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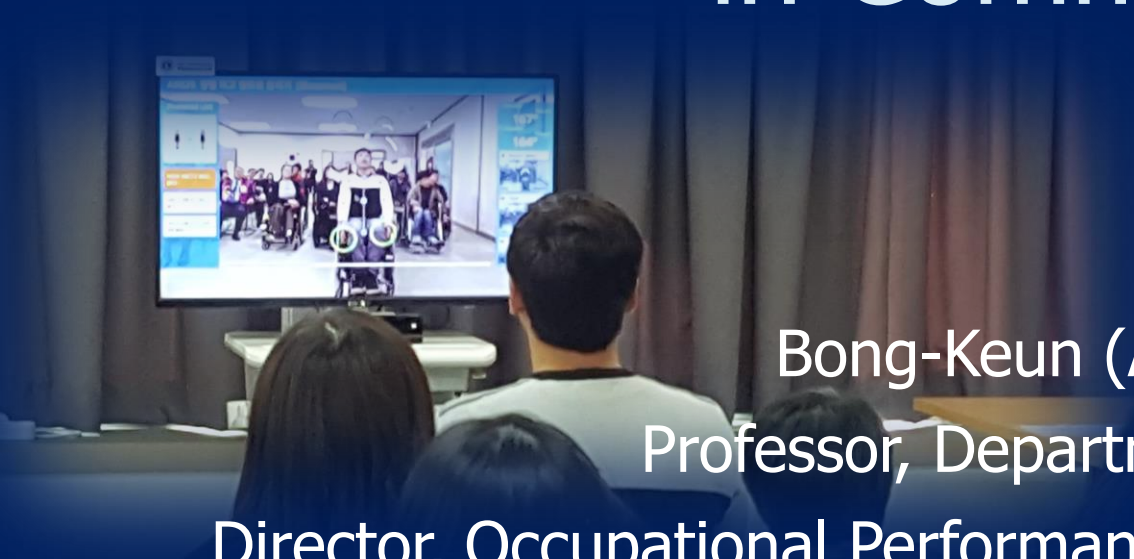
The Impact of Tele-Rehabilitation System on Health Promotion of People with Disabilities in Community settings



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Occupational Performance and Rehabilitation Engineering Laboratory
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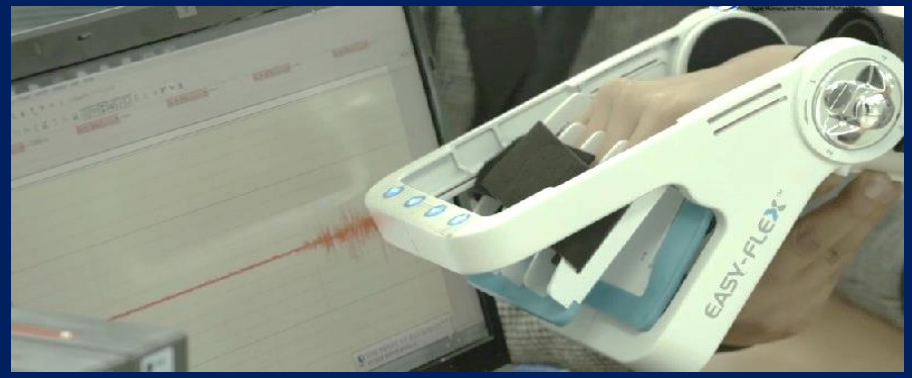
Education

University of Kansas (Cognitive Psychology)
Washington University School of Medicine in St.Louis (Occupational Therapy)
University of Wisconsin (Industrial Engineering)

Research Area

: Wearable Device, ICT accessibility, Rehab Robotics, Rehabilitation Engineering

ICTC RERC
ICT Convergence Rehabilitation Engineering Research Center



Outline

- Definition of Tele-Rehabilitation and Health Promotion
- Evidences related Tele-Rehabilitation
- Pilot study for PWD in community settings
- Summary
- Implementation of existing outcome

Definition of Tele-Rehabilitation

- The term, Tele-rehabilitation, was first used in late 1990s in literature to distinguish the application of ICT for the rehabilitation areas (Burns et al., 1998).
- TR is the clinical application of consultative, preventative, diagnostic, and therapeutic services via two-way interactive telecommunication technology.“ (AOTA, 2013)
- OT practitioners use tele-health as a **service delivery model** to help clients develop skills; incorporate assistive technology and adaptive techniques; modify work, home, or school environments; and create health-promoting habits and routines.

