

Virtual Reality in Medical Education:

Utilizing today's technology for tomorrow's healthcare

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29 November 2018



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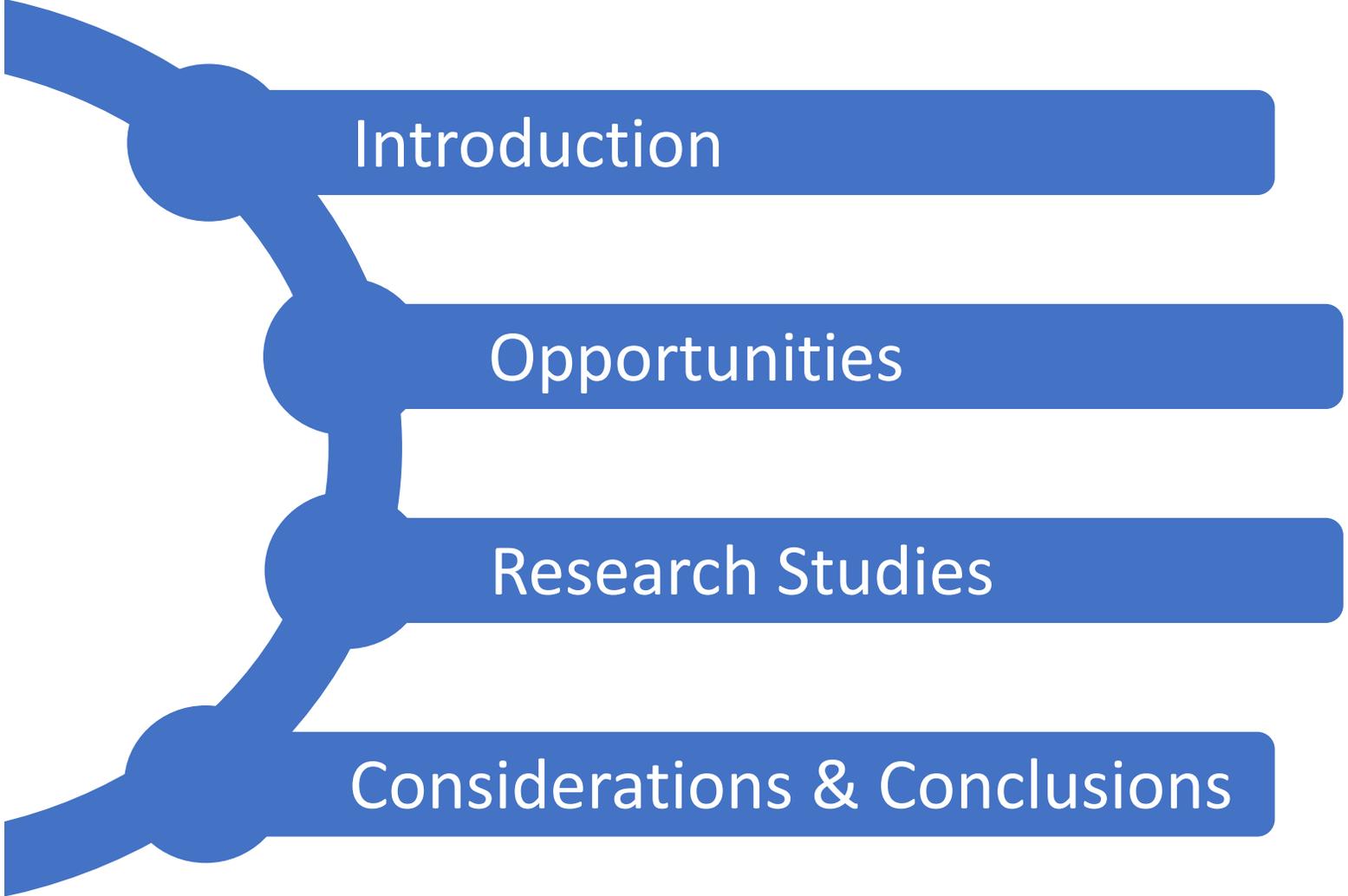
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■ Agenda



Introduction

Opportunities

Research Studies

Considerations & Conclusions

■ What is virtual reality?



