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# Virtual reality experience in the PICU

## A pilot study at the Ann & Robert H. Lurie Children's Hospital of Chicago

An overview of the virtual reality programme at the Ann & Robert H. Lurie Children's Hospital of Chicago and its potential benefits on patient outcomes.

Ann & Robert H. Lurie Children's Hospital of Chicago has introduced virtual reality into their paediatric intensive care unit. A pilot study was conducted with 32 participants between the ages of 3 and 17 years to evaluate whether the stimulation and interaction that virtual reality offers will mitigate the risk of delirium and other cognitive and emotional impairments as well as improve outcomes for these children (Badke et al. 2019).

The primary goal of the virtual reality programme was to create an “outlet” for patients in the Paediatric Intensive Care Unit (PICU) who, like many hospitalised patients, are usually confined to the four walls of their hospital room. While there are ways to engage and offer enjoyable, growth-oriented experiences for these patients who are receiving the highest level of medical support, patients often spend much of their days watching TV or movies, which are non-interactive and one-dimensional. We wanted to bring the outside in, and simulate high-stimulus experiences for our recovering critically ill patients. Virtual reality (VR), being immersive in nature, was one way we were hoping to achieve this. Essentially, we used a disposable VR headset, in order to avoid cross-contamination between patients, and provided a smartphone that displayed VR, 360-degree videos we curated by age

and experience preferences. In the study, patients were given a time limit of exposure, and patient and caregiver responses were recorded.

### Why a virtual reality programme?

We know that critical illness, and importantly the recovery period, can in itself present complications for the patient, including delirium, weakness, and susceptibility to immune dysregulation. Critically ill adult patients have shown a positive response to being exposed to nature and other

interactive stimuli, in an effort to combat co-morbidities. Critically ill children at all developmental levels can also benefit from interactive experiences that provide positive stimulation that otherwise are absent from the ICU environment. This programme complements the partnership that our PICU has with Child Life Specialists and Creative Arts Therapists. It is an immersive, 360-degree visual experience that offers an opportunity for patients to be active in choosing experiences that improve their sense of well-being. For this study, we were



The IGNITE Innovation Program

Image Credit: Ann & Robert H. Lurie Children's Hospital of Chicago



Virtual reality in the PICU

Image Credit: iStock

## Parents' response to the virtual reality programme

We surveyed all parents who observed their child experiencing the VR, and the majority reported that they enjoyed watching their child during the session, that it had a positive impact on their child's mood, and that they would want to repeat the experience. We even had some parents report, quite emotionally, that it was the happiest they had seen their child in some time.

## Future prospects

We are currently studying the clinical impacts of VR on a larger patient population, and in different clinical uses cases, in addition to better understanding its impact on mood. Our plan is to widely implement this as an additional tool that can be offered to patients in the PICU.

Identifying and creating novel uses for existing, or even new, technology in ways we have not considered before is the cornerstone of multi-disciplinary innovation in our PICU. Not only can this provide a substantial positive impact on our patients, but it also continues to introduce alternative methods for recovery for these patients. We hope to continue to expand on this, and similar programmes, in offering our patients and families holistic, well-rounded care. ■

largely general with providing the experience to a wide array of patient conditions, although those who have a prolonged hospitalisation may benefit the most.

## Benefits of the programme

For this study, we wanted to evaluate feasibility, satisfaction with the experience, and overall enjoyment. It was important for us to also include the parents' perceptions of their child's reaction, as they had the most exposure to their child throughout their hospitalisation and would hopefully be able to notice a difference. We found that the majority of patients and their parents thought that VR was easy to use, had minimal adverse effects, was enjoyable, and that they would want to continue using VR throughout their hospitalisation.

We are in the process of studying a number of clinical parameters for those patients exposed to VR, to understand if there is a measurable effect on some of these health indicators. Aside from the clinical implications, we will be offering the platform to patients as a distraction tool in the interim.

In this feasibility study, we were limited in what we could conclude about the short- and long-term psychological benefits of VR. However, with the help of Dr. Bonnie Essner,

a psychologist and one of our co-authors, this is another outcome that our team will be studying. There is growing evidence that daily doses of enjoyable moments can have a big impact on children's interpretation about their safety and well-being, and in turn, can protect against psychological comorbidities. We'd like to better understand

**critically ill children at all developmental levels can benefit from interactive experiences that provide positive stimulation that otherwise are absent from the ICU environment**

the role of VR in children's in-hospital and longer-term adjustment as they recover from critical illness.

We are in the process of studying outcomes in addition to a number of other parameters to better understand what clinical impact VR may have on patients in our PICU, and we are excited to share these results.

## Key points

- Ann & Robert H. Lurie Children's Hospital of Chicago has introduced virtual reality into their paediatric intensive care unit.
- Critically ill children can benefit from interactive experiences that provide positive stimulation.
- The majority of patients and their parents thought that VR was easy to use, had minimal adverse effects, was enjoyable, and that they would want to continue using VR throughout their hospitalisation.

## References

Badke C, Essner B, O'Connell M, Malakooti M [2019] An Innovative Virtual Reality Experience in the PICU: A Pilot Study. *Pediatric Critical Care Medicine*.