Critically appraised paper: A virtual reality education intervention prior to chest radiology for children reduces child distress related to the procedure and improves parent satisfaction

### Synopsis


**Question:** In children, what effect does virtual reality education about chest radiology have on: their anxiety and distress during the procedure, parental satisfaction, procedure time, need for repeated images and process difficulty?  
**Design:** Randomised controlled trial with concealed allocation and blinded outcome assessment.  
**Setting:** Single-centre tertiary hospital in the Republic of Korea.  
**Participants:** Children were included if they were aged 4 to 8 years, required chest radiography and were considered healthy or with mild disease, according to the American Society of Anaesthesiology Physical Status criteria. Exclusion criteria were: a history of prematurity or congenital disease; cognitive or hearing impairment; seizures; and prior experience of chest radiology in the past 12 months. Randomisation of 100 participants allocated 50 to the virtual reality group and 50 to the usual care group.  
**Interventions:** The intervention group was provided with a 3-minute immersive virtual reality experience, where the child virtually experienced the process of chest radiography guided by animation and narration. The experience was developed by radiology technologists, anaesthesiologists and a paediatric psychiatrist, in conjunction with a virtual reality production team. Those in the control group received simple verbal instructions for chest radiography.  
**Outcome measures:** The primary outcome was distress during the actual chest radiography procedure, using a modified version of the Observation Scale of Behavioural Distress for radiology procedures. The scale includes 11 operationally defined behaviours indicative of distress, including crying, clinging, fear, restraint and screaming, with a possible total score of 30 (higher scores indicate greater distress). Secondary outcome measures were the need for parental presence, parental satisfaction, time for the radiographic procedure, number of repeated procedures and process difficulty rated by the radiologist.  
**Results:** Ninety-nine participants completed the study. During chest radiography, distress scores were lower in the treatment group, with a mean difference of 3.0 (95% CI 1.0 to 5.0). Compared with the control group, the virtual reality group had fewer children classified as distressed (score >5) (risk ratio 0.3, 95% CI 0.1 to 0.7), less need for parent presence (risk ratio 0.3, 95% CI 0.1 to 0.9), higher parental satisfaction scores (MD 0.8, 95% CI –1.5 to –0.1) and reduced procedure time (MD 19.9 seconds, 95% CI 6.6 to 33.3). There were no between-group differences in the need for repeated procedures or process difficulty scores.  
**Conclusion:** A virtual reality education procedure prior to chest radiography reduced distress in children, improved parents’ satisfaction and reduced overall procedure time.

### Commentary

Distress and anxiety can have a substantial impact on both the duration and effectiveness of a therapeutic intervention in the paediatric setting, as well as a long-lasting effect on the child.1 Han et al reported on the use of virtual reality technology in children prior to chest radiography, to reduce anxiety and distress. Immersive virtual reality aims to move attention away from the present and into the virtual and more pleasant world. In children, virtual reality technology has been demonstrated to have some effect on gross motor performance in individuals with cerebral palsy and decreases pain and agitation during Botox injection.2,3 The impact of virtual reality in the paediatric radiology environment, with its unfamiliar machinery and noise, was unclear.

In this randomised controlled trial, children allocated to the intervention group experienced virtual reality immersion for 3 minutes prior to chest radiography. Of note, both the assessor rating the child’s distress and the radiology technician performing the procedure were blind to group allocation. The intervention was well received, and more children in the intervention group were classified as experiencing ‘less distress’ than those in the control group. Parental satisfaction and technician procedure difficulty scores were both better in the intervention group, although they were high in both groups. The virtual reality intervention resulted in a significant reduction in procedure time. The between-group difference was 20 seconds. It is unclear whether the application of a 3-minute intervention is practical for a 20-second gain in procedure time in a clinical setting. Virtual reality immersion shows some promise in reducing healthcare procedure-related distress in children. Like other telehealth-related interventions, clinicians require: support for implementing it into practice, training in managing technology issues and alternative therapy options for when virtual reality is not tolerated.4-6

### References