Definition of Health Promotion

"health is strongly influenced by [individuals] having choice and control in everyday occupations"

occupation is a determinant of health

Health promotion is a prevention strategy and the process of enabling people to increase control over, and improve, their overall health (WHO, 2017).

New Context in OT scope of practice

OCCUPATIONS	CLIENT FACTORS	PERFORMANCE SKILLS	PERFORMANCE PATTERNS	CONTEXTS AND ENVIRONMENTS
Activities of daily living (ADLs)* Instrumental activities of daily living (IADLs) Rest and sleep Education Work Play Leisure Social participation	Values, beliefs, and spirituality Body functions Body structures	Motor skills Process skills Social interaction skills	Habits Routines Rituals Roles	Cultural Personal Physical Social Temporal Virtual

*Also referred to as *basic activities of daily living (BADLs)* or *personal activities of daily living (PADLs)*.

Occupational Therapy Practice Framework (Domain & Process) 3rd Edition, (AJOT, 2014)

Virtual

- 'Virtual' context : interactions that occur in simulated, real-time, or near-time situations absent of physical contact.
- The virtual context is becoming increasingly important for clients as well as occupational therapy practitioners and other health care providers.
- Clients may require access to and the ability to use technology such as cell or smartphones, computers or tablets, and videogame consoles to carry out their daily routines and occupations.

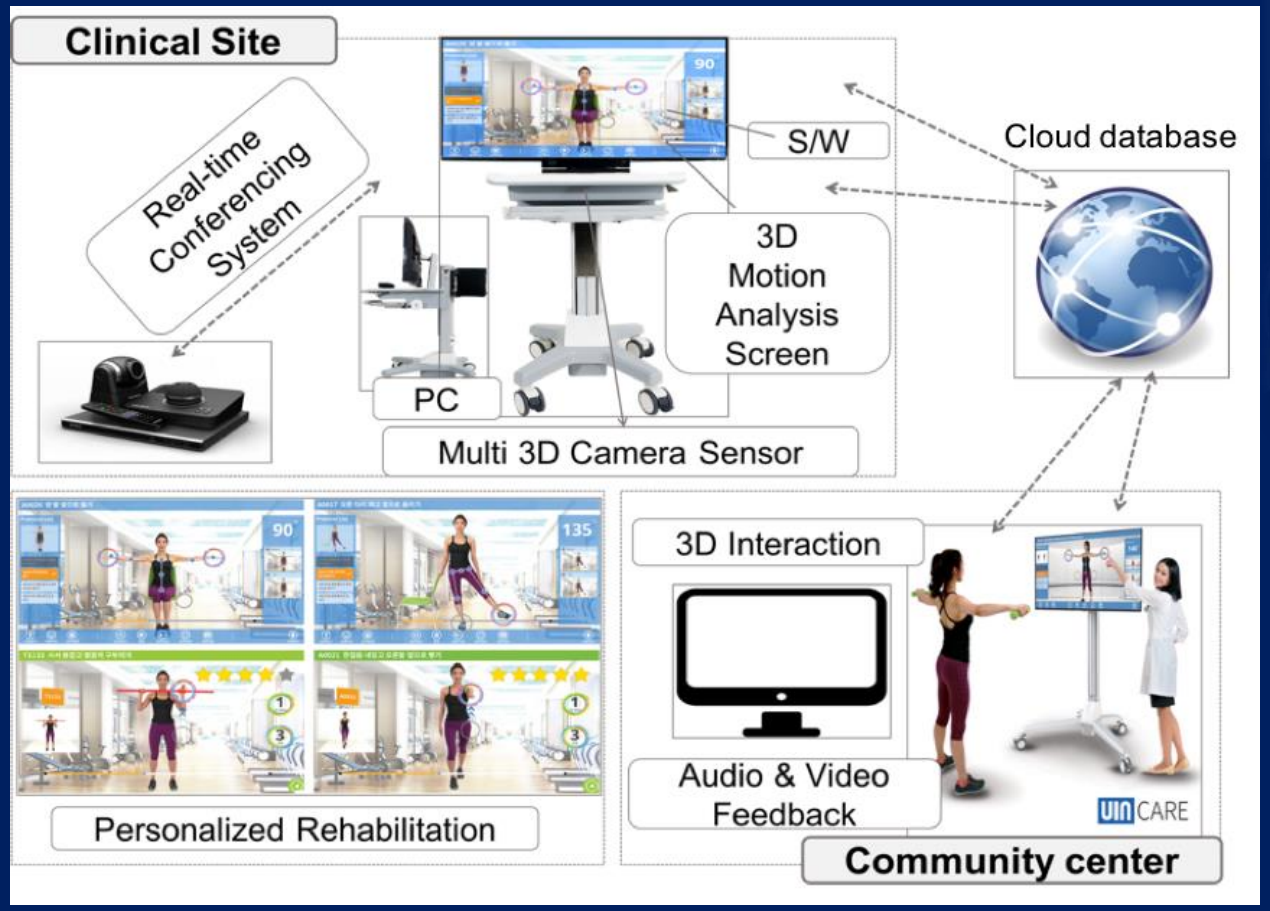
Evidences related to Tele-Rehabilitation

