

## Introduction

Patient satisfaction has become a meaningful and commonly-used proxy for measuring the quality of health-care and success of hospitals. Overall satisfaction of patients not only increases the likelihood of seeking healthcare in the future, but improves clinical outcomes, including mortality (Fenton, Jerant, & Bertakis, 2012).

- In pediatric patients who receive numerous intravenous (IV) starts as a part of treatment for acute and chronic medical conditions, management of not only their pain, but also their satisfaction with the procedure, becomes important.
- Over the past decade, virtual reality (VR) has shown promise in managing children's pain and distress during painful medical procedures.
- In a sample of 20 pediatric patients who utilized VR as distraction prior to MRI/CT scans that required IV starts, those within the VR group demonstrated double the amount of satisfaction with their pain management as compared to the standard-of-care (SOC) group (Gold et al., 2006).

The present randomized-controlled trial investigates the relationship between caregiver- and child-reported satisfaction on child-reported pain and anxiety. The effect of a VR intervention compared with standard-of-care on procedural satisfaction, pain, and anxiety during a pediatric IV start procedure will also be explored.

## Procedures and Measures

Participants were randomly assigned to one of two conditions for their IV start procedure.

- 1. Standard of care (SOC):** SOC procedures consist of a nurse applying a tourniquet to the arm, selecting a vein, cleaning the skin, and placing the IV
- 2. SOC plus VR intervention:** Patients played BearBlast (appliedVR™) on the Samsung Gear VR goggles (ages 13-21) or the Google Merge VR goggles (ages 10-12)

Patients and their caregivers completed standardized self-report measures of pain and anxiety before and after the IV start procedure. Following the procedure, patient-caregiver dyads completed an investigator-developed satisfaction questionnaire to assess procedural satisfaction.

- 1. Pain:** Pain was measured using a Visual Analogue Scale, with a scale ranging from 0-10 (no pain to worst/most pain)
- 2. Anxiety:** Anxiety was measured using a Visual Analogue Scale, with a scale ranging from 0-10 (no anxiety to worst/most anxiety)
- 3. Satisfaction:** Patients and caregivers were asked, "How well do you think the procedure went?" Responses were collected via a Likert-scale from 1-10 (1=Not at all well, 10=Extremely well)

Statistical analyses included four generalized linear models to assess the relationship between satisfaction (child and caregiver) and the child outcomes (pain and anxiety), while controlling for the treatment group and the child's baseline scores.



## Results

### Relationships between caregiver- and child-reported satisfaction and child-reported pain and anxiety

Outcome: Child pain post-procedure <sup>a</sup>			Outcome: Child anxiety post-procedure <sup>b</sup>		
	$\beta$ (95% C.I.)	<i>p</i> -value		$\beta$ (95% C.I.)	<i>p</i> -value
Model 1:			Model 3:		
Caregiver satisfaction	-.33 (-.60, -.07)	.01*	Caregiver satisfaction	-.22 (-.49, .04)	.10
Model 2:			Model 4:		
Child satisfaction	-.34 (-.54, -.14)	<.001*	Child satisfaction	-.36 (-.56, -.16)	<.001*

<sup>a</sup> Model 1 and model 2 both with treatment group and pre-child pain in the model

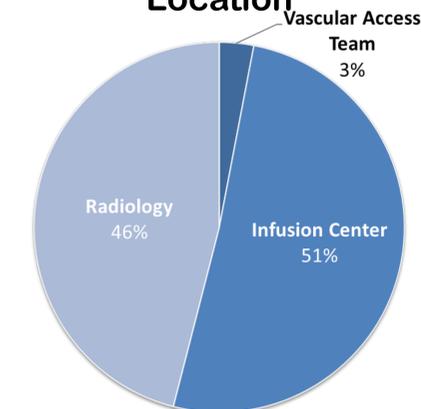
<sup>b</sup> Model 3 and model 4 both with treatment group and pre-child anxiety in the model

$\beta$  represents for every one point increase in satisfaction, there is a  $\beta$  point change in the child pain or anxiety outcome.

### Participant Demographics

	SOC (N = 51) n (%)	VR (N = 47) n (%)
Age in years, M (SD)	15.4 (3.2)	14.8 (2.7)
Boys	28 (54.9%)	30 (63.8%)
Hispanic/Latino	16 (31.4%)	16 (34.0%)
White/Non-Hispanic	10 (19.6%)	10 (21.3%)
African American	4 (7.8%)	2 (4.3%)
Asian/Pacific Islander	5 (9.8%)	1 (2.1%)
Multi-racial	4 (5.8%)	6 (12.8%)
Other/Unknown	12 (23.5%)	12 (25.5%)

### Recruitment Location



## Conclusions

- No significant differences in child pain or anxiety post procedure were found between the SOC and VR group, when controlling for pre-procedure pain or anxiety and either child or caregiver satisfaction.
- Caregiver satisfaction was significantly associated with lower child-reported pain, and child satisfaction was significantly associated with lower self-reported pain and anxiety.
- Satisfaction was related to better pain and anxiety outcomes, demonstrating that improved satisfaction leads to more well-controlled pain and anxiety, regardless of treatment group.
- VR has the potential to uniquely improve quality and experience for child and caregiver during routine, painful procedures.
- Healthcare providers should continue to focus on reducing pain and anxiety during routine medical procedures, which may lead to better overall patient experience and health outcomes.

