

# Use of Teleguidance to Teach Ultrasound to Undergraduate Medical Students: A Randomized Control Equivalence Study

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## OBJECTIVE

- To show that teleguidance is as effective as traditional in-person methods to teach ultrasound.

## BACKGROUND

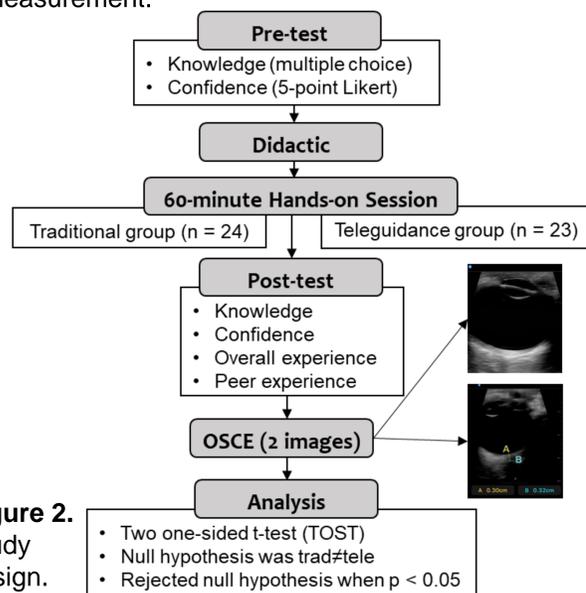
- Medical education curricula is rapidly expanding to include point-of-care ultrasound (POCUS).<sup>1</sup>
- Current teaching methods are limited by faculty time and expertise.
- Handheld ultrasound devices include a feature called **teleguidance**, allowing instructors to give **remote, live** feedback on maneuvers (**Figure 1**).
- Teleguidance and peer assisted learning (PAL) can both be engaging and effective.<sup>2-6</sup>
- Use of the **Butterfly iQ+ teleguidance system with peer instructors** has yet to be explored.



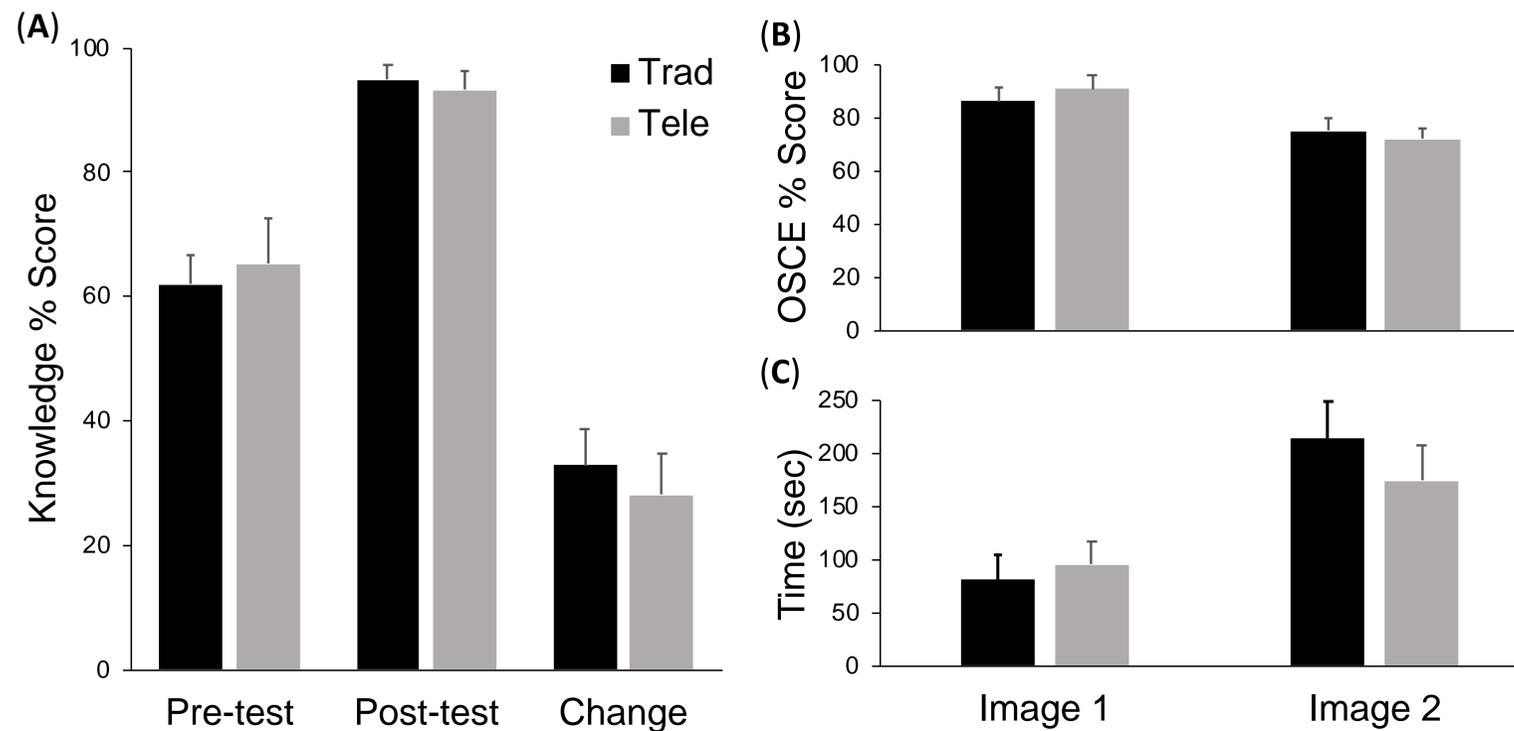
**Figure 1.** Butterfly iQ+ teleguidance system.<sup>7</sup>