Immersive Technology

Virtual Reality

Augmented Reality



■ Opportunities for VR in Medical Education

Medical Students

Patients

Physicians

Caregivers



Increase disease state awareness

Practice new techniques risk-free

Distract from painful or lengthy procedures

Increase empathy and understanding

■ Opportunities for VR in Medical Education

- Virtual Surgery – Osso VR
 - Pick-up and use tools naturally with a high level of precision
 - VR trained users performed surgery twice as well as non-VR trained individuals, as measured by the Global Rating Scale
 - Incorporated into medical residency training programs at top medical schools
 - Adaptable to any surgical technique



“When 30 percent of residency graduates still can't do the job they spent nearly a decade preparing for, something needs to change.”

- Justin Barad, MD, OssoVR CEO/Founder

■ Opportunities for VR in Medical Education

- Virtual Patients
 - Virtual patients complete with personalities and clinical case scenarios
 - Allow physicians to practice discussing difficult topics such as mental illness, sexual abuse, or substance abuse
 - Boost physicians' skills and confidence
 - Increases likelihood of engaging in difficult conversations
 - Simulation scores clinicians on their performance
 - Allows for distance learning
 - Adaptable to unique clinical scenarios



■ Research Studies

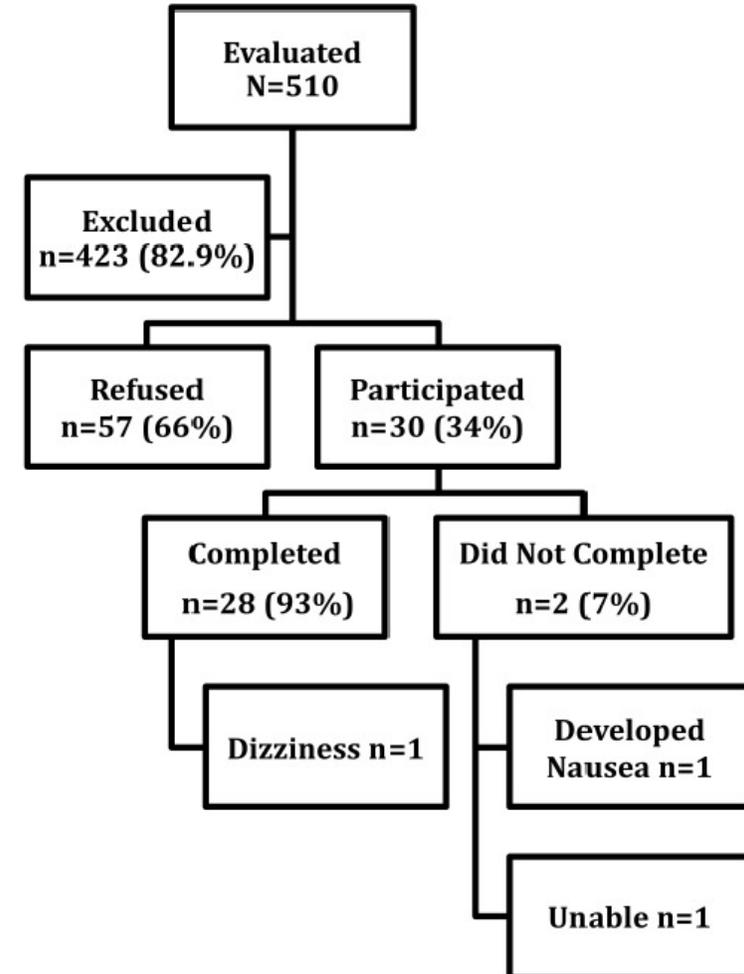
Virtual Reality for Hospitalized Patients

Study Design

- Adults admitted to Cedars-Sinai Medical Center, Las Angeles
- 4-month study period in 2015
- Cognitive de-brief interview

Available VR Programs

- Paint Studio
- TheBluVR
- Cirque du Soleil
- Tours of Iceland



Virtual Reality for Hospitalized Patients

Results

86% reported positive experiences

“Good distraction...welcome distraction...fun detour. Because it’s boring here in the hospital.”

“It provides a separation from what’s going on. Difficult to verbalize how.”

“Got away from being here in the hospital. Who wants to be here? It improved my mood.”

7% reported negative experiences

“The headset was uncomfortable and hard to focus with the dial. The nose part was causing me pain, and I could not fully enjoy it.”

