Social Network Analysis

MEASURING CHANGES IN THE LEVEL OF CONNECTIONS AMONG EMERGENCY DEPARTMENT PHYSICIANS AND NURSES IN THE KOOTENAY BOUNDARY

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OUR AIM

A core aim of the Emergency Medicine Network project was to improve inter-collegial relationships and communications between primary and secondary sites in the Kootenay Boundary.

CONTEXT

- The **Kootenay Boundary** (KB) region is made up of 7 geographically dispersed emergency department (ED) sites. 5 EDs feed into 2 larger sites; 1 of which is our regional hospital.
- This isolated rural setting means that small teams or solo practitioners respond to stressful trauma cases and require strong communication, trust, and efficiency with colleagues in referral centres.

STRATEGY

- A pre-post social network analysis was used to measure changes in relationships.
- Baseline results helped identify where and how connections could be cultivated within and between EDs.

KEY RELATIONSHIP BUILDING ACTIVITIES:

Local Engagements: a site-specific opportunity for nurses and physicians to connect and team-build in an informal setting. Six of seven KB EDs took part, May - August 2019.

Emergency Medicine Regional Retreat: 2-day event held November 2019, brought together ED practitioners and partners from across the KB in dialogue, team-building and learning.

Project Meetings: brought key stakeholders together on a regular basis

PROCEDURES

- Baseline data collected in September 2018 and follow up data in December 2019 with a roster-based online survey using Checkbox®
- The baseline & follow-up survey utilized the same question and procedure.
- All physicians, nurses, and nurse managers who worked regularly in a Kootenay Boundary ED were invited to participate.
- Network data was de-identified and imported into 'Gephi', an open source network mapping software tool

SOCIAL NETWORK ANALYSIS:

- Method for studying the structure of relationships
- Includes two fundamental elements: nodes (individual people within the network) and edges (the ties or interactions that connect them)
- Sociogram Graph: visual representation of the network data (Saqr et al. 2018)

SURVEY QUESTION

Please indicate the strength of your connections with other ED care providers in this way:

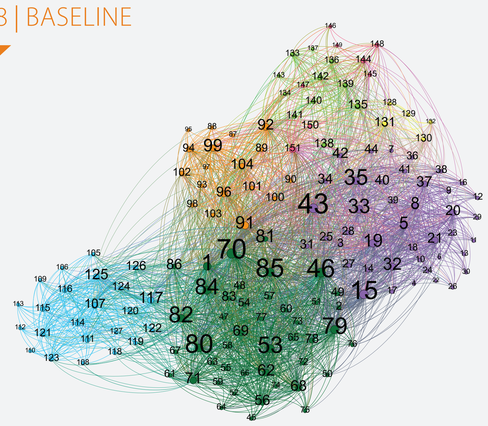
Tier 1: These people are your **closest** professional connections

Tier 2: These people are your **second closest** professional connections

Tier 3: These are people **you know or have heard of** but are not a close professional connection for whatever reason

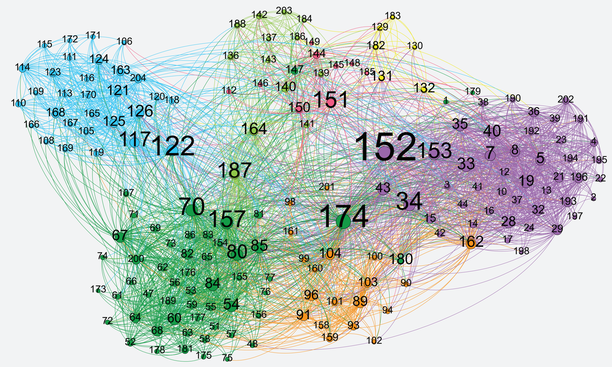
Tier 4: These are people you **have not interacted with** or have not yet met.

2018 | BASELINE



2019 | PROJECT ACTIVITIES

2020 | FOLLOW UP



Each ED site is colour coded. Larger font indicates individuals who are important connectors, known as betweenness centrality.

THE RESULTS

- Statistics show a **more closely knit network** at follow up, in comparison to our baseline (table 1)

Table 1 | Full baseline and follow up network statistics

Network Statistic	Baseline full network (n=55/151)	Follow up full network (n=78/176)	Baseline physicians only (n=19/45)	Follow up physicians only (n=33/59)	Follow up nurses only (n=45/117)	Explanation
Graph density	0.118	0.176	0.22	0.38	0.146	The # of actual ties/# of potential ties. If all nodes were connected to each other the graph density would be 1. If half the nodes were connected to each other it would be 0.5. Measure of how close the network is.
Network diameter	4	3	4	2	3	Indicator of how long it will take at most to reach any node in the network. It is the shortest distance between the furthermost nodes.
Average path length	1.773	1.604	1.565	1.298	1.654	Average distance between all pairs of nodes. It is based on the shortest path (number of edges) between any two nodes. It is a measure of the efficiency of information travel in a network. Shorter paths are desirable when speed of communication is desired.

LIMITATIONS

- Sample size and changes in the staff roster from each ED meant that the baseline and follow up results were not truly comparable.
- Second analysis completed using only the nodes (individuals) who completed both the baseline and follow up survey (n=29)
- These results also showed a much more closely knit network (table 2)

Table 2 | Addressing limitations with a pre-post analysis

Network Statistic	Pre-sample	Post-sample	Explanation
Graph density	0.37	0.51	The network increased in density. Half of the nodes were connected to each other at follow up.
Network diameter	4	3	The distance between the furthest most nodes decreased.
Average path length	1.7	1.5	The average distance between all pairs of nodes decreased.

KEY LESSONS & SUSTAINABILITY

- Social network analysis tells us where connections can be improved in a confidential way.
- Baseline results can be used to plan project activities.
- Overall results showed how implementing relationship building activities into a health region can achieve measurable and improved connections between ED staff.
- Asking the more connected people to have a more active voice in the network may have led to better results.
- With staff turnover, the work gone into improving relationships may not be sustainable after the project concludes.

Sustainability: The next step is to determine a plan to sustain these results. Future directions include looking at how to implement an annual ongoing regional event, with funding opportunities and planning partners being explored.

"Better patient care because of relationship building".

-KB practitioner, on how the regional retreat will impact practice

"The biggest achievement is relationships have been built between sites. We know each other, can call each other and have a dialogue".

– KB physician, on project activity impacts

Questions? | Get in touch
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Kootenay Boundary Division of Family Practice
A GPSC initiative

Interior Health
Every person matters

SharedCare
Partners for Patients

British Columbia

doctors of bc
British Columbia Medical Association

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