

Towards a Smart Trainer for Hemodialysis Cannulation

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Disclosures

- None

Objectives

- To articulate the core skills for preventing needle infiltration during cannulation
- To introduce simulator-based training
- To present metrics for skills training

Hemodialysis Cannulation

- Delayed Cannulation = Tunneled Dialysis Catheters (TDCs) use
- Cannulation-related infiltrations = access complications
 - 5.2% annual rate of infiltrations¹
- Fear of cannulation
 - 30% of patients eligible for AVFs refuse them²!
- New AVFs: 24% mis-stick rate³



Ball, Lynda K. "Improving arteriovenous fistula cannulation skills." *Nephrology Nursing Journal* 32.6 (2005): 611.

¹ Lee, T., Barker, J. & Allon, M. Needle Infiltration of Arteriovenous Fistulae in Hemodialysis: Risk Factors and Consequences. *American Journal of Kidney Diseases* 47, 1020–1026 (2006).

² Casey, J. R. *et al.* Patients' perspectives on hemodialysis vascular access: a systematic review of qualitative studies. *American Journal of Kidney Diseases* 64, 937–953 (2014).

³ Local, unpublished study

Cannulation Training

- Cannulation camps
 - Expensive
 - Limited training
- Simulators
 - Unrealistic
 - High-maintenance
- Practice on patients!



Image credit: VATA Inc.

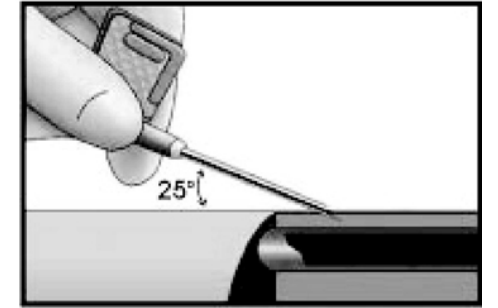
Core Cannulation Skills

Step 1: Determine location for needle insertion based on AVF inspection

Step 2: Insert needle at right angle and pressure



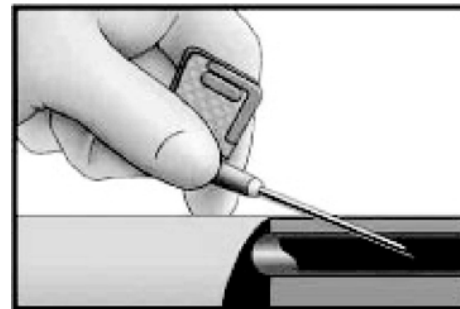
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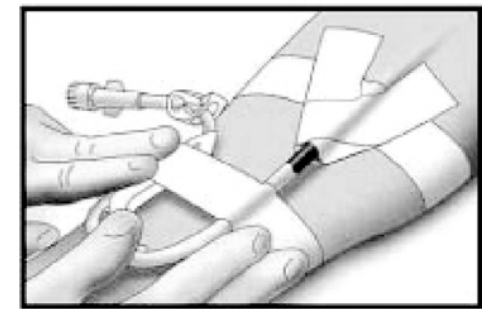
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Step 3: Flashback

Step 4: “Threading”



