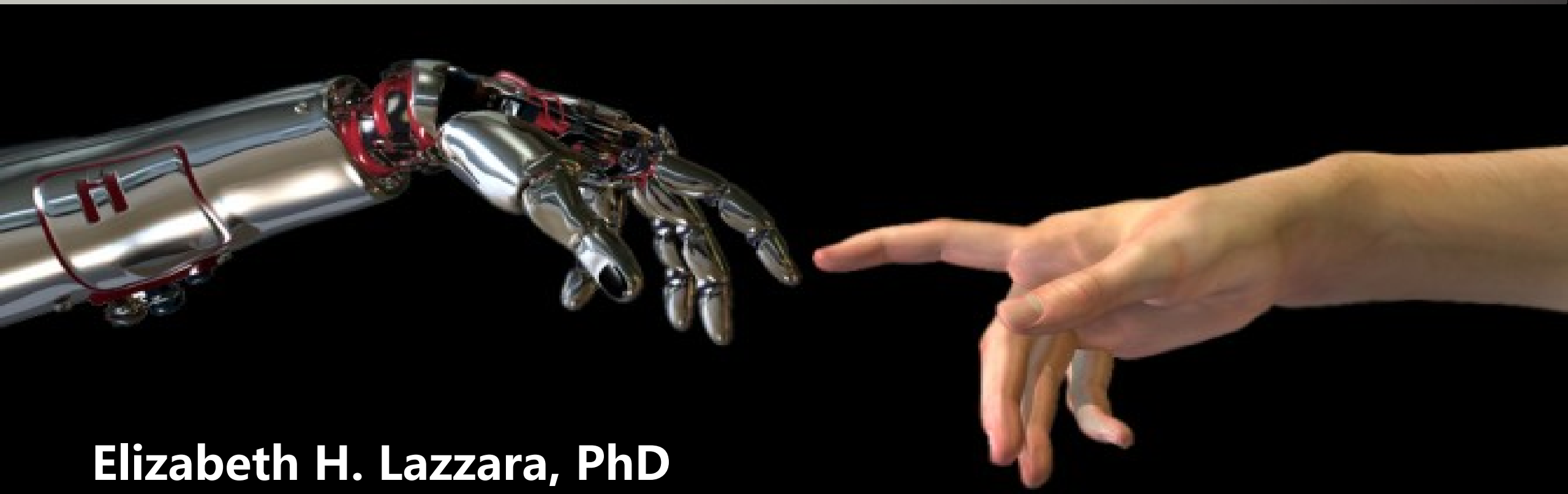
Utilizing telemedicine during rounds: Does it improve teamwork?



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November 19, 2015

Acknowledgments

- This work was supported by funding from the Department of Defense. All opinions expressed in this presentation are those of the authors and do not necessarily reflect the official opinion or position of the University of Central Florida, the University of Miami, Ryder Trauma Center, University of Kansas, Wichita State University, or the Department of Defense. (Award Number M162298)

Background & Purpose

Background & Purpose of Study

- Background
  - Telemedicine extremely prevalent
  - Telemedicine associated with positive outcomes
    - Reduced length of stay, preventable complications, cost, and mortality
    - Increased patient satisfaction and adherence to clinical best practices
  - BUT little research investigating the impact on teamwork

- Purpose
  - The aim of this study was to examine the impact of a telemedical robot on Trauma Intensive Care Unit (TICU) clinician teamwork (i.e., team attitudes, behaviors, and cognitions) during patient rounds.

