

Virtual Reality as a Tool for Non-Pharmacologic Pediatric Chronic Pain Management: A Case Series

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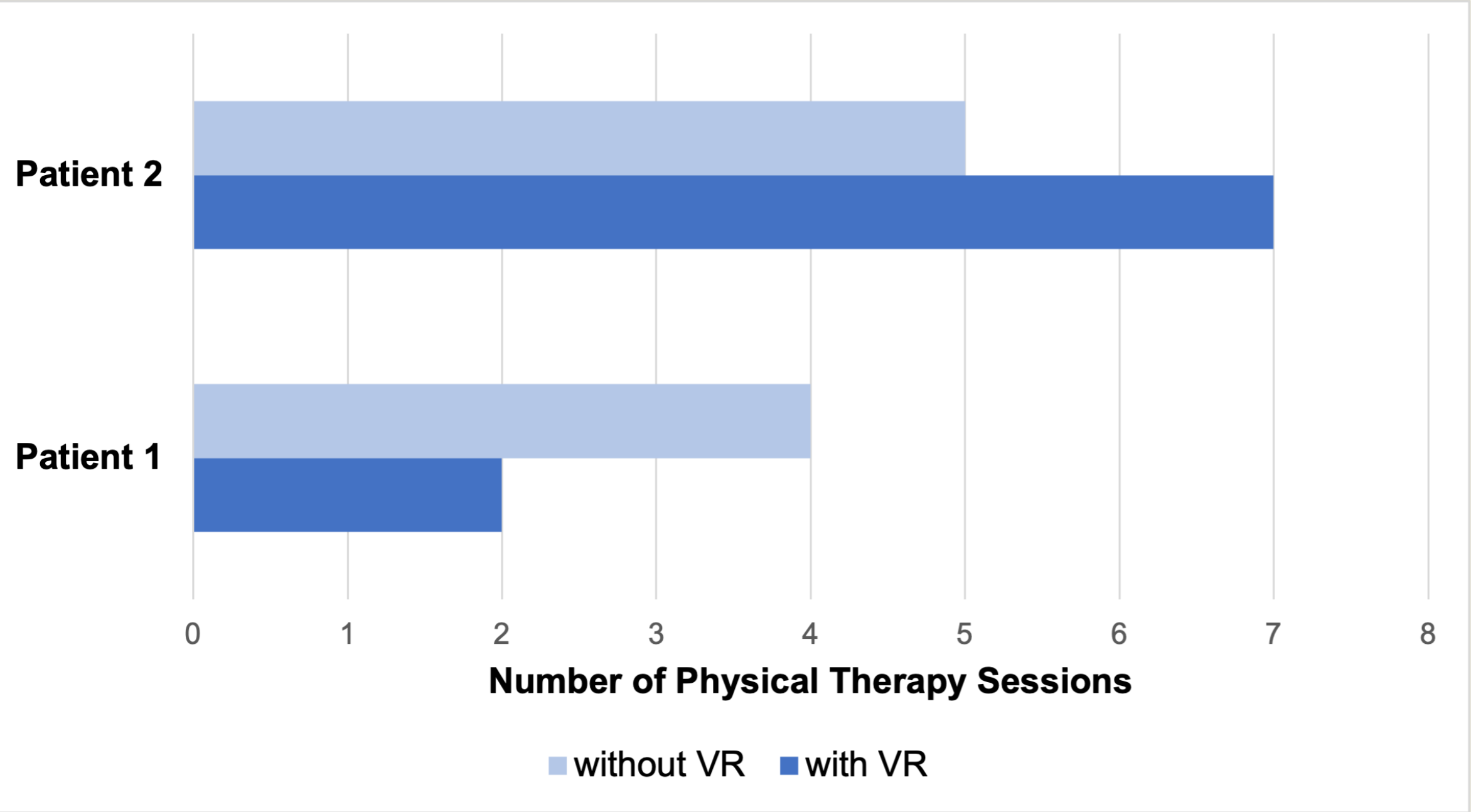
INTRODUCTION

- Virtual reality (VR) is an effective tool in helping pediatric patients undergo painful procedures.¹ However, research is limited on the effectiveness of VR for management of pediatric chronic pain.²
- Efficacy of VR as a tool for physical therapy (PT) for longitudinal, non-pharmacological management of pediatric chronic pain also remains poorly understood.
- We present the outcomes for two pediatric chronic pain patients who received VR as part of an interdisciplinary pain management treatment at a large pediatric hospital.

