A Novel Method for Visualizing Familiarity of Surgical Teams

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Introduction

- **Team familiarity** (TF) is important to understand as it **can impact processes and outcomes** of teams (Maruthappu et al. 2015)
- TF can **reduce operative time** and **increase efficiency** when maintaining **continuity of team pairings** (Xu et al. 2013)
- To date, the pairs of relationships that have been explored in the surgical literature are mostly surgeon and resident, however other dyads, such as surgeon and scrub, may be important (Sykes et al. 2015)
- Social network analysis (SNA) may be a useful tool for visualizing and understanding TF
- The objective of this study is to determine the appropriateness of SNA to better understand different patterns of familiar dyads

Methods

- **911 surgical records** of patients undergoing surgery between March and May 2015 were pulled from a 10 hospital system
- Familiarizing observations were performed to understand key players which led to creation of 2 team dyads: **Primary Surgeon (PS) + Scrub (S)** and **Primary Surgeon (PS) + Resident (R)**
  - We chose to compare these dyads since Scrub and Resident are both in similar surgical positions yet one is a learner. This can then show how much an impact a learner has on the surgical team network.
- Each node is a member of the team dyad and each edge (line) indicates if they have worked together or not
  - PS nodes were shaded Blue
  - R and S nodes were shaded Red
- Cytoscape 2.8.3 was utilized for visualization
- TopologicalAttribute from the CircleAttributeLayout was utilized to organize the network

Results

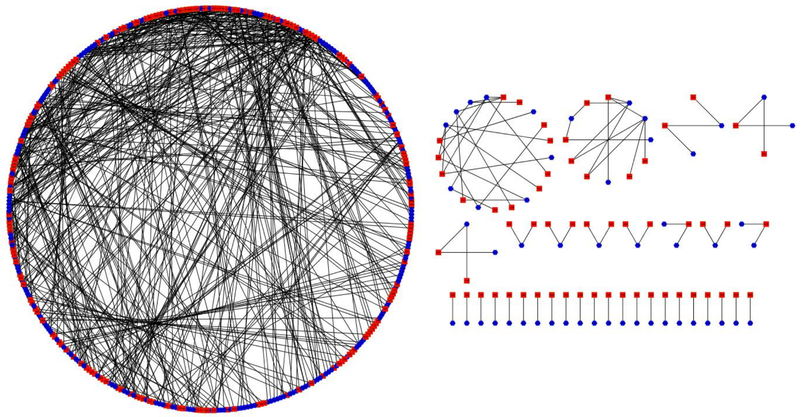

Figure 1: Primary Surgeon - Scrub

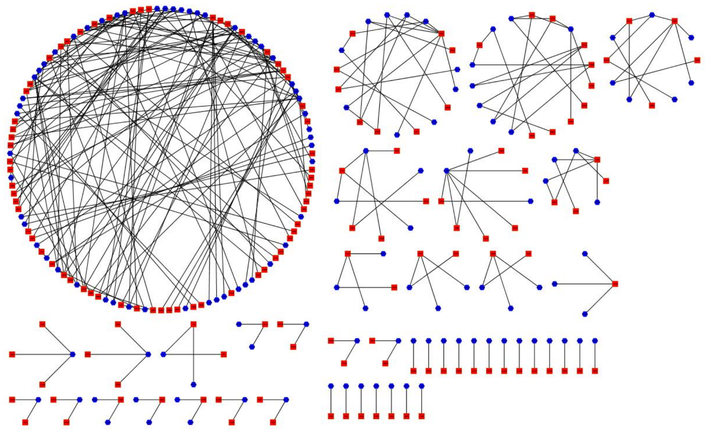

Figure 2: Primary Surgeon - Resident

- Figure1
  - 242 Primary Surgeons
  - 238 Scrubs
  - 35 components
  - 22 unique dyad components
  - 7 unique triad components
  - Network Density: .005
  - Heterogeneity: .804
  - Centralization: .026
- Figure2
  - 141 Primary Surgeons
  - 155 Residents
  - 45 components
  - 20 unique dyad components
  - 11 unique triad components
  - Network Density: .007
  - Heterogeneity: .659
  - Centralization: .017

Discussion

- We found multiple components within both networks. This is supported by the network heterogeneity being close to 1 (high tendency to contain components) and also through network centralization being close to 0 (high decentralization).
- Inspection shows that the Primary Surgeon - Resident teams have more unique components compared to Primary Surgeon – Scrub. This could mean that there is more rigid team formations when a resident is involved.
- It is important to notice how surgical teams are spread out into components and consider the impact this may have on scheduling.

Conclusions

- SNA can provide an insight into structures that arise from TF within surgical teams
- Primary Surgeons work in teams with Residents that are more rigid as compared to Scrubs
- This visualization strategy can inform administrators on who has worked with who and can maintain these components and/or investigate further if these components are ideal

Next Steps

- The next step is to evaluate if the size of the components that emerge has an influence patient outcomes

References

Xu, R., Carty, M. J., Orgill, D. P., Lipsitz, S. R., & Duclos, A. (2013). The teaming curve: a longitudinal study of the influence of surgical team familiarity on operative time. *Annals of surgery*, *258*(6), 953-957.

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