Key Concepts

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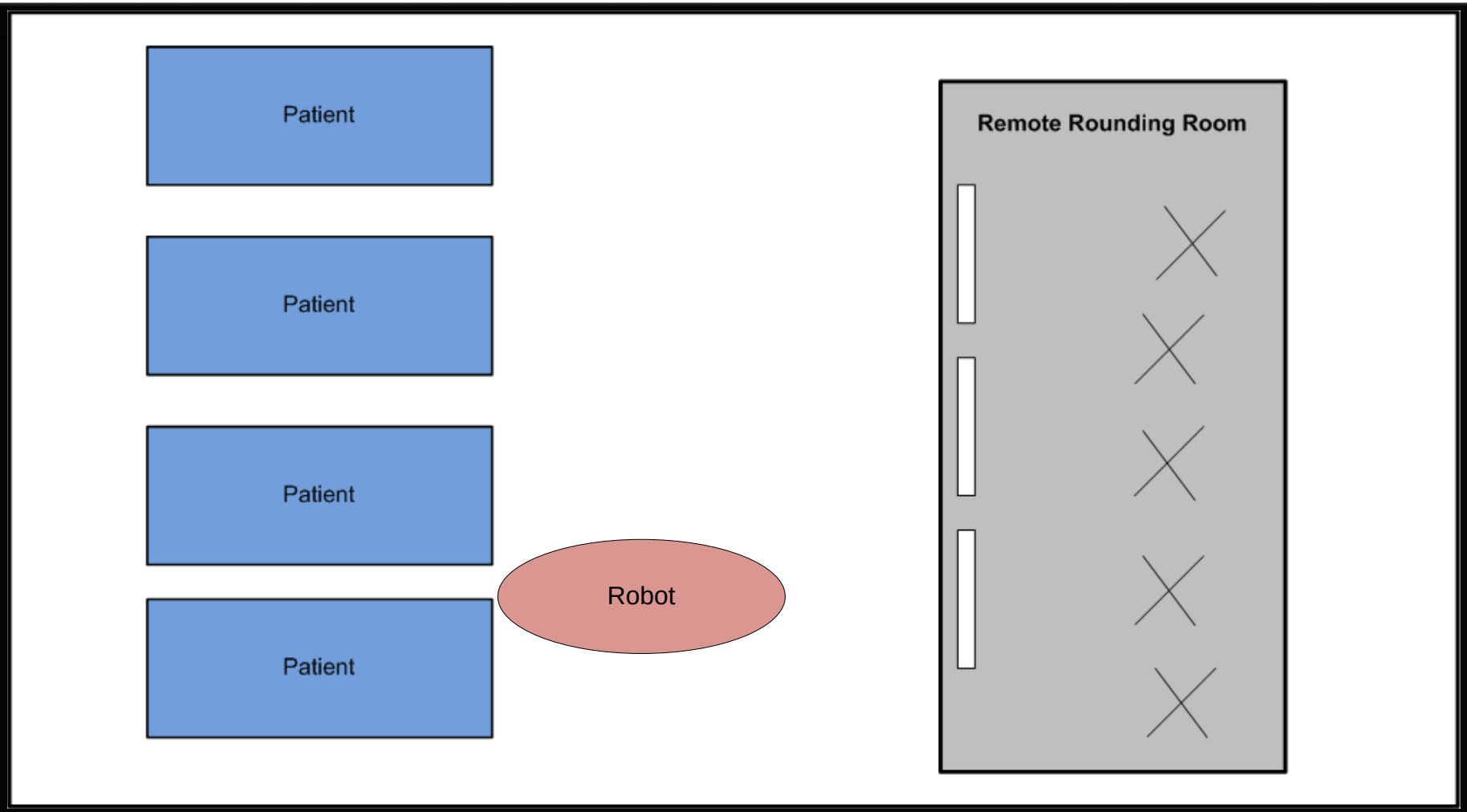
- Bedside Rounds
  - Clinicians walk and discuss each case directly beside the patient
  - Potential Problems
    - Increase risk of infection and more interruptions and distractions
- Remote Rounds
  - Clinicians discuss cases separate from the unit
  - Potential Problems
    - No visual cues and no real time vitals
- Telerounds
  - Clinicians discuss cases separate from the unit
  - Real time visual and audio of patient and unit

