

SHORT REPORTS ON SIMULATION INNOVATIONS  
SUPPLEMENT (SRSIS)

## Education on transgender/gender non-binary patient care using virtual reality

Mariju Baluyot<sup>1,✉</sup>, Adrian Daul<sup>2</sup>, Elizabeth A. Samuels<sup>3,✉</sup>,  
Shannon McNamara<sup>4</sup>, Zil Goldstein<sup>5</sup>,  
Christina Hajicharalambous<sup>6</sup>, Michael Cole<sup>7</sup>, Rhyen Goldman<sup>8</sup>,  
Makini Chisolm-Straker<sup>9,✉</sup>

<sup>1</sup>*Divisions of Pediatric Emergency Medicine and Simulation, Department of Emergency Medicine, Indiana University, Indianapolis, IN, USA*

<sup>2</sup>*Department of Emergency Medicine, Mass General Brigham, Northampton, MA, USA*

<sup>3</sup>*Department of Emergency Medicine, University of California-Los Angeles, Los Angeles, CA, USA*

<sup>4</sup>*CityMD, New York, NY, USA*

<sup>5</sup>*School of Public Health and Health Policy, City University of New York, New York City, NY, USA*

<sup>6</sup>*Department of Emergency Medicine, Hackensack Meridian Health, Hackensack, NJ, USA*

<sup>7</sup>*Department of Emergency Medicine, University of Michigan, Ann Arbor, MI, USA*

<sup>8</sup>*Department of Emergency Medicine, University of Pennsylvania, Philadelphia, PA, USA*

<sup>9</sup>*Department of Emergency Medicine, Icahn School of Medicine at Mount Sinai, New York, NY, USA*

**Corresponding author:** Mariju Baluyot, [mbaluyot@iu.edu](mailto:mbaluyot@iu.edu)

<https://ijohs.com/article/doi/10.54531/EJBE5597>

### Introduction

Clinicians frequently care for transgender and gender non-binary (TGNB) patients in the emergency department (ED). However, prior studies show that ED clinicians receive little training on the clinical needs of this marginalized patient population [1,2]. Additionally, clinicians may demonstrate transphobia, negatively impacting their ability to learn about care of TGNB patients [3]. The use of standardized patients (SPs) in simulations would be an ideal modality for clinicians to learn about TGNB patient care in a safe setting, but this approach can be difficult to implement for many institutions as it is time- and resource-intensive and requires expert instructors and TGNB SPs who may not be available in many communities.

In response to these challenges, we created novel learning experiences to teach emergency medicine (EM) residents about TGNB patient care using virtual reality (VR). VR has had many uses in medical education, from procedural training to practice of high-stakes and infrequent scenarios. Another novel use is the ability to experience a first-person perspective different from one's own, which has been studied as a way to encourage empathy and mitigate implicit biases [4,5]. Our aim was to provide an immersive learning experience, showcase realistic clinical scenarios and feature unique perspectives of TGNB patients, with the goal of improving EM residents' attitudes toward the TGNB population and teaching how to care for them.

Submission date: 18 February 2024

Accepted Date: 28 February 2024

Published Date: 05 August 2024

## Innovation

We created three educational experiences using a 360-degree video camera (Insta360 OneX) to record scripted TGNB patient scenarios. The 360-degree videos were edited with Final Cut Pro X software and uploaded to YouTube VR. We utilized 360-degree video as it provides a level of immersion distinctive from traditional video, specifically allowing users to change their own viewpoints and see different areas of the space around them in real time, mimicking actual first-person perspectives during interactions.

Each 360-degree video featured real EM clinicians as learners (residents or medical students) and preceptors (attending physicians or a nurse practitioner) and TGNB SPs with different presenting complaints. The cases and learning objectives were created by our team of TGNB patient population healthcare experts, featuring high-yield scenarios for EM resident education.

Each scenario can be viewed on YouTube VR with a VR headset, smartphone, tablet, or computer (see [Table 1](#) for specific instructions).

- Case 1: Abdominal pain in a trans male patient (Link: <https://youtu.be/tQheo9Pp7To>)
- Case 2: Leg swelling in a trans female patient (Link: <https://youtu.be/Dz7248pIsX4>)
- Case 3: Chest pain in a nonbinary patient (Link: <https://youtu.be/u4Rimv7bj8o>)

Each scenario begins from a first-person patient perspective with voiceover audio from the SP highlighting anxious thoughts and concerns about the upcoming visit ([Figure 1](#)). This perspective uniquely shows the initial interactions between the SP and the EM clinician as they clarify pronouns, titles, and the patient's preferred name, or being addressed by the wrong title and pronouns.

