

# A Socially Distanced Approach to Surgical Education: A Hybrid Web and Simulator-Based Course for Laparoscopic Common Bile Duct Exploration

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## Background

- The COVID-19 pandemic has had a profound impact on surgical education.
- Social distancing and travel limitations have made many large-scale in-person courses untenable.
- We adapted a laparoscopic common bile duct exploration (LCBDE) course into a “**hub-and-spoke**” model in which a central site led satellite centers using a hybrid web and hands-on simulator-based mastery learning curriculum.

## Methods/Study Design

- Faculty underwent a pre-course “**train-the-trainers**” curriculum focused on principles of simulator-based education and use of the rating scale.
- Day-long courses were then led by faculty based in Chicago with content streamed via a **web-based platform to satellite centers** with local faculty and learners.

### Mastery Learning model:

Learners completed a simulator-based **pre-test** at the onset of the course.

Course curriculum consisted of streamed lectures followed by **hands-on deliberate practice** using an LCBDE-specific simulator.

Learners then completed an identical **post-test** on the simulator.

- The pre- and post-tests were assessed using a previously validated LCBDE procedural rating scale with a **mastery standard** that had been developed using a **modified Angoff method**.

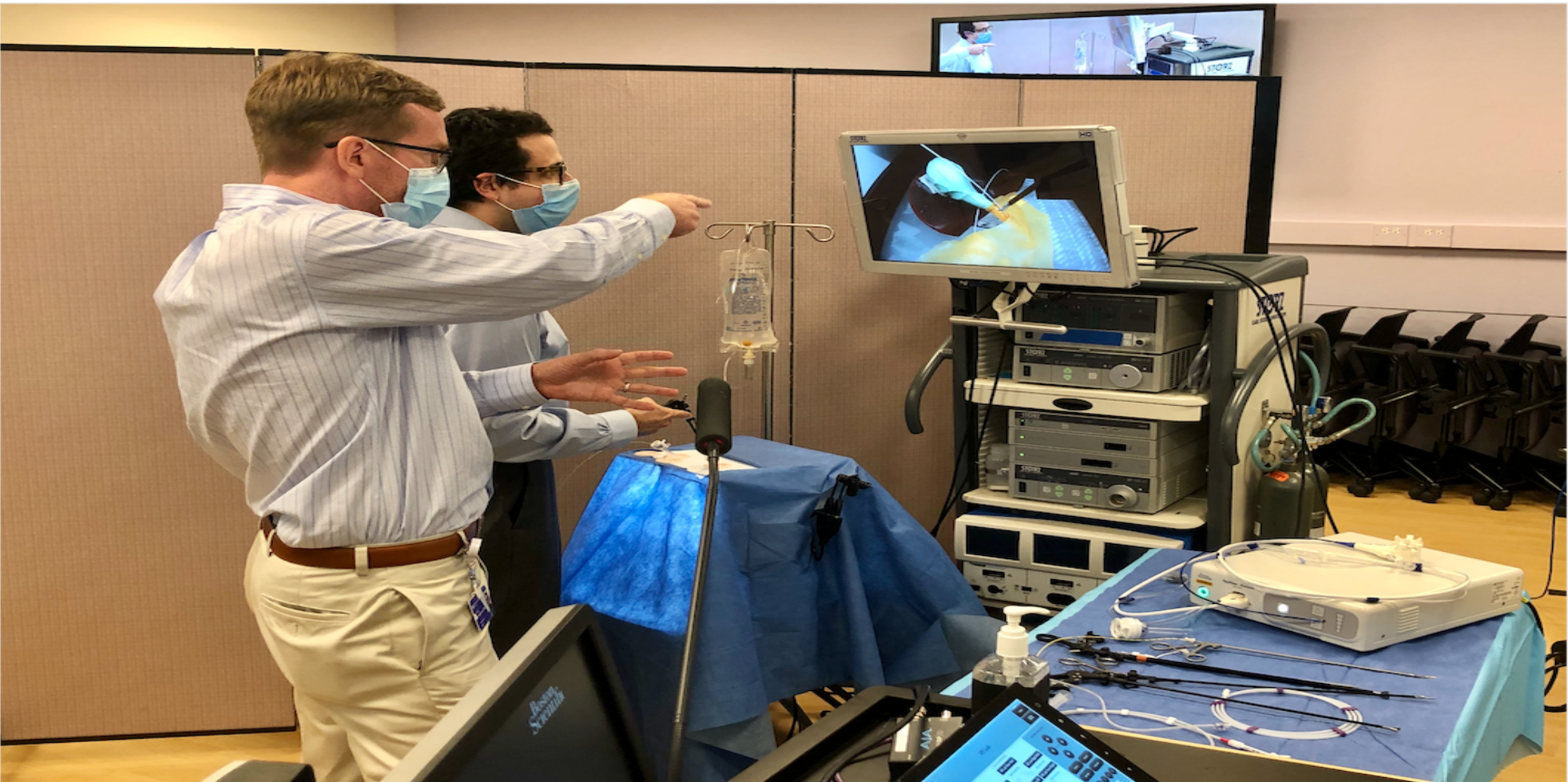


Fig 1. Live demonstration of the simulator and key steps being streamed via a web-based platform to all satellite centers during the live curriculum