Key Concepts



Key Concepts

- Attitudes
  - Trust – willingness to accept vulnerability based on positive intentions and behaviors of others
- Behaviors
  - Attendance – being present during rounds
  - Communication – Information verbally exchanged between a sender and a receiver
- Cognition
  - Transactive Memory Systems – shared knowledge about who knows what
- Climate
  - Psychological Safety – shared sense that it is safe to take interpersonal risks

Method

Participants

- Rounds – 34 recorded
  - 24 without telemedicine & 10 with telemedicine
- Surveys
  - 32 completed T1 only
  - 26 completed T1 & T2
  - 16 completed T1, T2, & T3
- Clinicians
  - 16 females & 16 males
  - 18 nurses, 5 attendings, 4 residents, 4 fellows,1 nurse practitioner
  - 14 day shift exclusively
  - 5 night shift exclusively
  - 13 both shifts

Study Design

- Mixed Model
  - Between Groups Factor (Treatment and Control)
  - Within Groups Factor (Time)
- Control group
  - Conducts rounds in a remote room for 30 days
  - Access to laboratory results, X-rays, and paper-based patient files
- Experimental Group
  - Conducts rounds same remote room for next 30 days
  - Access to laboratory results, X-rays, paper-based patient files, *and* real-time information provided by RP-7 robot

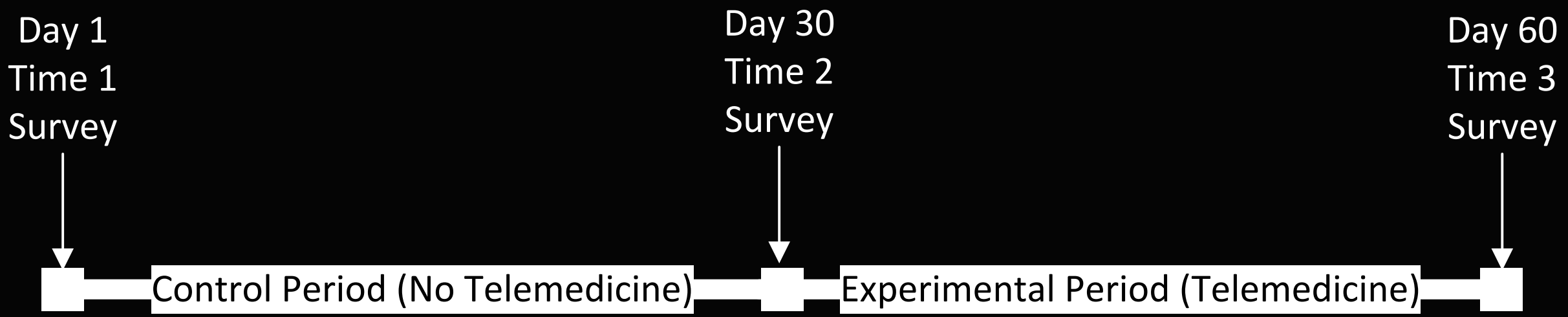
Rounding Technology

- Wireless, mobile device – RP7
- Approximately 5 feet tall with speeds up to 5 mph
- Providers in remote room control with proprietary joystick
- Base is 3 wheels and infrared sensors at midpoint detect objects
- Individuals in unit see provider's (i.e., operator's) face
- Robot projects live visual feed on large monitors on wall
- Phone on robot and speakers in remote room enable verbal communication

Measures

Table 1. Summary of Study Variables					
Construct	Definition	Metric Type & Source	Response Options	Items	Sample Items
Trust	A psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another	Survey (Wildman et al., 2009)	1 (Not at All) to 7 (Very Much So)	8	"To what extent do you feel assured that the other department will make intelligent decisions?"
Attendance	Being present during rounds	Video recordings	N/A	N/A	N/A
Communication	The amount of information exchanged between a sender and a receiver	Video Recordings	N/A	N/A	N/A
Transactive Memory System	Share knowledge about who knows what	Survey (Lewis, 2003)	1 (Strongly Disagree) to 7 (Strongly Agree)	15	"Different team members are responsible for expertise in different areas"
Team Psychological Safety	A shared sense amongst the team that it is safe to take interpersonal risks	Survey (Edmonson, 1999)	1 (Never) to 7 (Always)	7	"Working with members of this team, my unique skills and talents are valued and utilized."