“This was a new experience for me. But I know there are now holograms you can see in front of you, so this technology is already outdated.”

“Anxious about getting dizzy during the experience, even though I didn’t feel that way.”

■ Virtual Reality for Hospitalized Patients

Results

- Only 5.9% of screened adults were willing and able to participate
- 57% chose Tours of Iceland
- Preferred 10 min videos
- 75% believed the experience could improve pain by means of distraction

Future Directions

- Evaluate patient knowledge and beliefs about VR to better understand why some patients are unwilling to use VR
- “Virtualist Consult Service” could be beneficial for hospitalized patients

Virtual Reality vs Paper-based Learning



or



Study Design

- Randomized controlled design study conducted in March 2017
- 1st and 2nd year medical students from the University of Saskatchewan
- Multiple-choice pre-test and post-test questions assessed the participants' ability to visualize relations of structures in 3 dimensions
- Follow-up survey to assess student satisfaction with the learning experience

Virtual Reality vs Paper-based Learning

Results

- 64 participants (31 VR, 33 paper-based)
- Similar demographics (age, sex, medical school year, etc.)
- VR group showed greater improvements than paper-based group
 - Increased accuracy on post-intervention test
 - Improved retention on 7 day post-intervention test

“This method should be used in the curriculum”

VR: 94% Strongly Agreed

Paper: 33% Strongly Agreed

“I feel less afraid with the complexity of neuroanatomy”

VR: 81% Strongly Agreed

Paper: 12% Strongly Agreed

Virtual Reality vs Paper-based Learning



or



Conclusions

1. Training utilizing VR improved knowledge attainment and retention of neuroanatomy compared to paper-based training
2. VR training may increase engagement and motivation to study
3. Useful supplement to classic medical education

■ VR Training for Paraplegic Patients

- Study Design

- Immersive VR uses EEG to control avatar with visuo-tactile feedback
- Treadmill training with brain-controlled sensorized robotic exoskeleton
- 8 paraplegic patients with spinal cord injury (>1 year)
- 12 month Walk Again Neurorehabilitation Program



■ VR Training for Paraplegic Patients

- Results
 - Improvement in voluntary muscle control below the SCI
 - Improved tactile, proprioceptive, vibration, and nociceptive perception
 - Improved gastrointestinal and bladder function
 - Improvements noticeable at 7 months, peaked at 10 months



■ VR for Empathy and Bedside Manner

- “In My Shoes” seizure experience
- Programs at national events:
 - American Epilepsy Society
 - American Academy of Neurology
 - Neurocritical Care Society
 - Epilepsy Foundation
- Programs for local stakeholders:
 - Medical schools
 - Private practices
 - Physicians, nurses, staff, etc.



TAKE A
FIRST
GLIMPSE
INTO THE
WORLD
OF JANE

Experience living with epilepsy.
Hear Jane's words, see what she sees,
feel what she feels.

 Inspired by patients.
Driven by science.

UCB/VCU Jane VR Teaching Collaboration

Patient Insight

- 1st visit to doctor is a defining factor of patient experience
- Fostering empathy in physician-patient relationships has been associated with higher patient satisfaction & better patient health outcomes

Strategic Fit

- Aims to improve epilepsy patient experience and outcomes by augmenting the empathetic education of tomorrow's epilepsy healthcare leaders

Collaborative Actions

- Co-conduct a study that objectively evaluates the value of the Jane VR when it is combined with a scheduled lecture series
- Jane VR will be scheduled regularly throughout the semester with sessions including 10-15 3rd year medical students during their Neurology rotation
- Pre- and post-test questionnaire will be completed by the students

Stakeholder Partners

- VCU faculty who deliver lectures on seizures

Patient Value Impact

- Improve epilepsy patient experience and outcomes by increasing physicians' awareness of their patient's journey

■ Considerations & Conclusions

■ Considerations for Utilizing Virtual Reality

- Participant may experience cybersickness, headaches, or technological challenges
- Students may feel overconfident
- Technology will require significant up-front costs
- Technology may require dedicated technical staff to maintain equipment and programs
- Standards for uniform GME training of medical students are needed

Conclusions

Virtual reality has a wide range of applications in medical education.

Virtual reality has shown efficacy in studies of inpatients and medical students.

Virtual reality technology remains unfamiliar and uncomfortable for some.

 **Questions?**

Thank you for your attention

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