work together to reach collective goals.

Shortell 1993; Contandriopoulos et al 2003; Curry & Ham, 2010;

Overview of Method

- Selection of approach
- Development of indicators for key concepts
- Sampling of respondents by CSSS and network
- Survey administration
- Psychometric analysis to identify emerging constructs and scoring of instrument dimensions
- Aggregation of scores to a network level
- Empirical findings and relationships between dimensions

Approach

1. Social network analysis
   - Examines the frequency and nature of exchanges between (all) organizations in a network
   - Structural characteristics: density, centrality, cliques
2. Perceptions of key actors that drive the interactions and governance and structural shifts required to coordinate actions and achieve collective objective

Approach & Development

- Approach: self-administered survey instrument
- Inspiration: Health System Integration Study (Shortell et al, 1993, 2000), adaption for Cancer Care Ontario networks (Dobrow et al, 2009)
- Indicators based on conceptual and operational definition of key features from case studies of initial CSSS consolidation and literature.
- Likert response options eliciting degree of implementation, intensity or breadth of coverage.

Development

- Statements elicit « systemness » perspective rather than direct experience of individuals or individual organizations
- Clinical coordination questions , one of two clinically complex scenarios, patients with:
  1. Multiple physical morbidities (asthma & diabetes)
  2. High social and physical needs (diabetes & dementia)
- Elicited most active partners in network; frequency of exchanges for referrals and case coordination.

Development

- Different types of key respondents for different dimensions of integration
- statements adjusted slightly to type of respondent, with core conceptual structure
  - Example: indicators for functional integration

Type of respondent	Item statement
CEO (strategic level)	What proportion of managers in your CSSS are involved in quality management activities?
Senior manager (governance level)	What proportion of managers in your division are involved in quality management activities?
Clinical program managers (operational level)	What proportion of managers in your clinical program are involved in quality management activities?
Response options:	1= none; 2= a few; 3=many; 4=most; 5=almost all

Sampling Challenges

- Different sizes of networks and CSSSs
  - Metropolitan (17), Large urban (22), Mid-size (27), small rural (21)
- Appropriate respondents:
  - need to represent executive, managerial, and operational levels in CSSS
  - Virtual integration around clinical scenarios: primary care medical clinics and community organization
- Respondent burden: appropriate questions to appropriate respondents

Sampling

		CSSS			Partners	
	Dimension of integration	CEO	Senior manager	Program manager	Primary medical clinic	**Community Organization**
	Respondents per network	2	2	1-2	2-18	**2-4**
CSSS	Functional Integration	●	●	●		
	Professional Integration	●	●	●		
	Clinical integration	●	●	●		
	Normative integration	●	●	●		
NETWORK	Functional integration	●	●	●		
	Professional Integration			●	●	●
	Clinical Integration	●	●	●	●	
	Normative Integration	●	●	●	●	●

Type of respondent by dimension of integration

	Dimension of integration	HSSC			Partners	
		CEO	Senior manager	Clinical program manager	Primary medical clinic	Community organization
HSSC	***Functional Integration***					
	Strategic alignment	•	•	•		
	Strategic information management	•	•	•		
	Quality & performance management	•	•	•		
	Integration of clinical information	•	•			
	Professional Integration					
	Professional alignment	•	•	•		
	Clinical Integration					
	Clinical coordination mechanisms	•	•	•	•	
	Normative Integration					
	Shared objectives & orientations	•	•	•		
NETWORK AS A WHOLE	***Functional Integration***					
	Strategic alignment within network	•	•			
	Information sharing	•	•			
	Quality & performance sharing			•		
	Commitment to quality improvement			•		
	Professional Integration					
	Quality of relations with network's partners			•	•	•
	Quality of relations with lead organization				•	•
	Clinical Integration					
	Clinical support across network			•		
	Clinical coordination across network	•	•	•	•	
	Normative Integration					
	Shared orientations	•	•	•	•	•

Survey administration

- All 95 networks; all surveys in French
- First wave: to CSSS CEO and senior managers
  - Pre-notification letter by mail
  - Email link to web survey
  - Elicit name of clinical program manager for relevant clinical case scenario
  - Email reminders, mailed paper version
- Second wave: to CSSS clinical program manager
- Third wave: primary medical clinics and community organizations for diabetes, COPD or dementia
  - Pre-notification letter by mail
  - Paper version of questionnaire by mail
  - Postal reminders
- Average response rate = 68.4% (98% of senior managers, 48% clinics)
- Final sample n=878

Factor analysis

- No items excluded due to high missing values (>5%) or low variation
- No significant differences in response behavior by respondent type or clinical scenario; combined for factor analysis.
- Factors correspond generally to intended constructs (15 distinct sub-dimensions); reliability estimates from 0.63 to 0.94
- Factor score: average of all items, range 1 to 5 regardless of number of items in subscale

Score Aggregation by Network

- 87 of 95 networks included for score generation (require response from at least 1 clinical program manager, 1 clinic)
- Scores for each dimension average dimension scores of all respondents
- Central tendency represented initially by median
- Index of within-group agreement (rwg) calculated by network for each dimension

Index of within-group agreement

- Extent to which group responses are homogenous
- Compares observed variance to expected (random) variance (formula varies by expected variance, number of Likert responses, number of items)
- Varies between 1 (perfect agreement) and -1 (extreme disagreement); 0=no better than random agreement
- Often used to ensure that aggregation is justified (rwg is >0.7), we integrated it into the score