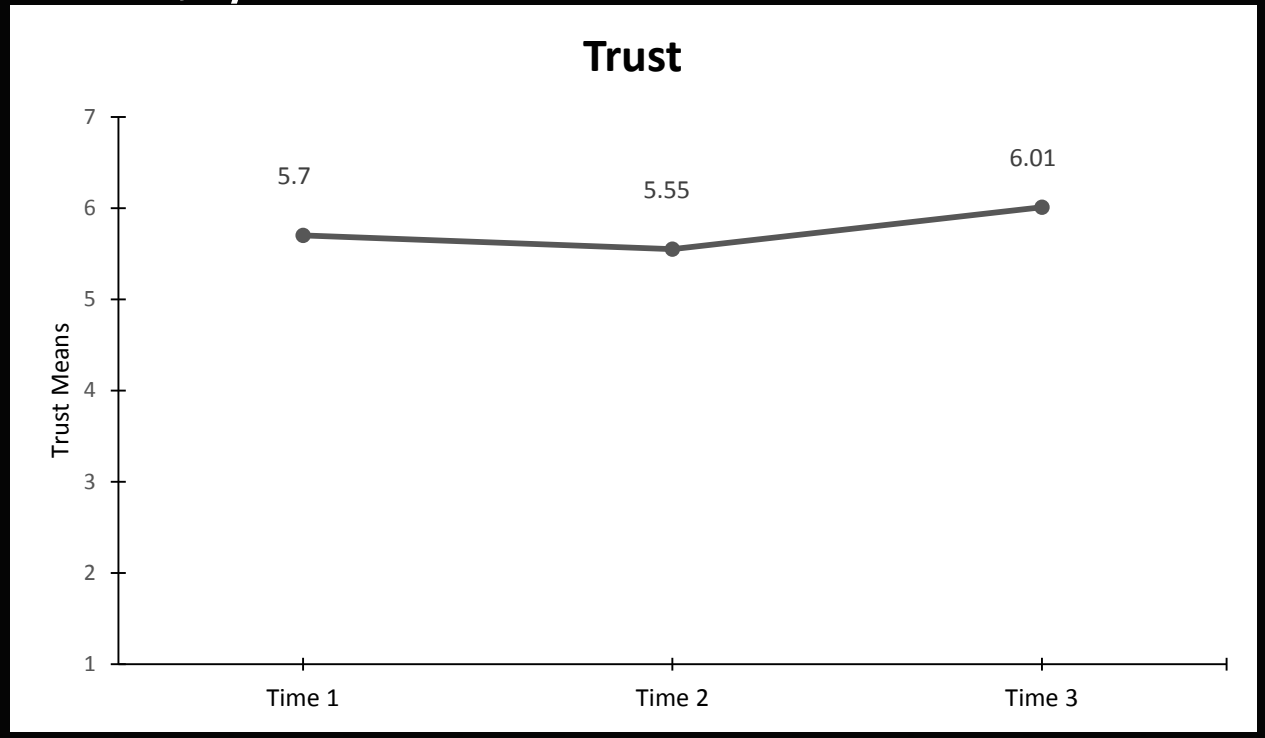
Procedure


Day 1
Time 1
Survey
Day 30
Time 2
Survey
Day 60
Time 3
Survey
Control Period (No Telemedicine)
Experimental Period (Telemedicine)