- Recent survey showed 78% of respondents had strong interest and positive acceptability of tele-rehabilitation for their health management and rehabilitation although most of respondents (74.7%) never heard of it (Jung, 2017)
- The remote place has been varied between hospital to client home, hospital to community based wellness center, or community based center to client home (Buckley, 2004; Holden, 2007; Piron, 2004; Lai, 2004; Pierce, 2004).

Evidences related to Tele-Rehabilitation

- Tele-rehabilitation was effective service model for rehabilitation for clients with brain injury, spinal cord injury, speech impairment, kidney impairment, and COPD, (Kairy et al., 2009).
- Tele-rehabilitation and findings show that one's confidence in the ability to manage a fall was increased (Chumbler et al., 2015) and quality of life and depression after stroke was improved (Linder et al., 2015) whereas TR is widely considered a useful and efficient rehabilitation service (Chumbler et al., 2012) for individuals with various neurological conditions including stroke and neuromuscular disabilities (Russell, 2007).

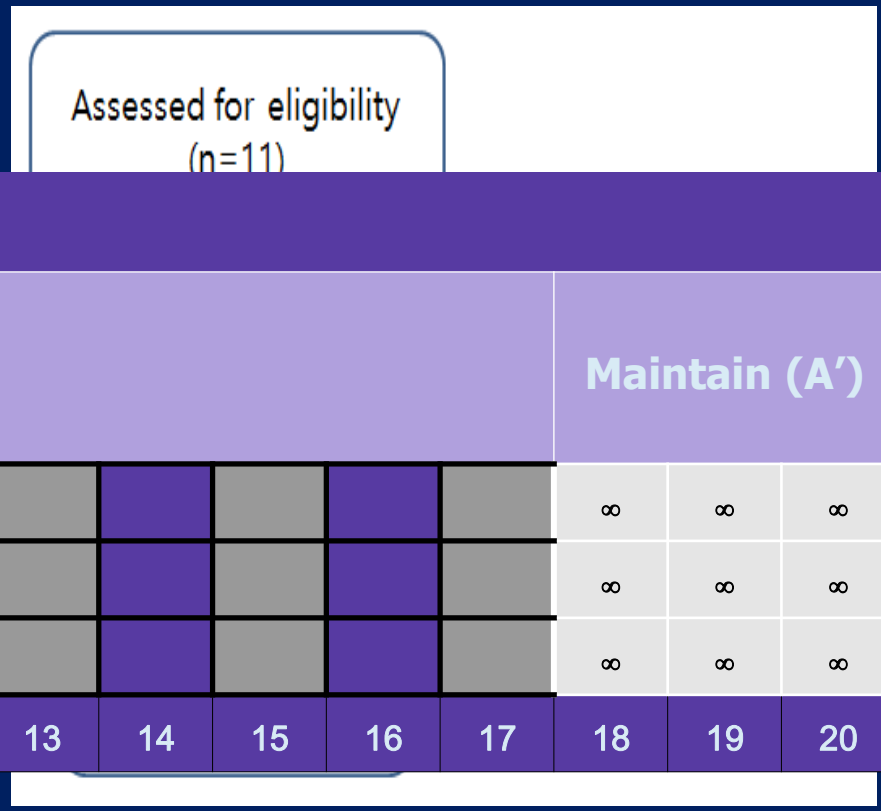
Pilot Study (System)