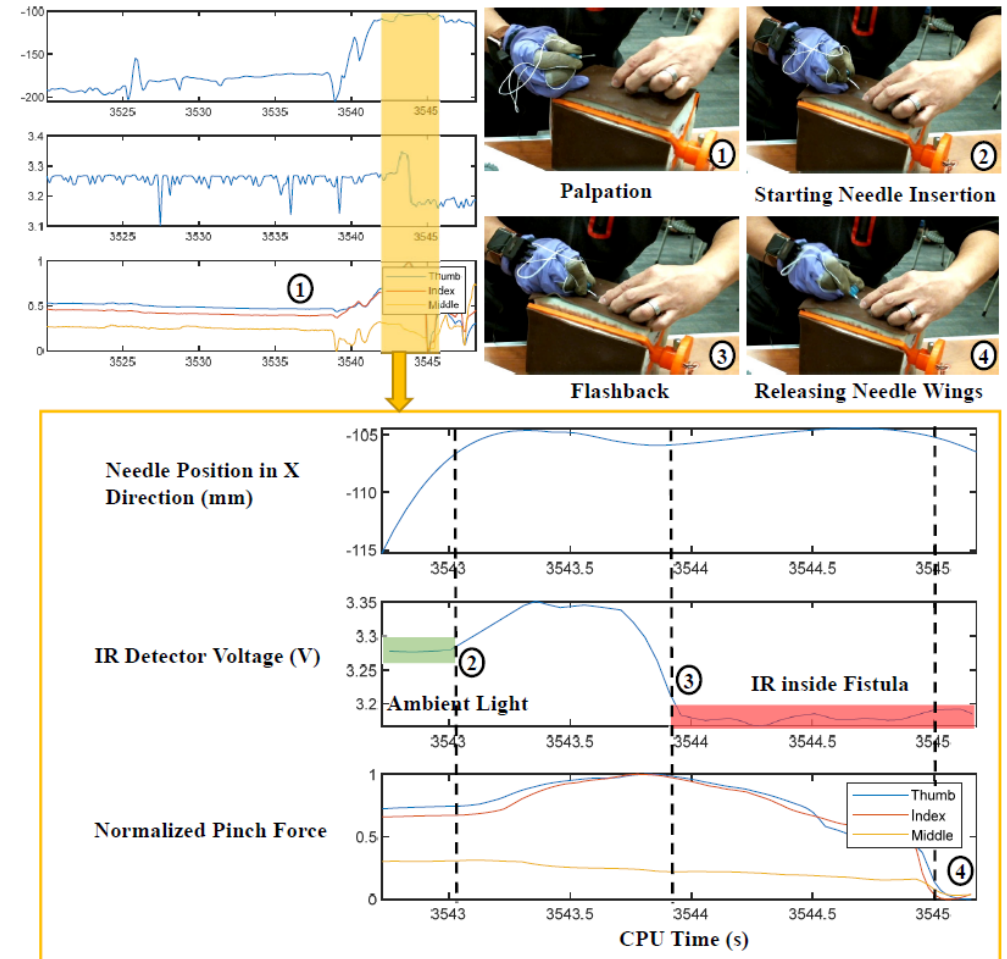
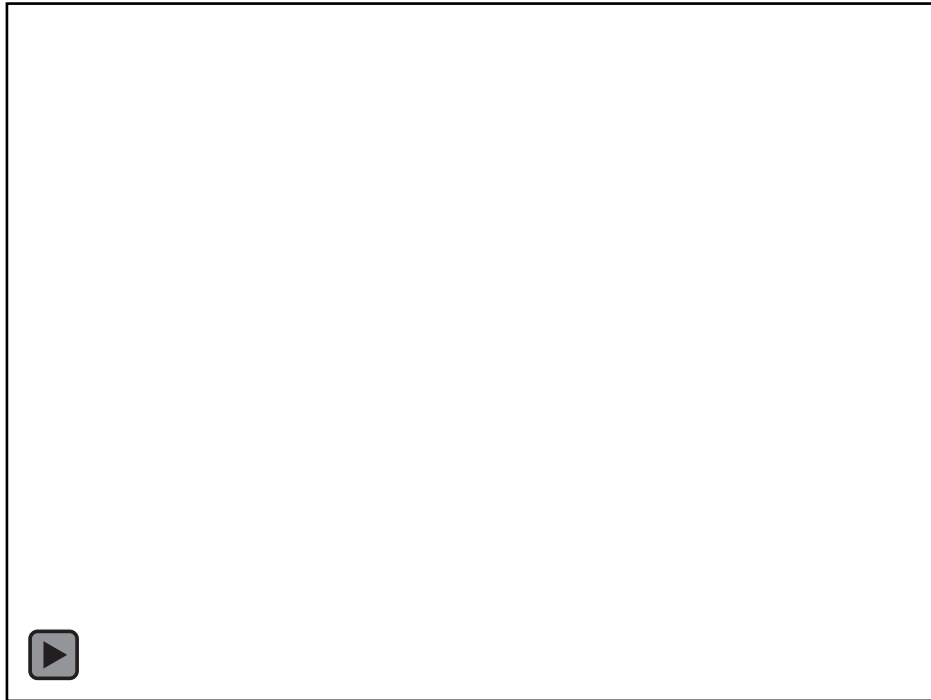
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