


## Hands-on Virtual Training: Teaching Clinical Procedural Skills in a New Way

Garrett W. Burnett, M.D.  
Assistant Professor of Anesthesiology, Perioperative & Pain Medicine  
Icahn School of Medicine at Mount Sinai

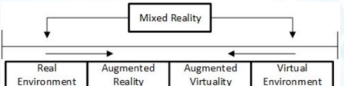
1

## What is Virtual Reality?

2




### What is Virtual Reality?




Milgram, SPIE, 1995

3



### Commonly Used VR Technology



Computer-Based Virtual Patients
Standalone VR Procedural Simulation Systems
Immersive Headset-Based VR Environments

Huang, Int Anesthesiol Clin, 2020

4



### Computer Based VR Patients



ASA SimSTAT, 2021

5



### Standalone VR Procedural System



Symbionix BRONCH Mentor, 2017

6

 Immersive Headset-Based VR Technology



Katz, JMIR, 2020.

7

## Why is Virtual Reality Useful?


8

### Benefits of VR

<p><b>Pre-COVID:</b></p> <ul style="list-style-type: none"> <li>• Low-stakes procedural training</li> <li>• Transferability to clinical practice</li> <li>• Does not require resources of full simulation center</li> <li>• Repeatability</li> </ul>	<p><b>Post-COVID:</b></p> <ul style="list-style-type: none"> <li>• Online alternatives required             <ul style="list-style-type: none"> <li>• Solo vs Digital Classroom</li> </ul> </li> <li>• Rapid deployment of COVID training</li> </ul>
--	---

Walbron, Orthop Traumatol Surg Res. 2020; Samuelson, BJA, 2016; Kohan, Anesth Analg, 2021; Green, Becker's Health IT, 2020.

9

 Potential Limitations of VR

- Unfamiliar technology
- Potentially costly (but doesn't have to be!)
- Many immersive procedural VR training is in prototype stage

10

## VR for Airway Management

11

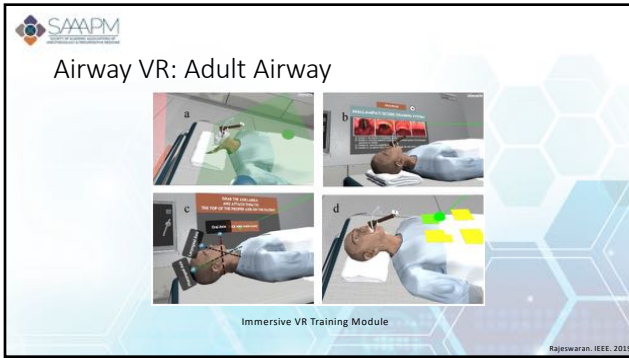
 Airway VR: Bronchoscopy



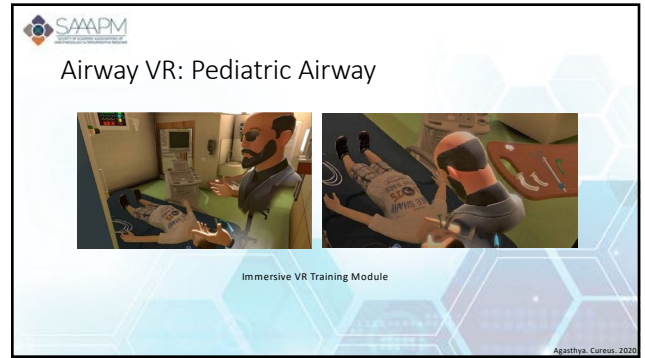
Standalone VR Procedural System

CAE, 2021; Baker, BJA, 2016; Samuelson, BJA, 2016.