## METHODS

- 47 students and 4 peer instructors, all second-year medical students.
- Students were randomized 1:1 into a **traditional in-person** or **teleguidance** teaching group.
- Topic was **ocular nerve sheath diameter (ONSD)** measurement.



## RESULTS



**Figure 3.** (A) Knowledge scores of traditional (n = 24) and teleguidance groups (n = 23) with 90% confidence intervals (CI). (B) OSCE scores and (C) OSCE completion times of traditional (n = 24) and teleguidance (n = 23) groups with 90% confidence intervals (CI).

**Table 1.** Confidence change scores of traditional (n = 24) and teleguidance (n = 23) groups.

Question	Trad Change	Tele Change	p-value
I feel comfortable...			
Adjusting the depth and gain of the Butterfly iQ+ device.	2.5	2.8	0.007
Setting up the Butterfly so I can start scanning.	2.5	2.9	0.069 <sup>†</sup>
Completing an Optic Nerve Sheath Diameter (ONSD) measurement.	3.0	3.0	0.008
Determining a positive ONSD result.	3.1	2.9	0.016
<b>Total</b>	<b>11.1</b>	<b>11.6</b>	

Trad = traditional group. Tele = teleguidance group. Participants scored each item on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). <sup>†</sup>Denotes acceptance of the null hypothesis.

**Table 2.** Experience scores of traditional (n = 24) and teleguidance (n = 23) groups.

Question	Trad	Tele	p-value
<b>Overall experience</b>			
The (trad/tele) educational format was effective.	4.8	4.4	0.409 <sup>†</sup>
I would have preferred learning in the other teaching group.	2.3	3.3	0.033
I had a positive experience learning ultrasound via this teaching method.	4.8	4.5	0.173 <sup>†</sup>
<b>Total</b>	<b>13.3</b>	<b>11.6</b>	
<b>Peer experience</b>			
The peer teaching method was effective.	4.7	4.5	0.017
I would have preferred learning from a physician.	2.9	2.8	0.007
I had a positive experience learning ultrasound from a peer instructor.	4.9	4.7	0.057 <sup>†</sup>
<b>Total</b>	<b>12.5</b>	<b>12.0</b>	

Trad = traditional group. Tele = teleguidance group. <sup>†</sup>Denotes acceptance of the null hypothesis.



**Figure 4.** Ultrasound interest group.

## DISCUSSION

- The teleguidance group **performed as well** as the traditional group in terms of knowledge change, confidence change, and OSCE scores.
- Teleguidance group rated the experience **highly overall**, but this rating was **significantly lower** than the traditional group.
- Students had a very **positive experience** working with **peer instructors** (avg 4.8/5).
- Limitations:
  - Small sample size.
  - Only taught a specific, simple topic.
  - Future work would look at long-term outcomes

## CONCLUSION

- Peer-instructed teleguidance is an effective method of teaching ultrasound to medical students.

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