

Successful Use of Immersive Technology Distraction for Non-Sedate Transthoracic Echocardiograms in Pediatric Cardiac Patients

Presenting Author: Elizabeth Rossmann Beel, MD, MPH, Baylor College of Medicine/Texas Children's Hospital, Houston TX

Co-authors: Clinton L. Fuller, MD, Baylor College of Medicine/Texas Children's Hospital, Houston, TX; Joannie Stoker APRN, MSN CPNP-PC, Texas Children's Hospital, Houston, TX; Kathleen Chen, MD MS, Baylor College of Medicine/Texas Children's Hospital, Houston TX

Background/Introduction: Though transthoracic echocardiograms (TTE) do not generally require the services of an anesthesiologist in the adult population, young children may require sedation for the acquisition of appropriate images. Dexmedetomidine is used as a front-line agent for these studies in our institution and often yields successful TTE images. However, in a subset of our pediatric patients with congenital heart disease, heart block, or those who are taking negative chronotropic medication, this sedative is a contraindication (1). Midazolam can be a safe, alternative sedative for this group of patients, but its use as the sole sedative has been associated with high failure rates.

Approximately 20,000 echocardiograms are performed per year in our pediatric quaternary care institution; of these, around 400 require sedation to complete successfully. Young children between 15 months and 3 years of age are at the highest risk for needing pharmacological assistance. Of the children who do require sedation, approximately 11% will still be unable to complete the echocardiogram and are classified as sedation failures. These patients will then need to undergo general anesthesia to obtain echocardiogram images. We report the application of immersive technology (IT) as a distracting technique for a successful TTE exam in a young pediatric patient who wasn't an appropriate candidate for the use of dexmedetomidine and had also failed sedation with midazolam.

Methods: Patient selection was based on age (15 months and older) and those who were candidates for sedation with midazolam. The patient was a 23-month-old female with a history of a neuroblastoma and taking labetalol as part of her treatment protocol. She presented to the echo lab for routine cardiac surveillance. Preoperatively, we obtained consent and introduced our IT device. The IT device utilized was a compact, portable, bedside video projector (BERT-Bedside Entertainment Relaxation Theatre) loaded with multiple age-appropriate movies and videos. The child's preferred movie was then dramatically projected onto an empty wall in the dark examination room for the feel of a movie theatre environment (2). The anesthesiologist remained at bedside, providing supplementary distraction coaching during times of uncomfortable probe placement. The imaging study took approximately 20-30 minutes to complete. The parent was surveyed about their child's anxiety and their experience post-echo study.

Results: Distraction using immersive technology was successful in achieving a successful TTE exam in this 2-year-old child without the use of any sedation. During times of extra stimulation or discomfort, we re-engaged her through coaching and introducing a new movie selection to recapture her attention. The parent reported decreased anxiety and expressed satisfaction during this experience as compared to the previous TTE studies.

Conclusion: Transthoracic echocardiograms are non-invasive exams that have the potential to be successfully accomplished without sedation in select young patients. The application of immersive technologies as a distraction technique using the BERT device has been found to

obtain satisfactory TTE images by increasing cooperation and decreasing anxiety in these patients. The potential elimination of sedation during these exams have the benefit of decreasing preoperative preparation stress from fasting, decreasing risk of pharmacological adverse effects, while enhancing our patient's experience and overall satisfaction.

References:

- 1) Hammer GB, Drover DR, Cao H et al. The effects of dexmedetomidine on cardiac electrophysiology in children. *Anesthesia & Analgesia* 2008; 106(1): 79-83.
- 3) Rodriguez S, Caruso T, Tsui B. Bedside Entertainment and Relaxation Theater: size and novelty does matter when using video distraction for perioperative pediatric anxiety. *Paediatr Anaesth* 2017; 27: 668-9.