Results

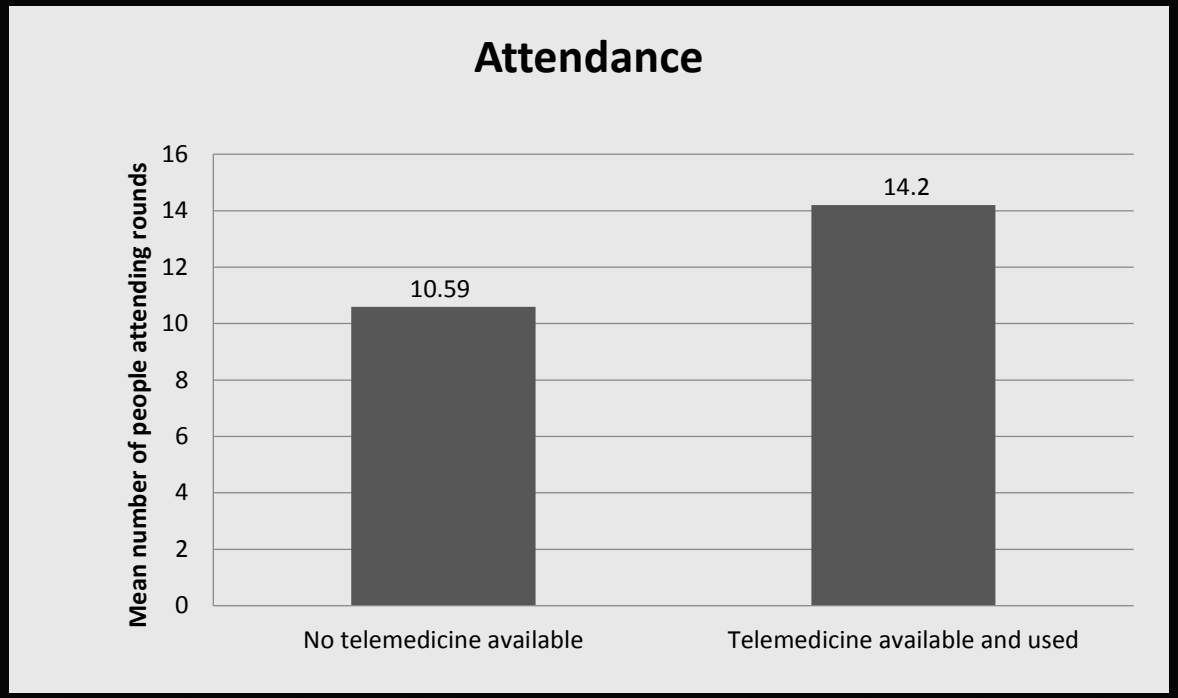
Findings: Attitude (Trust)

- Time 1 (M = 5.70, SD = 1.07), Time 2 (M = 5.55, SD = 1.51), and Time 3 (M = 6.01, SD = .65)
- $F(2, 14) = 1.20$, $p = .16$



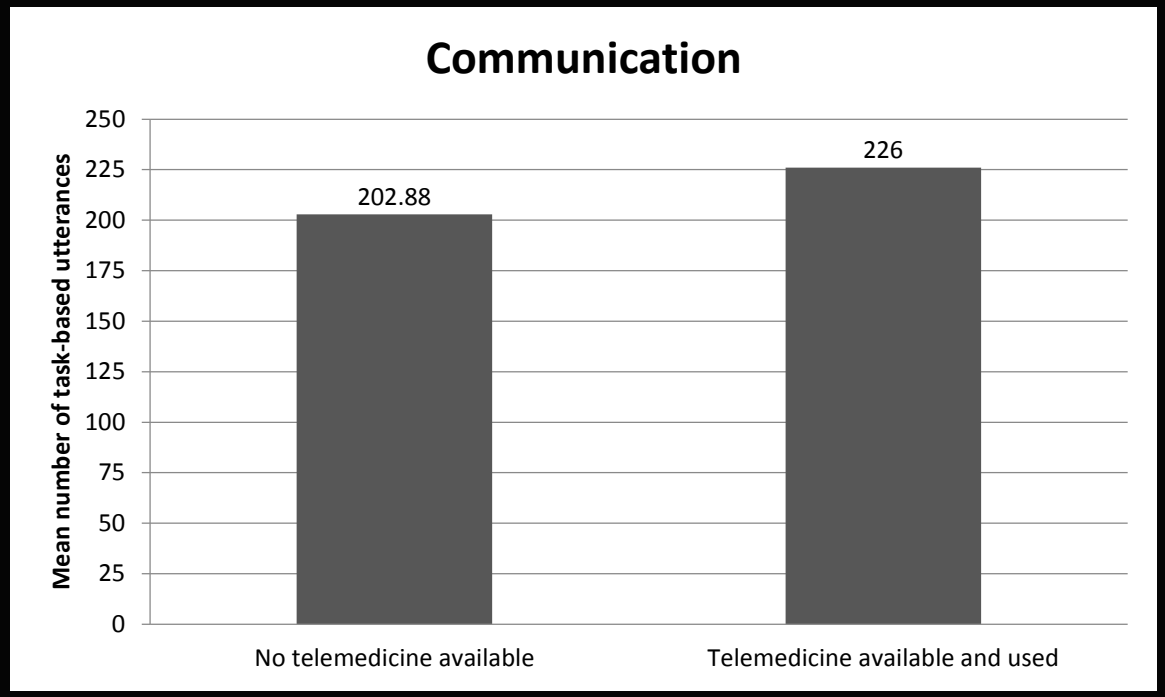
Findings: Behaviors (Attendance)

