Effect of virtual reality headset for pediatric fear and pain distraction during immunization – a pilot study

Sulaiman E[1], Rudnick C[2], Orden J[1]

1. Florida Atlantic University. Boca Raton, FL
2. Charles E. Schmidt College of Medicine. Florida Atlantic University, Boca Raton, FL.

Objective

Fear of needles is a well-known phobia among children and adults. We present the rationale, feasibility, and results of a pilot study applying a virtual reality headset with smartphone applications aimed as a fear reduction and pain distraction during immunizations.

Introduction

In some cases, needle phobia or needle anxiety causes parents to delay scheduled visits with their child's doctor in order to postpone vaccinations due to this phobia[1]. To combat fear of needles and potentially reduce pain, several distraction techniques have been used such as deep breathing exercises, watching videos, listening to music, or playing video games. More recently, virtual reality (VR) has been shown to reduce mental stress and pain in chemotherapy, venipuncture, and long-term hospitalalizations[2]. With the success VR in recent years, it has become a non-pharmacologic method to reduce pain and fear that patients feel prior to, during, and after painful medical procedures.

Despite guidelines and various fear and pain reducing techniques currently in practice, pediatric fear and pain during immunization remains. The intent of this pilot study is to determine the rationale, feasibility, and effectiveness of utilizing a VR headset to for fear reduction and pain distraction during pediatric immunization.

Design

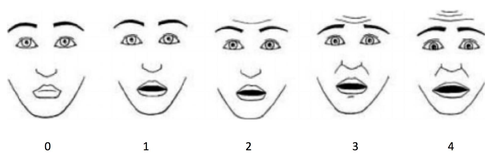

Fig. 1 McMurthy Children's Fear Scale[3]

Fig. 2 Wong-Baker Pain Scale[4]

Fig. 3 Pediatric Subject with VR headset

Design

For the study group, the research assistant presented the McMurthy children's fear scale[3] and Wong-Baker pain scale[4] to both the subject and the parent/guardian with the appropriate dialogue and had both the subject and parent proclaim their anticipated fear and pain level from the needle before goggle use. The research assistant then placed the virtual reality goggles, VR Tepoinn® Virtual Reality Glasses, on the subject. A virtual reality enabled smartphone app was inserted into the goggles with the subject choosing between a roller coaster, helicopter, or hot-air balloon ride VR experience prior to VR headset placement. Once the VR headset was set in place the physician administered a single injection with aseptic technique to the deltoid. The headset was removed and the crying time post needle injection was noted by the research assistant. After crying (if any) was resolved, the research assistant then presented the same fear and pain scale and asked the subjects to choose the one that shows their fear level and pain level towards needles after the VR headset was used. The parent/guardian was asked to choose which face they believed resembled the child's actual fear and pain level from the needle usage post VR headset use.

Results

	Measured by Parent		Measured by Child	
	Decrease in perceived pain level in child	Decrease in perceived fear level in child	Decrease in pain level in child	Decrease in fear level in child
Mean	2.71	2.18	2.5	2.57
P value	0.02	0.05	0.52	0.43

Table 1: Perceived pain/fear level in child as measured by Child and Parent

Results

17 children (N = 15 for ages >6 yrs old) completed the questionnaires. Ratings of expected vs actual fear and expected vs actual pain improved following use of the virtual reality headset during vaccination in 94.1% of children (N=16). Average decrease in fear score in pediatric subjects was 90%. Average decrease in pain score in pediatric subjects was 77%. The decrease in fear score as perceived by the parent was 77% (p=0.05) and 83% (p= 0.02) in perceived pain.

Discussion

The use of a virtual reality headset was well-received and improved reporting of fear and pain in children receiving an immunization. 94.1% of children reported that they would prefer to use the virtual reality headset during their next immunization or injection. VR headsets are an inexpensive non-pharmacologic technique which may reduce fear and pain in pediatric patients receiving an immunization. Additionally, in our study, the use of VR headset during scheduled immunization did not require an additional member of the office staff to implement. Randomized controlled studies in larger populations are needed to determine the effectiveness compared to other distraction techniques and determine if using virtual reality reduces delays in immunizations as a result of anticipated fear or pain. Future studies should also determine whether VR headset leads to similar reduction of anticipated and actual fear and pain when multiple immunizations are provided during the same office visit.

References

1. Taddio, Ipp et al. Survey of the prevalence of immunization non-compliance due to needle fears in children and adults. Vaccine 2012;30(32):4807-12
2. Wiederhold. Virtual Reality as a Distraction https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4043365/#B4
3. Technique in Chronic Pain Patients. McMurtry, C.M., Noel, M., Chambers, C.T., McGrath, P.J. (2011). Children's fear during procedural pain: Preliminary investigation of the Children's Fear Scale. *Health Psychology, Advanced Access Online*. Adapted from the (adult) Faces Anxiety Scale: McKinley, S., Coote, K., & Stein-Parbury, J. S. (2003). Development and testing of a faces scale for the assessment of anxiety in critically ill patients. *Journal of Advanced Nursing*, 41, 73-79.
4. Wong-Baker FACES Foundation (2016). Wong-Baker FACES® Pain Rating Scale. Retrieved [January 3, 2017] with permission from http://www.WongBakerFACES.org.