METHODS & CASE DESCRIPTION

- Methods:**
 - Inclusion criteria: patients who opted for a non-pharmacological treatment approach including physical therapy and psychotherapy.
 - Outcome measures:
 - Functional Disability Inventory (FDI) and Tampa Scale of Kinesiophobia (TSK).
 - Qualitative data:
 - Patients had the opportunity to describe their experiences including their satisfaction with VR.
- Patient 1 Case Description:**
 - 8-year-old female with a seven-month history of worsening suprapubic pain following a dance injury.
 - Pain refractory to ibuprofen and initial physical therapy.
 - Patient struggled with anxiety and limitations with daily activities, including competitive dance.
 - The patient received two sessions of physical therapy with six sets of VR exercise per session followed by four sessions without VR (Figure 1).
- Patient 2 Case Description:**
 - 15-year-old female presenting with a three-year history of back pain that had progressed to diffuse amplified musculoskeletal pain syndrome.
 - Heating pads, ibuprofen, and acetaminophen ultimately failed to alleviate symptoms.
 - Pain severely impacted the patient's mood, behavior, and sleep.
 - Patient received seven sessions of physical therapy with four to eight sets of VR exercise per session and five sessions of physical therapy without VR (Figure 1).

Figure 1. Number of Physical Therapy Sessions with and without Virtual Reality



RESULTS

- Patient 1**
 - Patient's FDI decreased and lower extremity functional scale increased, indicating improved physical function (Table 1)
 - Patient demonstrated decrease in TSK, indicating improved kinesiophobia (Table 1)
 - Patient reported high satisfaction with VR and believed that VR was helpful for PT (Table 2)
- Patient 2**
 - Patient's TSK and FDI increased (Table 1)
 - Patient reported improvements in pain, strength, and balance
 - Patient reported markedly high satisfaction with VR for PT (Table 2)

Table 1. Patient Functional Status, Kinesiophobia, and Attitude Toward Virtual Reality Following Pain Management

Score	Patient 1	Patient 2
Tampa Score, Initial	57	34
Tampa Score, Final	17	39
Tampa Score Change, %	-70.2	14.7
Functional Disability Inventory Score, Initial	27	9
Functional Disability Inventory Score, Final	1	12
Functional Disability Inventory Score Change, %	-96.3	33.3
Lower Extremity Functional Scale Change, %	344.4	N/A

Table 2. Patient Feedback on Virtual Reality in Physical Therapy

Question	Patient 1	Patient 2
On a scale of 1 to 10, how likely are you to recommend VR for PT? (1 = Not Likely, 10 = Very Likely)	8	10
Do you believe VR as a tool for PT is helpful?	“Yes, it helped me focus on the movements and not the pain or injury. My physical movements improved a lot because VR distracted me.”	“Yes, VR is helping me with PT”
How satisfied are you with VR?	“I’m satisfied, I liked it.”	“Very satisfied.”
Additional illustrative quotes on VR	“VR is fun and helpful for PT.”	“I really like VR a lot!”

DISCUSSION

- This preliminary study demonstrates the feasibility of using virtual reality as a tool for pediatric non-pharmacologic chronic pain management.
 - Both patients received VR during their physical therapy and reported marked improvements.
 - Despite patient 2 showing an increase in FDI and TSK score, indicating difficulties with physical functioning, it is important to note that these scores were obtained following volleyball camp. Therefore, patient appeared to experience pain following rigorous physical activities.
 - Both patients demonstrated high satisfaction with VR exercise and cited VR as a helpful tool in PT
- Study limitations:
 - Study would benefit from larger sample size and treatment protocol standardization.
 - The use of validated outcome measures may contribute to an improved understanding of VR's long-term impact.

CONCLUSION

- Virtual reality in physical therapy may be a feasible tool for non-pharmacological management of pediatric chronic pain.
- Future studies are needed to determine the longitudinal efficacy of VR as part of pediatric chronic pain treatment by measuring physical and psychological outcomes following treatment.

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