Score aggregation by CSSS

- CSSS scores: consider rwg part of score; assumption that agreement an expected outcome of integration.
- Increased spread around threshold of 3.3 (2 SD from minimum of 1, assuming slightly skewed expected distribution)
  - If median >3.3, Score = median + rwg
  - If median ≤3.3, score = median – rwg
  - Range 0 to 6
- Standardized to 0 to 10 scale
- Scores for network : rwg NOT taken into account; median standardized to 0 to 10 scale

Score: Intentsity of interactions

- Valid scores only available for 73/95 networks
- Each respondent asked to identify most active partners in management of clinical scenario
  - CSSS clinical program manager: 2 clinics, 2 community org
  - Network partners: 1 clinic, 1 community organization, CSSS hospital, CSSS ambulatory, CSSS long-term care.
- For each partner, report frequency of referrals sent, referrals received, information shared for collaborative care, case coordination
- Calculate the average density of functional interactions for each activity: number of functional links / total possible links (%)
- Calculate: the average frequency of all interactions (0=none, 2=regular)

EMPIRICAL FINDINGS

Distribution of Integration Scores (CSSS)

Dimension of integration	Score	Std deviation of score	Minimum score	Maximum score	Mean of rwg-skew	Range of rwg-skew
Functional Integration						
Strategic alignment	6.1	2.9	0.0	10.0	0.2	2.0
Strategic information management	7.0	1.5	3.1	8.7	0.8	1.2
Quality & performance management	7.5	1.4	3.5	9.3	0.8	1.2
Integration of clinical information	7.7	2.1	2.2	10.0	0.4	2.0
Professional Integration						
Professional alignment	5.4	1.8	2.3	8.1	0.8	1.7
Clinical Integration						
Clinical coordination mechanisms	6.5	1.7	2.8	8.3	0.8	1.5
Normative Integration						
Shared objectives & orientations	7.9	1.2	3.1	9.9	0.8	1.4

Distribution of Integration Scores (Network as a whole)

Dimension of integration	Score	Std deviation of score	Min score	Max score	Mean of rwg-skew	Range of rwg-skew
Functional Integration						
Strategic alignment within networks	3.0	3.3	0.0	10.0	-0.3	2.0
Information sharing	5.3	1.5	1.7	8.3	0.7	1.5
Quality & performance sharing	4.8	2.7	0.0	10.0	0.0	2.0
Commitment to quality improvement	6.0	1.6	0.0	10.0	0.4	2.0
Professional Integration					0.6	1.1
Quality of relations with network's partners	6.6	0.9	4.4	8.5	0.5	2.0
Quality of relations with lead organization	6.4	1.2	3.5	9.0	-0.1	2.0
Clinical Integration					0.6	2.0
Clinical support across networks	6.1	2.8	0.0	10.0	0.6	1.2
Clinical coordination across networks	5.8	1.0	3.8	7.9	-0.3	2.0
Normative Integration					0.7	1.5
Shared orientations	6.3	1.0	3.3	8.3	0.0	2.0

Pearson Correlations between scores of integration of lead organizations (HSSCs) and scores of integration for networks as a whole

Dimension of Integration		NETWORK AS A WHOLE								
		Functional Integration				*Professional Integration*		*Clinical Integration*		*Normative Integration*
		Strategic alignment within networks	Info. sharing	Quality & perfo. sharing	Commit-ment to quality improve-ment	Quality of relations with network partners	Quality of relations with lead organization	Clinical support across network	Clinical coordination across network	Shared orientations
HSSC – ***Functional Integration***	Strategic alignment	0.37	0.21	--	--					
HSSC – ***Functional Integration***	Strategic information management	0.22	0.34	--	--					
HSSC – ***Functional Integration***	Quality & performance management	--	0.26	--	0.32					
HSSC – ***Functional Integration***	Integration of clinical information	0.28	0.36	--	0.23					
HSSC – ***Professional Integration***	Professional alignment					--	--			
HSSC – ***Clinical Integration***	Clinical coordination mechanisms							0.29	0.73	
HSSC – ***Norm. Integration***	Shared objectives & orientations									0.18

Intensity of Interactions with Most Active Partners for Case Scenario

	Functional links	Std Dev	Min	Max
Referrals sent	53%	12	27	90
Referrals received	48%	13	19	90
Information shared	45%	12	18	70

- Average scores indicate that there is room for improvement
- Average frequency of exchange is 'only occasionnally'
- No correlation between any integration scores and density or frequency of interactions

DISCUSSION

- The instrument demonstrates adequate reliability and validity as per usual metrics; but has complex structure and sampling
- Dimensions based on few respondents should be dropped, doubtful stability and validity
- Some statements can be improved and others dropped (redundant)
- Sampling and aggregation poses challenges in organizational research; scores are dependent on high response rates for network.
- Incorporation of within-group agreement into scores is an innovation
- Additional work needed to examine limits of sampling and within-group agreement

- Empirical results suggest that the imposition of a structural change – the mergers of healthcare organizations to create the CSSSs – has lead to a partial and widely varied consolidation within lead organizations
- Lead organizations have simultaneously invested efforts in many dimensions of integration; these dimensions are appropriately inter-related
- In the lead organization, integration is more advanced and more internally coherent than the negotiated and persuasive integration with community partners
- There is questionable coherence of responses from network partners and only modest exchanges between partners; not correlated to perceived integration