The video recording then transitions to the perspective of an observer in the room as the EM clinician takes a focused history and exam. This section is designed to focus on language used during the encounter, specifically when discussing sensitive subjects such as examining under clothes (Case 3) or the use of a transvaginal ultrasound (Case 1). Later, the learner discusses the case with a preceptor, who provides expert knowledge on TGNB-specific patient care in the ED and advice on unique challenges.

These learning experiences were shown to EM residents asynchronously using Oculus Quest VR headsets at five residency programs as part of a multi-institutional collaboration to improve education on TGNB patient care.

## Evaluation

Residents had positive and negative feedback for the VR education. Negative critiques included inability for interactivity with these VR environments. Also, some experienced mild nausea and headaches from wearing the VR headset. Overall and when compared to other ways of learning (including webinar), residents found the VR experience more enjoyable, engaging and immersive with decreased distractions. Residents also found the VR experience easy to use and thought that it would be a helpful addition to their education. Additionally, residents highlighted that they thought the VR experience provided a unique perspective on TGNB care in an ED setting.

## Outcomes

This learning experience was part of an educational research study comparing the 360-degree video experience with a recorded webinar lecture. EM residents completed pre- and post-intervention knowledge assessments, and answered questions about usability (relative satisfaction, perceived effectiveness and ease of operation), and their attitudes towards TGNB people.

## Next Steps

Future improvements to the VR experience include improving realism by allowing for interactivity during scenarios by using more sophisticated VR platforms and the use of professional video and design teams. Users' complaints of mild headache and nausea are likely to improve with the use of newer headsets, which are lighter, more comfortable and have improved graphics.

VR provides helpful and engaging educational experiences for medical trainees in multiple settings. Our group used VR and 360-degree video technology to create novel immersive experiences to improve resident education and patient care. VR using 360-degree video may be a feasible, scalable and useful way to teach about the care of TGNB patients, as well as for other groups that may be difficult to capture with traditional simulations using standardized patients. Additionally, we hope that the ability to feature unique

**Table 1** : Directions for viewing cases

<i>On a VR headset:</i>
(1) Open the link using the YouTube VR application (2) Explore the room and change the direction of view with head-turning while wearing the device.
<i>On a smartphone or tablet:</i>
(1) Open the link using the YouTube application. (2) Explore the room and change the direction of view by utilizing the touchscreen or moving the device.
<i>On a computer:</i>
(1) Open the link in the most updated version of the web browser. (2) Explore the room and change the direction of view by utilizing the mouse to click and drag the screen, or utilizing the arrows at the top left corner of the video).

**Figure 1** : Screenshot from Case 1 (abdominal pain), patient perspective



perspectives will continue to encourage empathy for other marginalized populations, mitigate biases and be used to address other challenges in diversity, equity, inclusion and accessibility work.

### Declarations

### Acknowledgements

None declared.

### Authors' contributions

None declared.

### Funding

None declared.

### Availability of data and materials

None declared.

### Ethics approval and consent to participate

None declared.

### Competing interests

None declared.

### References

1. Chisolm-Straker M, Willging C, Daul AD, McNamara S, Sante SC, Shattuck DG, et al. Transgender and gender-nonconforming patients in the emergency department: what physicians know, think, and do. *Annals of Emergency Medicine*. 2018;71(2):183–188.e1. doi:[10.1016/j.annemergmed.2017.09.042](https://doi.org/10.1016/j.annemergmed.2017.09.042)
2. Samuels EA, Tape C, Garber N, Bowman S, Choo EK. “Sometimes you feel like the freak show”: a qualitative assessment of emergency care experiences among transgender and gender-nonconforming patients. *Annals of Emergency Medicine*. 2018;71(2):170–182.e1. doi:[10.1016/j.annemergmed.2017.05.002](https://doi.org/10.1016/j.annemergmed.2017.05.002)
3. Stroumsa D, Shires DA, Richardson CR, Jaffee KD, Woodford MR. Transphobia rather than education predicts provider knowledge of transgender health care. *Medical Education*. 2019;53(4):398–407. doi:[10.1111/medu.13796](https://doi.org/10.1111/medu.13796)
4. Banakou D, Hanumanthu PD, Slater M. Virtual embodiment of white people in a black virtual body leads to a sustained reduction in their implicit racial bias. *Frontiers in Human Neuroscience*. 2016;10:601. doi:[10.3389/fnhum.2016.00601](https://doi.org/10.3389/fnhum.2016.00601)
5. Schutte NS, Stilinović EJ. Facilitating empathy through virtual reality. *Motivation and Emotion*. 2017;41(6):708–712. doi:[10.1007/s11031-017-9641-7](https://doi.org/10.1007/s11031-017-9641-7)