- No telemedicine (M = 10.59, SD = 3.45)
- Telemedicine (M = 14.20, SD = 4.64)
- $t(25) = -2.13$, $p < .05$



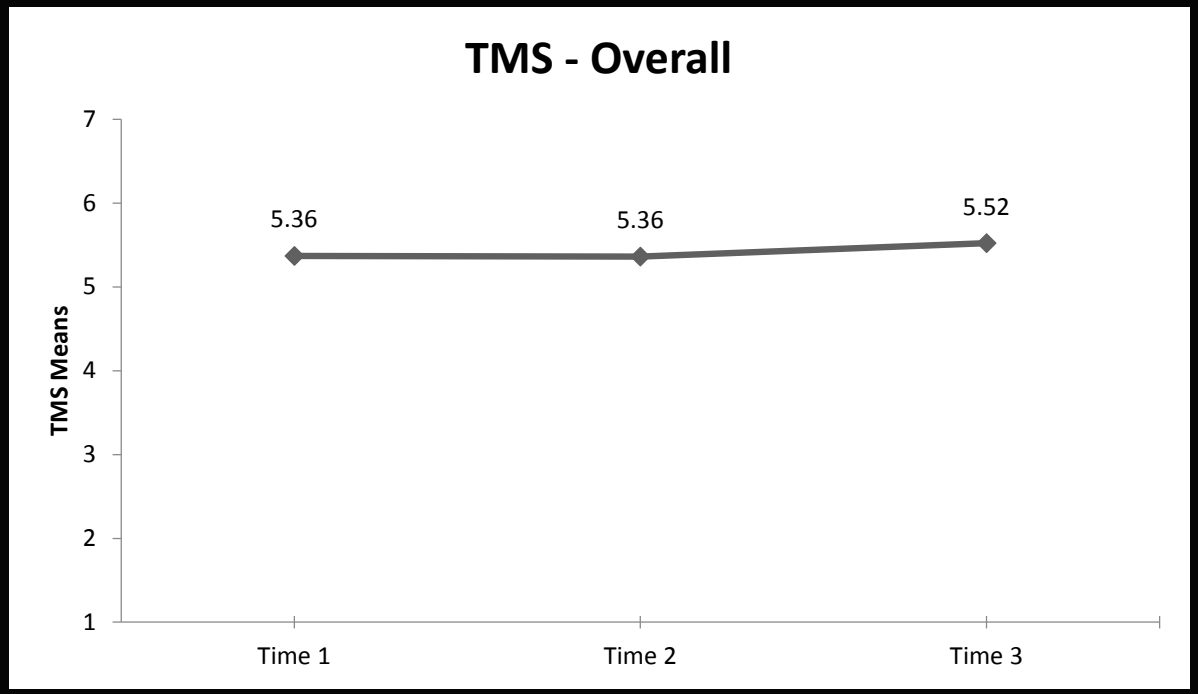
Findings: Behaviors (Communication)

