Development of a Simulation Curriculum to Teach and Assess Advanced Laparoscopic Suturing Skills using Telesimulation: A Feasibility Study

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Background

Telesimulation helps overcome limitations in time and local expertise by eliminating the need for the learner and educator to be physically co-located, especially important during COVID-19.

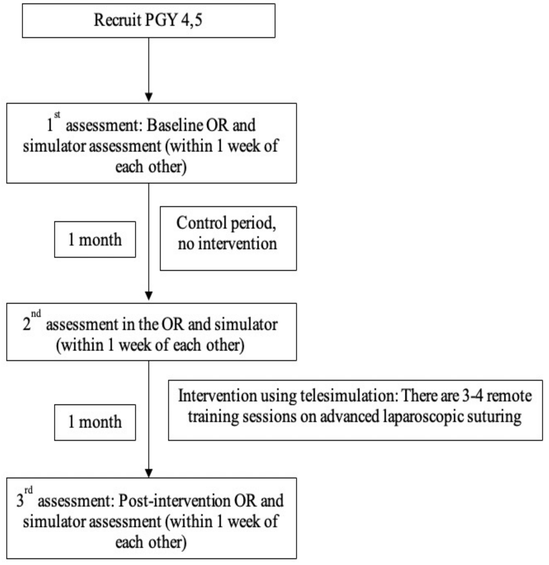
Objective:
The purpose of our study was to investigate whether training using advanced laparoscopic suturing (ALS) tasks through telesimulation is feasible and has educational value at improving skills in the operating room (OR).

Methods

Prospective feasibility study

Multicenter: McGill University and University of Toronto

Study Design



Methods – Assessments

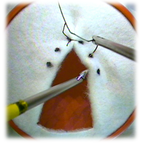
Assessment in simulation
- Time, precision, and error

Assessment in the operating room (OR)
- Global Operative Assessment of Laparoscopic Skills (GOALS)
  - Depth perception
  - Bimanual dexterity
  - Efficiency
  - Tissue handling
  - Autonomy

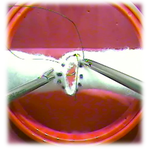
Methods – Advanced Laparoscopic Suturing tasks



Needle Handling (NH)



Suturing Under Tension (UT)

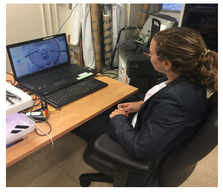


Continuous Suturing (CS)

Methods - Telesimulation Training

- Skype free videoconferencing software
- **Pre-trained expert educator at one site remotely trained the residents at the other site**
- 3-4 sessions
- **Educators gave feedback** based on:
  - Time and error proficiency benchmarks
  - Formative feedback tool (FFT)





Methods – Additional Data and Analysis

Questionnaire 1 (end of Assessment 1)
- Demographics, Case exposure, Future plans for fellowship/practice

Questionnaire 2 (end of telesimulation training)
- System usability, Educational value, Audiovisual reliability and session quality, Adaptation and integration

Data Analysis
- Descriptive statistics
- Comparison of scores between the 3 assessment points.
  - Using Paired t-test

Results – Demographics

- **N= 6** senior surgical residents:
  - 3 from McGill University (1 PGY4, 2 PGY5)
  - 3 from University of Toronto (3 PGY4)
- **Residents' future plans** (data for 1 not available):
  - 2 would like to pursue a MIS fellowship,
  - 1 MIS/bariatrics,
  - 1 colorectal,
  - 1 trauma and bariatrics
- **Resident experience with performing laparoscopic suturing using free-needle in the OR**:
  - 1-5 cases per year (3 residents),
  - 6-10 (1 resident),
  - 11-25 (1 resident),
  - 26-50 (1 resident)

Results – Resident Perceptions about Telesimulation

- **All residents found telesimulation:**
  - Easy to use
  - Video and audio quality were high
  - Had strong educational value
  - Want the system to be incorporated into their training
- **Trainees were motivated to take part**
  - Practice ALS with an educator
  - Network with educator from the other site

Results – Scores in simulation and OR

Table: Comparison of scores between the 3 assessment points for simulation and operating room assessments

				p-value		
	A1	**A2**	**A3**	**A2vsA1**	**A3vsA1**	**A3vsA2**
Simulation						
Needle Handling	265± 107	352±78	317±71	0.016	0.41	0.68
Suturing Under Tension	416± 133	472±126	568±60	0.21	**0.019***	0.059
Continuous Suturing	539± 211	545±139	756±113	0.95	**0.02***	0.061
Operating Room	17±4	18±4	21±3	0.47	**0.018***	**0.0008***

Mean±SD; A Assessment
*Statistically significant p<0.05

Results – Feasibility

- Used a **standardized set-up** procedure previously used for FLS tele-proctoring
- **A member of the research team** was present at both sites during the sessions
- **Technical issues** at the beginning, which were resolved after 1-2 usages
  - Related to connection, and computer malfunctioning at the start of the session
- **Scheduling:**
  - Overall, went smoothly
  - Required a lot of communication and flexibility of mentors and mentees
  - Delays or re-scheduling did happen due to prolonged OR time or other emergencies

Summary

- **Telesimulation is a feasible option to train residents in advanced laparoscopic suturing, and is an effective learning tool, leading to significant improvement in the trainees' performances in both the simulation setting and in the operating room.**

Conclusion

- As the pandemic has caused a major structural shift in resident education, telesimulation can be an effective alternative to on-site simulation programs, where trainees could be taught without the need for physical presence. Future research should focus on how telesimulation can be effectively incorporated into training programs.