

Immersive Virtual Reality Improves Compliance During a Minor Procedure

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Background

Virtual reality (VR) replaces visual and auditory stimuli with a virtual experience. This cognitive behavioral intervention can divert attention from a stressful stimulus such as needle insertion to an enjoyable experience. [1] Using a modified Samsung Gear VR headset, a commercially available game immerses children into an aquatic safari park, which is age appropriate and user friendly without requiring active participation from the child.

Objective

This study examined the effectiveness of using immersive VR in reducing stress during a minor procedure (phlebotomy, intravenous access, port access, arterial line, or other access).

Methods

Children ages 7 to 18 were recruited and randomized to a non-intervention (control) group and intervention (VR) group (set-up shown in *Figure 1*). An observer recorded signs of distress through a modified Induction Compliance Checklist (ICC) [2] tailored to all procedure compliance. The entire procedure was video recorded. The success endpoint of "perfect access" was defined as complete cooperation without any signs of distress noted in the ICC criteria. Various pre and post surveys were also obtained including a clinician satisfaction survey (*Table 1*).



Figure 1. Passive VR set-up during IV access

	Survey Question	Mean Score
Control Group	1. your patient did not use any form of technology. Do you think he/she could have benefitted from using technology tools to distract them prior to the procedure?	3.3 SD± 1.54
Passive VR Group	1. The screen based distraction tool was helpful for this patient prior to the procedure	4.6 SD± 0.72
	2. Having this patient use the screen-based distraction tool made me feel more at ease prior to the child's procedure	4.1 SD± 1.35
	3. The screen-based distraction tool was unnecessary for this patient prior to the procedure	2.1 SD± 1.46
	4. I would like this patient to have access to this screen-based distraction tool for future procedures or surgeries	4.5 SD± 0.97
	5. How immersed was the child in this screen-based distraction tool?	4.7 SD± 0.66

Table 1. Clinician Satisfaction Survey

Results

A total of 112 subjects were recruited and 12 subjects were excluded (incomplete data and technical problems) from the analysis. The control group (29%) had a significantly higher patient interference rate ($p=0.015$) during vascular access than the VR group (10%) as shown in *Figure 2*. The clinician satisfaction surveys were completed by 54 clinicians (control group) and 44 (passive VR group). In regards to patients who experienced passive VR, scored a mean of 5 for questions 1, 4, and 5, a mean of 4 for question 2 and a mean of 2 for question 3. The control group however scored a mean of 3. Other surveys including the fear faces scale, pain rating, and pain catastrophizing scale did not show any significant difference.

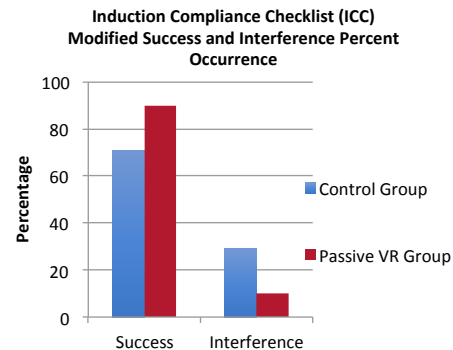


Figure 2. Induction Compliance Checklist Modified

Discussion

This is one of the first studies that demonstrates the viability and successful implementation of VR for vascular access in children. We showed that VR could achieve a significantly higher incidence of successful vascular access without any visual stress signs and symptoms (according to the ICC) from using the VR when compared to standard of care. In addition, the clinician satisfaction survey yielded positive responses to VR.

Conclusion

Passive VR reduced the incidence of children with signs of distress during a needle related procedure and clinician's had a positive response to VR use.

References

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