- No telemedicine (M = 202.88, SD =30.30)
- Telemedicine (M = 226.00, SD = 37.25)
- $t(25) = -1.76$, $p < .05$



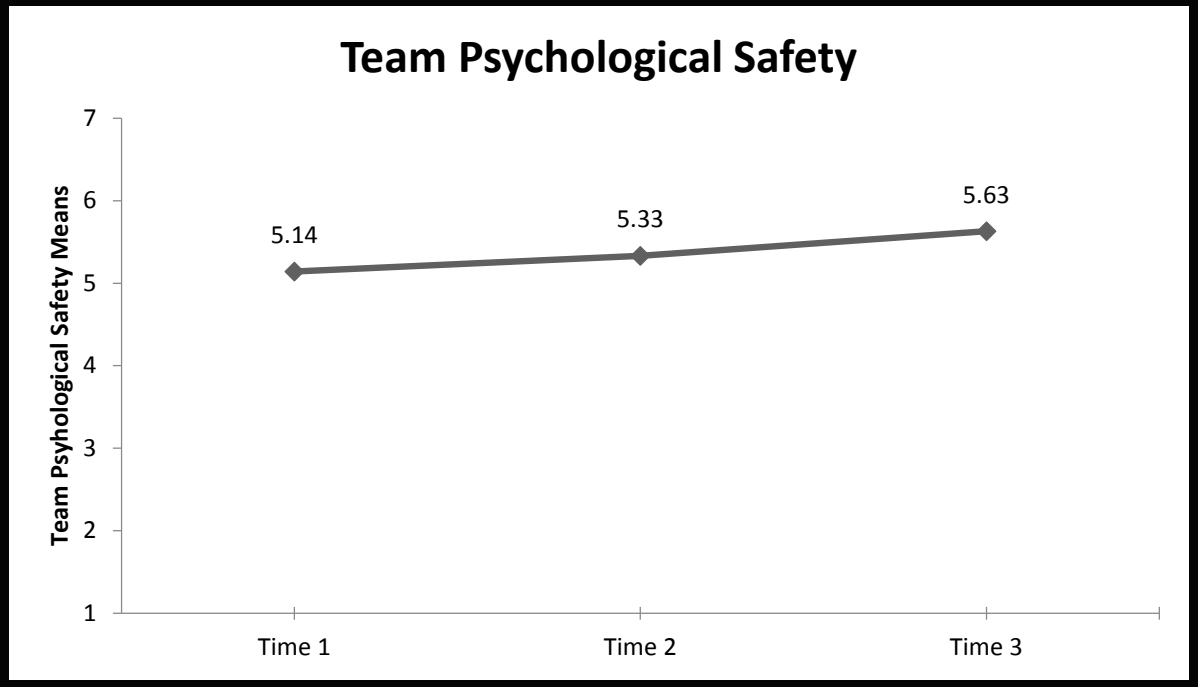
Findings: Cognition (TMS)

- Time 1 (M = 5.36, SD = .91), Time 2 (M = 5.36, SD = .70), and Time 3 (M = 5.51, SD = .78)
- $F(2, 15) = 1.33$, $p = .15$



Findings: Team Climate (Psychological Safety)

- Time 1 (M = 5.14, SD = 1.01), Time 2 (M = 5.33, SD = .97), and Time 3 (M = 5.63, SD = .80)
- $F(2,15) = 1.53$, $p = .12$



Findings: Summary

- Telemedicine increases attendance and communication
- Telemedicine is not significantly related to trust, transactive memory systems, or team psychological climate

Future Directions

- Investigate other team sizes, types (e.g., ad-hoc teams and multi-team systems), and team members (e.g., patients, physician specialists, and technicians)
- Examine various tasks (e.g., consultations, planning, and surgery)
- Assess additional team competencies (e.g., shared mental models, cohesion, leadership, and backup behavior)

Questions?