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Patient Tolerance to Virtual Reality-Based Vestibular Rehabilitation: A Scoping Review

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Introduction: Virtual reality-based therapy (VRBT) using head-mounted devices (HMDs) is being explored as a novel treatment modality for rehabilitation of vestibular disorders. We hypothesize there may exist unique risks and side effects to VRBT using HMDs in the vestibular patient population which no previous studies have directly explored. This scoping review compiles all currently published data concerning vestibular patient tolerance to this treatment modality and provides preliminary interpretation of overall risks.

Methods: An exhaustive list of search terms covering virtual reality, HMDs, vestibular disorders, side effects, and adverse events were submitted to six different databases. Returned papers were uploaded to RefWorks and deduplicated. The papers were screened based on title and abstract criteria and then screened again based on their full-text according to protocol. Study details, VR-induced symptoms, adverse events, and measures of evidence were extracted according to protocol and then reviewed.

Results: A total of 658 papers were returned after deduplication. After title and abstract screening, 23 papers remained and after full text screening, six papers remained. The remaining papers utilized a mix of VR headsets including HTC Vive (2), Oculus Rift (3), and smartphone-based HMDs (2). Across these studies, only one patient dropped out due to concern for

symptoms and there were no adverse events, including falls, reported. Three studies quantified post-treatment cybersickness symptoms using a simulator sickness questionnaire (SSQ) that demonstrated a mild increase in incidence and severity of existing vestibular symptoms.

Discussion: The mild increase in SSQ scores with only one patient drop-out indicate that the vast majority of vestibular patients tolerate VRBT. Ultimately, the mild and transient symptom increases in the absence of any serious adverse events across the literature indicate that there are no red flags concerning the continued research of VRBT with HMDs for patients with vestibular disorders.