Effect of Virtual Reality on Pain Levels in Pediatric Patients During IV Placement

By: Lauren Anderson, Emily Brennan, and Rose Colmenar, BSN
University of Maryland School of Nursing

PICOT and Objectives

In patients aged 6 months to 21 years old, what is the effect of implementing virtual reality vs no virtual reality in reported level of pain during IV related procedures?

- Measure the changes in reported pain in pediatric patients receiving virtual reality vs standard of care.
- Monitor reduction in other markers of distress such as anxiety, stress, and fear.
- Determine if VR is an appropriate intervention for pediatric patients in a variety of ages and situations.

Background and Significance

- Pediatric patients are considered a vulnerable population when it comes to pain
- Repeated pain exposure in children can cause long term adverse effects (Cunico, 2023)
- Over 60% of children exhibit a phobia of needles (Orenius, 2018)
- Currently there is no widely implemented pain management technique
- Leads to increased trust
- Nonmaleficence and Beneficence

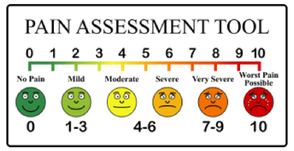
Conclusion

- A significant decrease in pain levels when VR was used for IV insertion in pediatric patients
- VR is an effective non-pharmacological intervention for managing procedural pain at various developmental stages
- We recommend implementing VR during IV insertion in pediatric patients

(Panjwani, 2023)

Literature Review

- The ages ranged from 6 mos to 21 years old
- Inclusion and exclusion criteria...
  - No developmental delays
  - No vision or hearing deficits
  - Not currently in isolation
  - No urgent IV need
  - No analgesics in the previous 24 hours
  - A specific diagnosis based on the unit the research was being conducted on
  - Not currently on isolation for COVID for research studies performed during COVID-19



(Tbdwp, 2021)

- Methods included...
  - Surveys for pain and anxiety
    - FACES, FLACC, Visual Analogue Scale (VAS), CAM-S, VAT
    - Frequency of pain assessments
    - Pre and post; pre, during and post; just post
- Technology Utilized...
  - Samsung Galaxy, Google Pixel XL Smartphones
  - Oculus headset connected to a smartphone
  - HTC Vive VR, Xiaozhai V4 headset
  - Age-appropriate VR environments such as rollercoasters, underwater adventure, space exploration, a wildlife park, and travel destinations.

Search Methods: We utilized the databases CINAHL and PubMed. We conducted a Boolean search using the search terms “Virtual Reality” AND “Pain Management” AND “Pediatrics”. We also restricted our search to publications that were RCT, within the past five years, and peer reviewed

Synthesis and Results

Major Study Findings:

- All results are statistically significant
- The VR intervention reduced, pain, anxiety, and fear in all studies.
- Multiple studies suggested a reduction in time spent in procedure.

Article	VR Group	Control Group
Chan et al (FPS-R)	ED: 1.39 Outpatient: 1.37	ED: 0.39 Outpatient: 2.75
Chen et al (FACES)	3.35	4.35
Erdogan et al (FACES)	0.9	2.5
Gerçeker et al (FACES)	2.4	5.3
Hsu et al (FACES)	1.33	2.06
Lee et al (FLACC)	6	7
Semerci et al (FACES)	2.34	5.02
Wong et al (FPS-R)	2.24	4.99
Gold et al (FPS-R)	1.34	2.54

Implications to Nursing Practice

- VR is a safe and effective distraction method in reducing port needle-related pain (Gerçeker et al 2021)
- The time required for successful intravenous injections was significantly shorter in the VR group compared. Time enduring pain is decreased (Chen, 2020).
- VR increases patient-centered care. The use of VR increases patient, provider, and guardian satisfaction in needle experience.
- Virtual reality is an affordable tool to increase the quality of patient experience.

(Pediatric virtual reality, n.d.)

References

Chan, E., Hovenden, M., Ramage, E., & et. al. (2019). Virtual Reality for Pediatric Needle Procedural Pain: Two Randomized Clinical Trials. *The Journal of pediatrics*, *209*, 160–167.e4. https://doi.org/10.1016/j.jpeds.2019.02.034

Chen, Y. J., Cheng, S. F., Lee, P. C., Lai, & et. al. (2020). Distraction using virtual reality for children during intravenous injections in an emergency department: A randomised trial. *Journal of clinical nursing*, *29*(3-4), 503–510 https://doi.org/10.1111/jocn.15088

Erdogan, B., & Aytekin Ozdemir, A. (2021). The Effect of Three Different Methods on Venipuncture Pain and Anxiety in Children: Distraction Cards, Virtual Reality, and Buzzy® (Randomized Controlled Trial). *Journal of pediatric nursing*, *58*, e54–e62. https://doi.org/10.1016/j.pedn.2021.01.001

Gerçeker, G. Ö., Bektaş, M., Aydınok, Y., Ören, H., Ellidokuz, H., & Olgun, N. (2021). The effect of virtual reality on pain, fear, and anxiety during access of a port with huber needle in pediatric hematology-oncology patients: Randomized controlled trial. *European journal of oncology nursing : the official journal of European Oncology Nursing Society*, *50*, 101886. https://doi.org/10.1016/j.ejon.2020.101886

Gold, J. I., SooHoo, M., Laikin, A. M., Lane, A. S., & Klein, M. J. (2021). Effect of an Immersive Virtual Reality Intervention on Pain and Anxiety Associated With Peripheral Intravenous Catheter Placement in the Pediatric Setting: A Randomized Clinical Trial. *JAMA network open*, *4*(8), e2122569. https://doi.org/10.1001/jamanetworkopen.2021.22569

Hsu, M. F., Whu, Y. W., Lin, I. C., & et. al. (2022). Effectiveness of Virtual Reality Interactive Play for Children During Intravenous Placement: A Randomized Controlled Trial. *Asian nursing research*, *16*(2), 87–93 https://doi.org/10.1016/j.anr.2022.03.002

Lee, H. N., Park, J. W., Hwang, S., Jung, J. Y., Kim, D. K., Kwak, Y. H., & Lee, E. J. (2023). Effect of a Virtual Reality Environment Using a Domed Ceiling Screen on Procedural Pain During Intravenous Placement in Young Children: A Randomized Clinical Trial. *JAMA pediatrics*, *177*(1), 25–31. https://doi.org/10.1001/jamapediatrics.2022.4426

Pediatric virtual reality. KindVR. (n.d.). https://www.kindvr.com/hospital-programs

Panjwani, L. (2017, August 28). *Virtual reality reduces pain, anxiety for kids in Hospitals.* Research & Development World. https://www.rdworldonline.com/virtual-reality-reduces-pain-anxiety-for-kids-in-hospitals/

Semerci, R., Akgün Kostak, M., Eren, T., & Avci, G. (2021). Effects of Virtual Reality on Pain During Venous Port Access in Pediatric Oncology Patients: A Randomized Controlled Study. *Journal of pediatric oncology nursing : official journal of the Association of Pediatric Oncology Nurses*, *38*(2), 142–151. https://doi.org/10.1177/1043454220975702\

Tbdwp. (2021, November 10). *How to communicate your pain with others*. To Better Days. https://tobetterdays.co.uk/blog/how-to-communicate-your-pain-with-others/

Wong, C. L., & Choi, K. C. (2023). Effects of an Immersive Virtual Reality Intervention on Pain and Anxiety Among Pediatric Patients Undergoing Venipuncture: A Randomized Clinical Trial. *JAMA network open*, *6*(2), e230001. https://doi.org/10.1001/jamanetworkopen.2023.00012