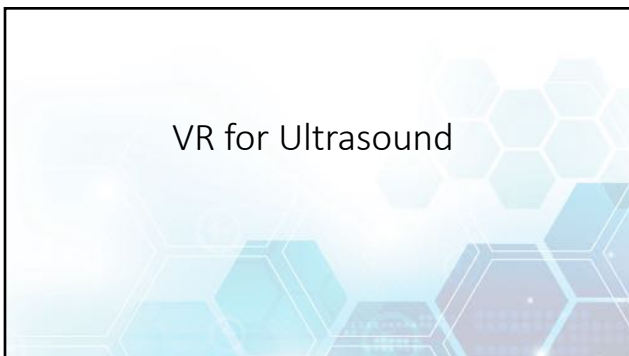
12



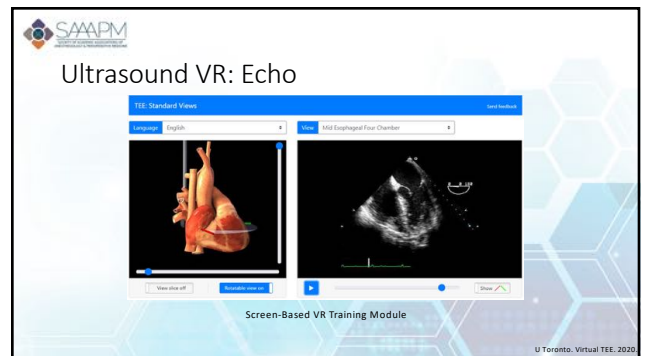
13



14



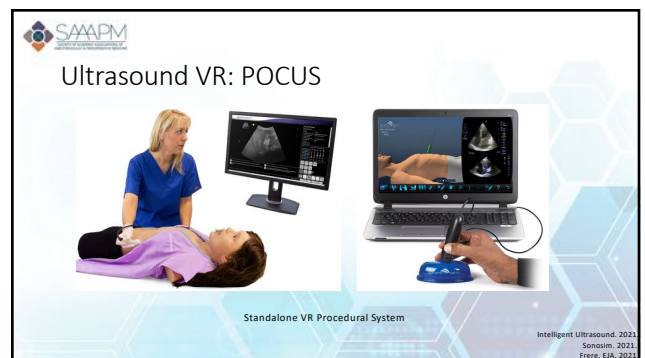
15



16



17



18

# VR for Vascular Access

19

SAAPM  
SOCIETY OF ANESTHESIA AND ANALGESIA  
PAIN MANAGEMENT

## Vascular Access VR: Central Line




Standalone VR Procedural System

Warren, Anesth Analg. 2018

20

SAAPM  
SOCIETY OF ANESTHESIA AND ANALGESIA  
PAIN MANAGEMENT

## Vascular Access VR: Central Line



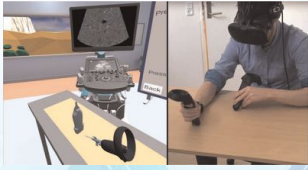
Immersive VR Training Module

Acadus. 2020.

21

SAAPM  
SOCIETY OF ANESTHESIA AND ANALGESIA  
PAIN MANAGEMENT

## Vascular Access VR: Central Line



Immersive VR Training Module

Anderson, Medicine. 2021.

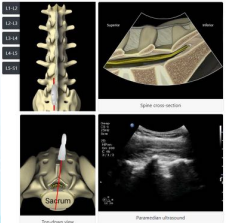
22

# VR for Neuraxial Anesthesia

23

SAAPM  
SOCIETY OF ANESTHESIA AND ANALGESIA  
PAIN MANAGEMENT

## Neuraxial VR



Screen-Based VR Training Module

U Toronto, Lumbar Spine Ultrasound. 2021. Ramlogan, RAPM. 2017.

24

 Neuraxial VR



Standalone VR Procedural System

Simbiosis SPINE Mentor, 2017.

25

# VR for Regional Anesthesia

26


 Regional VR

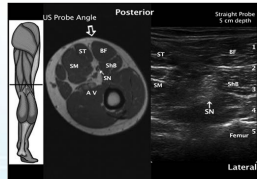


Semi-immersive VR Task Training Module

Grottko, BJA, 2009.

27


 Regional VR




Screen Based VR Training Module

Woodworth, JCA, 2014.

28

 Regional VR: Dental Anesthesia



Immersive VR Training Module

**Simulator Devices**

- Haptic Feedback
- Visual Feedback
- Audio Feedback
- Force Feedback

Collaco, J Dent Educ, 2021.

29

# Conclusion

30

