

Abstract Title: Augmented Reality as Sole Anxiolytic for Pediatric Inhalational Induction of General Anesthesia

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Introduction:

Preoperative anxiety is common in pediatric surgical patients and increases the risk of emergence agitation and maladaptive behavior weeks after surgery.¹⁻⁵ Children requiring multiple procedures are particularly susceptible, often demonstrating exaggerated fear and distress during subsequent hospital visits.

Immersive technologies show promise as effective anxiolytics. However, most head-mounted displays (HMD) block the eyes and obscure appropriate face mask placement over the nasal bridge. The purpose of this abstract is to present the feasibility and effectiveness of a unique holographic HMD that provides distractive anxiolysis while minimizing typical limitations of HMDs during mask induction.

Methods:

This feasibility pilot implementation occurred at a quaternary care children's hospital in northern California. The DreamGlass AR 4K is a head-worn apparatus that allows viewers to see 2D or 3D images superimposed onto the real environment, projected onto the equivalent of a 200-inch screen with 90-degree field of vision optics. The headset utilizes a native, embedded platform to access commercial entertainment applications. Unlike virtual reality HMDs, a glass

visor sits approximately 2 inches away from the patient's face, allowing the provider to visualize the patient's eyes and provide a face mask seal during induction. Media release was obtained prior to enrollment. The primary outcome was acceptability and effectiveness as determined by patient and family interviews.

Results:

A 12 year-old female with trisomy 21 and a complex neuropsychiatric history including anxiety and needle-phobia was recruited to pilot this device. She was scheduled for a diagnostic lumbar puncture followed by MRI under general anesthesia (GA) for diagnostic workup in the context of an acute developmental regression attributed to Down Syndrome Disintegrative Disorder.

Although initially planning to administer preoperative oral midazolam, the patient's mother expressed concerns around prolonged sedation following the patient's prior anesthetics. In discussing distraction techniques, the patient's mother identified "Moana" (Walt Disney Animation Studios™) as the patient's favorite movie. The patient was then fitted with a DreamGlass HMD.

With "Moana" playing on the headset, separation from the patient's mother was achieved in the preoperative area. Uninterrupted by changes in position or perioperative location, the patient continued to be aware of her surroundings while simultaneously enjoying her projected movie. As the patient watched the movie in the operating room, she was compliant with monitor placement and introduction of the anesthesia mask. A mixture of 30% oxygen with 70% nitrous oxide was administered through the patient's mask as she continued to use the headset (Image 1). Sevoflurane was titrated to induction of GA. The headset was then removed for the remainder of the patient's perioperative course and cleaned with hydrogen peroxide wipes. In the post-operative care unit, the patient emerged without issue and was ready for discharge within 41 minutes after arrival (in comparison to 102 minutes with her prior anesthetic 5 months earlier). Video of the induction was shared with the patient's mother, who expressed gratitude and high satisfaction for how calm her daughter appeared during mask induction of anesthesia.

Conclusion:

The DreamGlass headset offers a practical, cost-effective tool for addressing preoperative anxiety, and may be an alternative to pharmacological anxiolysis for appropriate patients. A previous report has described the use of parent present induction of anesthesia with augmented reality as a tool for employing distraction techniques with interactive games.⁶ However, this headset is 75% more affordable, allows for provider control with a tethered mobile device, and offers mixed media including commercially available videos in addition to gaming applications. With wireless internet connectivity and online streaming services, we are now able to provide our patients with semi-immersive experiences during mask induction while overcoming the typical barriers associated with immersive technologies.

Image 1:



Patient wearing augmented reality headset during mask induction of anesthesia

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