Compared Effectiveness of Mirror Therapy and Virtual Reality Therapy in Upper Extremity Motor Rehabilitation during the Acute Stage of Stroke

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Objectives

- At the conclusion of this presentation, participants will be able to identify what upper extremity hemiparesis is following stroke.
- At the conclusion of this presentation, participants will be able to identify the difference between Mirror Therapy and Virtual Reality Therapy.
- At the conclusion of this presentation, participants will be able to determine the benefits of Mirror Therapy and Virtual Reality Therapy for individuals with upper extremity hemiparesis in the acute stage of stroke.

Background

What is Stroke and Upper Extremity Hemiparesis?

- A stroke can occur due to the formation of a clot, which obstructs the blood flow to the brain (ischemic stroke) or when a blood vessel ruptures in the brain which obstructs blood flow (hemorrhagic stroke) (Centers for Disease Control and Prevention [CDC], 2020).
- Upper extremity (UE) hemiparesis is motor impairment of one arm which is a common physical ailment seen in individuals during the acute stage of a stroke (Raghavan, 2015).

What is Virtual Reality Therapy (VRT)?

- VRT involves interacting and receiving real-time feedback in a virtual environment to practice scenarios that are relevant to daily living (Kwon et al., 2012).

What is Mirror Therapy (MT)?

- MT involves placing a mirror between the arms or legs of the client s they view the image of their non-affected limb moving, which creates the illusion that their affected limb is functioning normally (Lee, Cho, & Song, 2012).

Statistics and Functional Impact of Stroke

- Stroke or cerebrovascular accident (CVA) is a major cause of disability worldwide and the second leading cause of death (CDC, 2020).
- Upper extremity hemiparesis can negatively impact performance in many occupations (Raghavan, 2015).

Relevance to Occupational Therapy

- Both MT and VRT are relevant to occupational therapy practitioners as they both provide a potential opportunity to improve UE function, which may improve functional performance in activities of daily living (ADLs) and other meaningful activities.
- There is a critical period of cerebral recovery during the acute stage of stroke (0-6 months), therefore it is significant that the most effective intervention is selected during this time (Kwon et al., 2012).

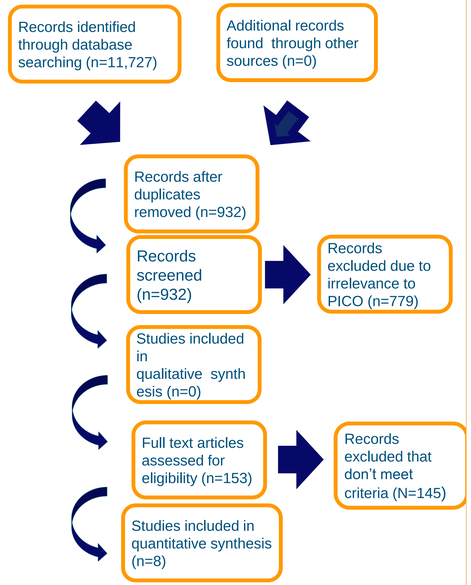
Methods

➔A comprehensive literature search was performed over several medical databases

Databases
CINAHL
MEDLINE
Cochrane Database of Systematic Reviews

Search Terms:
- **Population:** acute stroke, UE hemiparesis
- **Intervention:** Virtual reality therapy, mirror therapy
- **Outcome**: Fugl-Meyer Assessment of Upper Extremity (UEFMA), Wolf-motor Function Test (WFMT) , Manual Function Test (MFT)

Prisma Flow Chart



Results

Outcome Measures

- The Fugl-Meyer assessment of upper extremity (UEFMA) is a scale of motor impairment that is commonly used during the post-stroke phase (Woytowicz et al., 2017).
- The Wolf Motor Function Test (WMFT) is a quantitative index of upper extremity function (Wolf et al., 2001). Upper extremity function is quantified by the individual performing functional tasks that are timed (Wolf et al., 2001).
- The Manual Function Test (MFT) is designed to measure upper-extremity function in individuals who have hemiparesis following the diagnosis of a stroke (Kwon et al., 2012).

Table 1: Study Results

Intervention Type, Study Type, Study Reference	Assessment Tool(s)	Results
MT RCT (Lee et al., 2012)	UEFMA	- Improvements in shoulder/elbow/forearm items for UEFMA for experimental group compared to control (P <0.05)
MT RCT (Samuelkamaleshkumar et al., 2014)	UEFMA	- Significantly greater mean scores for MT group for UEFMA (P = .008)
MT RCT (Yeldan et al., 2015)	UEFMA	- No significant changes in any assessment measures for control or experimental group (p>0.05)
MT RCT (Antoniotti et al., 2019)	UEFMA	-No significant increases on UE assessment measure (p>0.05)
VRT RCT (Fluet et al., 2014)	UEFMA, WMFT	- Substantial improvement in FMA scores (mean improvement = 6 points (SD = 2)). - Improvements in proximal arm supports the section of FMA and WMFT (p<0.05).
VRT RCT (Kwon et al., 2012)	UEFMA, MFT	- The VRT group showed significant improvement in FMA and MFT (p<0.05).
VRT Case Study (Samuel et al., 2015)	UEFMA	- Clinically relevant increases in UEFMA post-test scores for shoulder/elbow/forearm items.
VRT RCT (Oh et al., 2019)	FMA	- Both control and experimental groups showed significant improvements in FMA grip strength scores (p<0.05).

- 2 out of 4 studies analyzing MT interventions provided statistically significant results (Lee et al., 2012; Samuelkamaleshkumar et al., 2014).
- 3 out of 4 studies analyzing VRT interventions provided statistically significant results (Fluet et al., 2014; Kwon et al., 2012; Oh et al., 2019)

Discussion

- Both virtual reality therapy (VRT) and mirror therapy (MT) showed effectiveness in improving UE motor function during the acute stage of stroke based on assessment findings.
- Each study had different treatment protocol (time, frequency, duration) for VRT and MT.
- MT interventions had more cohesive intervention types (resources used) and VRT interventions were less cohesive

Clinical Implications

- Occupational therapy practitioners should utilize this information cautiously as each study had small sample sizes.
- The findings suggest that it may be beneficial to utilize either intervention for individuals with UE hemiparesis during the acute stage of stroke.
- When selecting either VRT or MT as an intervention, the occupational therapy practitioner should base their decision on personal clinical knowledge, intervention resources, and the individual factors of the client.

Future Research

- Future research should utilize larger sample size to make the results more generalizable to larger populations.
- Research should focus what specific VRT and MT treatment protocols produce the best outcomes for clients during the acute stage of stroke.

Conclusion

- Upper extremity motor impairment during the acute stage of stroke can result in major dysfunction for self-care and other functional activities.
- Occupational therapy practitioners may utilize either virtual reality therapy and mirror therapy as interventions for individuals with UE hemiparesis during the acute stage of stroke depending on their own clinical expertise, resources, and the client they are working with.

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