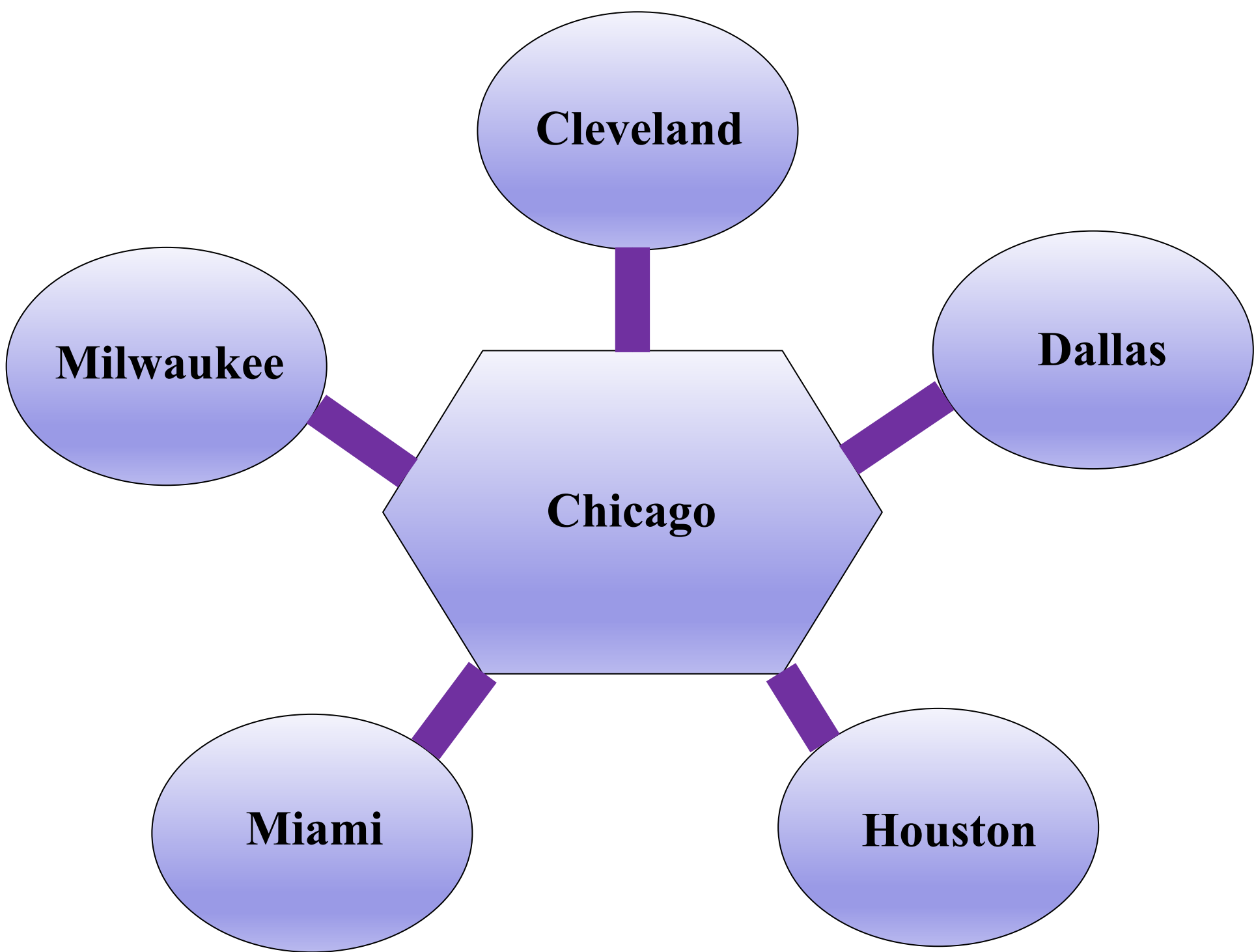


Fig 2. Schematic representing the hub and spoke model of the web-based curriculum.

## Results

- 40 attending and fellow-level surgeon learners participated
- 2 courses held in Chicago and at 9 satellite locations.
- Mean of 9 years of post-training experience with 48% having  $\leq 5$  years in practice.
- Only 62% had any prior experience performing LCBDE
- **Pre-Testing:** 88% of learners failed to meet the mastery standard (a score of  $\geq 31$  out of 45).
- **Post-Testing:** 100% met or exceeded the mastery standard
- Mean scores were significantly improved (pre-test  $24 \pm 8$  vs post-test  $43 \pm 2$ ; scale 0-45,  $p < 0.001$ ).
- When analyzed separately, even the five participants who passed the pre-test had a significant increase in their post-test scores ( $36 \pm 3$  vs  $43 \pm 2$ ,  $p < 0.01$ ).

## Conclusions

- Used a multisite course design to overcome COVID-19 travel restrictions
- Trained surgeons uniformly to a mastery standard in LCBDE.
- This hybrid web and hands-on simulator-based approach can serve as a model for other procedural curricula during the COVID-19 era and beyond.

### References:

1. Santos BF, Reif TJ, Soper NJ, Nagle AP, Rooney DM, Hungness ES. Development and evaluation of a laparoscopic common bile duct exploration simulator and procedural rating scale. Surg Endosc. 2012 Sep;26(9):2403-15. doi: 10.1007/s00464-012-2213-8. Epub 2012 Mar 22. PMID: 22437949.
2. Campagna RAJ, Belette AM, Holmstrom AL, Halverson AL, Santos BF, Hungness ES, Teitelbaum EN. Addressing the gap in laparoscopic common bile duct exploration training for rural surgeons: imparting procedural ability is not enough. Surg Endosc. 2020 Oct 6. doi: 10.1007/s00464-020-08003-7. Epub ahead of print. PMID: 33025249.
3. Teitelbaum EN, Soper NJ, Santos BF, Rooney DM, Patel P, Nagle AP, Hungness ES. A simulator-based resident curriculum for laparoscopic common bile duct exploration. Surgery. 2014 Oct;156(4):880-7, 890-3. doi: 10.1016/j.surg.2014.06.020. PMID: 25239339.