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Research In-Progress

Social Network-based Surgery Scheduling for Optimized Patient Experience and Quality of Care

Alejandro Diaz Barreiro Aldana; Abdullah Alsaheal; Nurcin Celik; Mehmet Akcin; M. Carolina Jimenez; Onur C. Kutlu, MD; and Jose M. Martinez

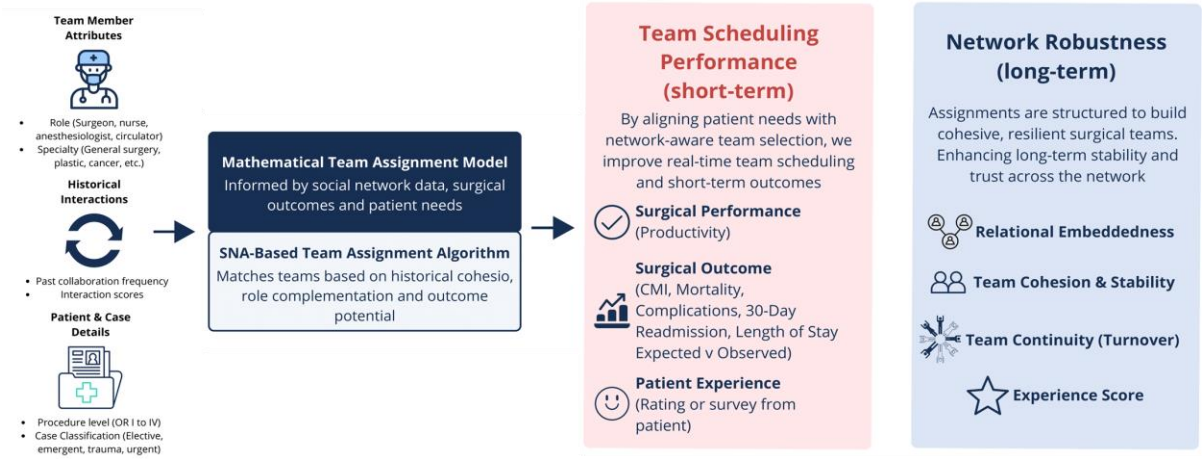
University of Miami, Miami, FL; University of Miami, Coral Gables, FL

Introduction: Delivering high-quality surgical care and a positive patient experience requires more than clinical expertise, it demands thoughtful scheduling that accounts for the dynamic hospital environment and the operational limitations of care teams. Traditional scheduling models prioritize efficiency or resource allocation, often overlooking the nuanced factors that shape patient satisfaction and care outcomes. This study aims to address that gap by developing a scheduling framework that incorporates social network-based insights to enhance quality of care and patient experience, assuming fixed surgical teams.

Methods: The framework assumes predefined surgical teams and shifts the focus toward enhancing outcomes through strategic scheduling. Social network metrics are employed to quantify collaboration dynamics, including social proximity, influence, preference, and surgical proficiency. These factors are integrated into a mathematical optimization model that guides the case assignment. Constraints such as case urgency, team capacity, and minimum proficiency thresholds are incorporated to ensure patient safety and resource feasibility. Network robustness is also included to preserve continuity of interactions between surgeons and staff.

Preliminary Results: Simulation-based preliminary assessments indicate that incorporating social network metrics into scheduling could improve case allocation compared to traditional methods. Preliminary findings highlight strengthened continuity of care, greater alignment between team proficiency and case requirements, and enhanced patient-centered outcomes. These results suggest that the framework could support both short-term improvements in quality of care and long-term team cohesion.

Next Steps: Future work will extend validation through larger clinical datasets and broaden the model to incorporate additional performance indicators. The ultimate goal is to transform the framework into a practical decision-support tool that hospital administrators can use to design evidence-based, patient-centered scheduling policies that enhance both care outcomes and surgical network resilience.


Team Member Attributes
Role (Surgeon, nurse, anesthesiologist, circulator)
Specialty (General surgery, plastic, cancer, etc.)
Historical Interactions
Past collaboration frequency
Interaction scores
Patient & Case Details
Procedure level (OR I to IV)
Case Classification (Elective, emergent, trauma, urgent)
Mathematical Team Assignment Model
Informed by social network data, surgical outcomes and patient needs
SNA-Based Team Assignment Algorithm
Matches teams based on historical cohesio, role complementation and outcome potential
Team Scheduling Performance (short-term)
By aligning patient needs with network-aware team selection, we improve real-time team scheduling and short-term outcomes
Surgical Performance (Productivity)
Surgical Outcome (CMI, Mortality, Complications, 30-Day Readmission, Length of Stay Expected v Observed)
Patient Experience (Rating or survey from patient)
Network Robustness (long-term)
Assignments are structured to build cohesive, resilient surgical teams. Enhancing long-term stability and trust across the network
Relational Embeddedness
Team Cohesion & Stability
Team Continuity (Turnover)
Experience Score