Novel Camera Navigation Training: A Prospective Study on Clinical Engineers National Training in Japan

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Introduction

- In Japan, there is growing momentum for task-sharing and task-shifting in line with work style reform for physicians and surgeons.
- With the amendment of related laws and regulations, the government has authorized clinical engineers (CEs) to expand their scope of practice and perform scope operator upon completion of a government-accredited formal curriculum.
- For this reason, we have developed a camera navigation curriculum using a newly developed simulation model.

- This study aims to explore the preliminary evidence on the impact of this curriculum for novice trainees by comparing pre- and post-training scores of our new model.

Methods

- This study was conducted in Japan from Oct to Nov 2021.
- The study population included CEs who participated in the government-accredited program.
- Five consecutive training sessions from the first session moderated by the same surgeon were included.

Training Program

- Participants learned about surgery, endoscope, and usage guidelines, then recorded their initial task time using our simulator.
- Following an hour of practice, they retried the task again.





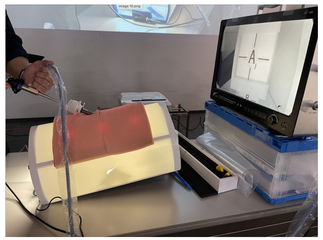
e-learning (25 hrs) → Hands-on training(2 days)

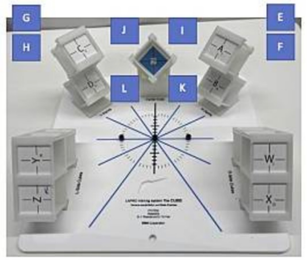
No.	Contents	Min.
1.	Basics Principles	100
2-1.	Vein Access	200
2-2.	Vein Care	
2-3.	IV Medication	250
3.	Artery Puncture	150
4.	Catheter Testing	350
5-1.	Surgical Camera Use	580
5.2	Surgical Cleanliness	100

	No.	Contents	Min.
Day 1	5-2	Surgical Cleanliness	70
	5-1	Surgical Camera Use	290
Day 2	2-3	IV Medication	30
	2-1 2-2	Vein Access Vein Care	90
	3	Artery Puncture	70
	4	Catheter Testing	60

= Time trial session

The Task in the LAPCO Training System





- The training used a 30-degree angled scope and a LAPCO training system which has five cube towers labeled A-Z.
- A monitor template ensured target size, centering, and alignment.
- Primary outcome: “Time-based score” in our model where participants project A-L characters with a 30-degree scope.

Time-based score = 300 sec – (Time to complete + Error * 10 sec)

Statistical Analysis

- Participant demographics summarized, using paired t-tests for pre/post instruction score comparison. Subgroup analyses differentiated by experience, using Wilcoxon signed-rank test.
- Statistical significance set at $p < 0.05$ using R software.

Results

Participants Demographics

Variables	Participants (N = 533)
Age	
Mean (SD)	43.5 (9.10)
Median (IQR)	43.0 (13)
Self-reported experience of scope operator (*N, %*)	
No	477 (89.5)
Yes	56 (10.5)

- The average number of participants per session was 107.

Primary Outcome

	Pre-training score	Post-training score	P value
Score mean ± SD (95% CI)	164.0 ± 69.5 (158.0, 169.8)	192.0 ± 54.1 (187.2, 196.4)	<0.01

Subgroup Analysis

	Pre-training score	Post-training score	P value
Experienced group Score median (IQR)	196 (81.25)	219 (44.75)	<0.01
Inexperienced group Score median (IQR)	183 (85.25)	203 (68.0)	<0.01

Conclusion

- The study indicates our training curriculum has the potential to improve camera navigation skills. Further study is needed to estimate the effectiveness of the curriculum.

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