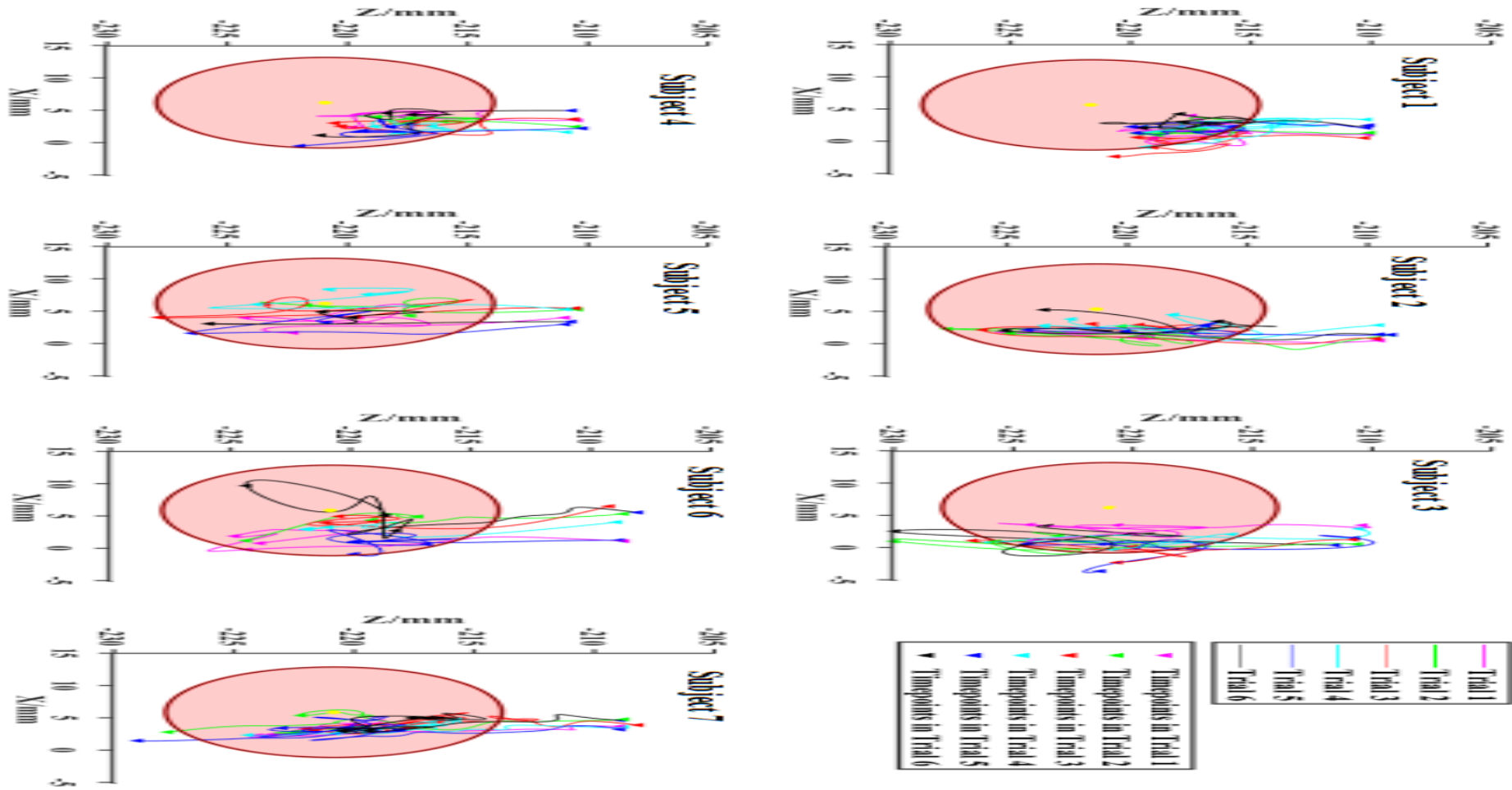
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Image credit: K-DOQI Guidelines

Cannulation Simulator

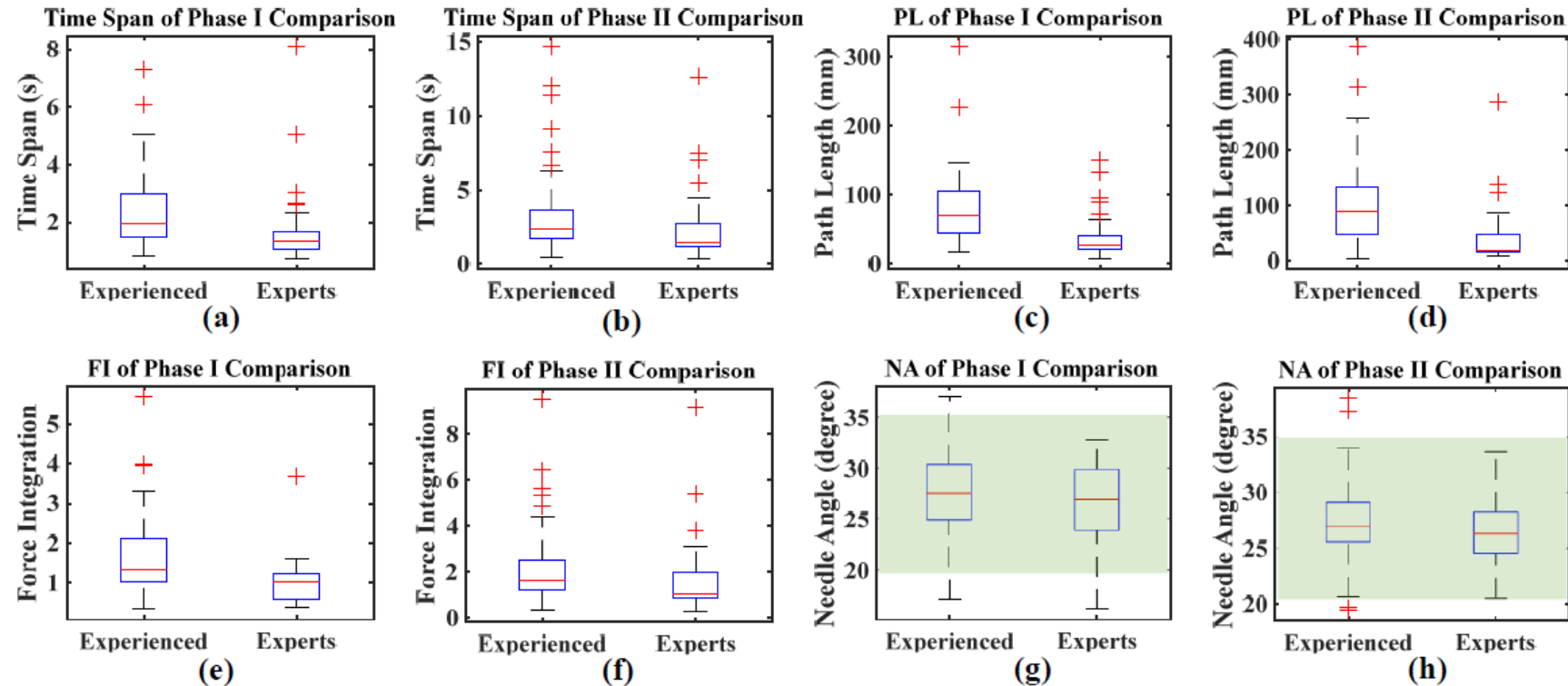


Preliminary Experimental Study



Metrics that assist skill learning

- Results from VASA2019 study
 - Objective metrics



Questions for Panel

- How can a smart trainer help cannulators improve their skills?
- What features would you like to see in the smart trainer?

Other Questions?

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