Class	Features
Health record management	• Log in for either healthcare professionals or general users • User management • Protocol management for rehabilitation training • Schedule management
Motion analysis	• Motion analysis system • Protocol design for individual users • Rehabilitation training protocol execution • Result analysis
Interactive rehabilitation training	• 300 kinds of rehabilitation training contents • Customization for rehabilitation protocol • Auditory and visual feedback with virtual avatar • 3D interaction technology and high quality guide video that react in real time to movements • The augmented feedback
Rehabilitation game	• 10 kinds of full 3D rehabilitation game training contents. • Control to suit the condition and function of each user (4 Level of difficulty in each game, control the training time) • Visualized results
Tele-consultation (TC)	• Video conferencing to communicate remotely (feedback and discussion on rehabilitation strategies)

Study Design

- Mixed Methodology (Quantitative & Qualitative)
- Multiple Baseline Across Single Subject
- Narrative Interview

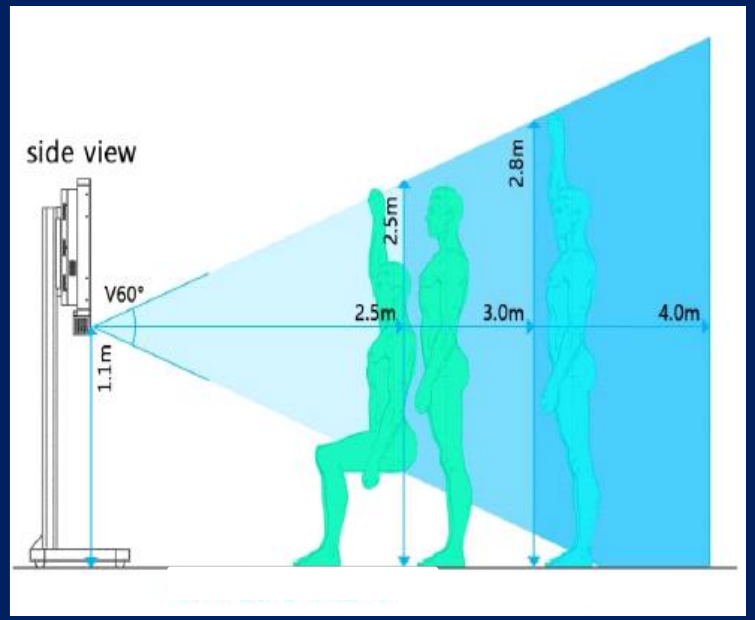


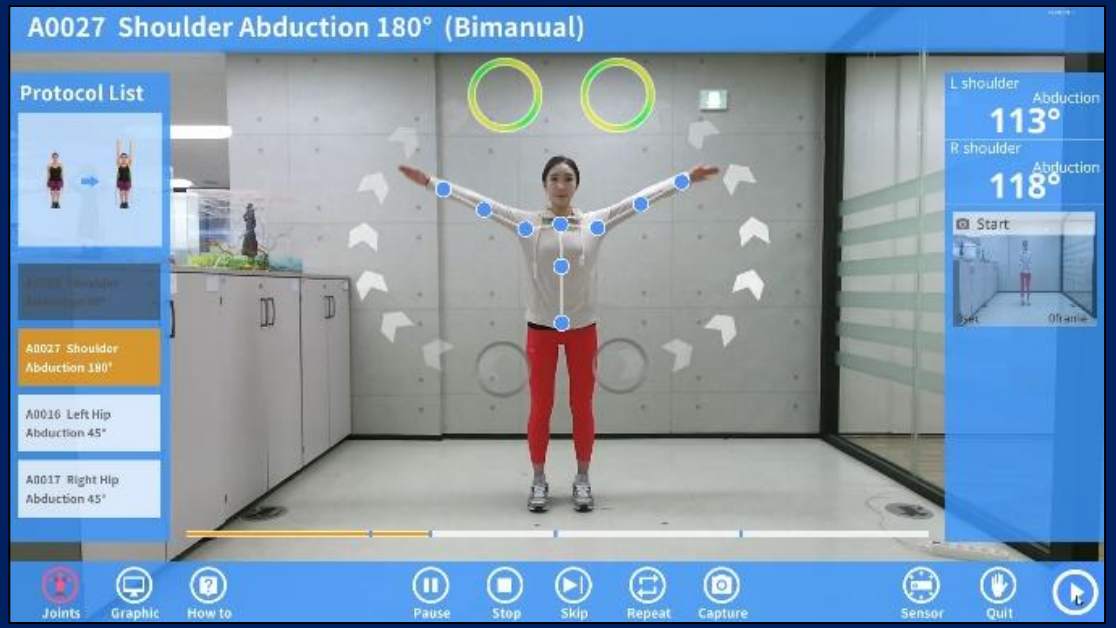
Research Design

Participants	Baseline (A)			Intervention (B)													Maintain (A')		
A	∞	∞	∞														∞	∞	∞
B	∞	∞	∞	∞	∞												∞	∞	∞
C	∞	∞	∞	∞	∞	∞	∞										∞	∞	∞
Session	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

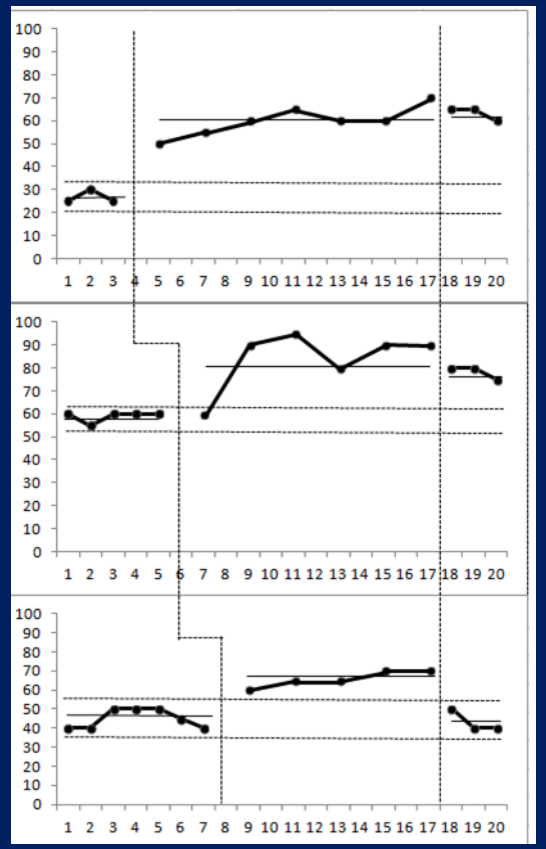
Outcome Measure

Health Promotion	Psychosocial (Perceived) Health	Self-Reported Health Status Assessment	EQ-5D-VAS
	Physical health	UE Function	MFT
		UE Strength	Grasp power
			ROM
QoL		SF-36	

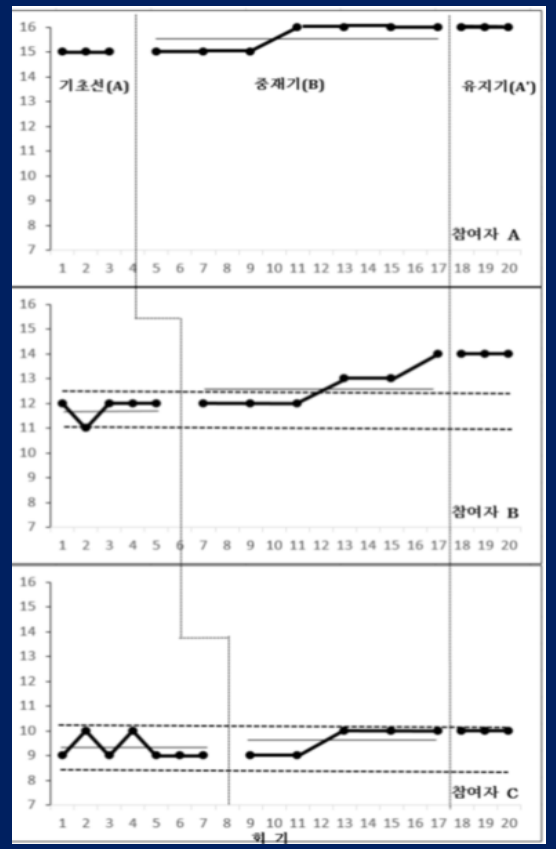




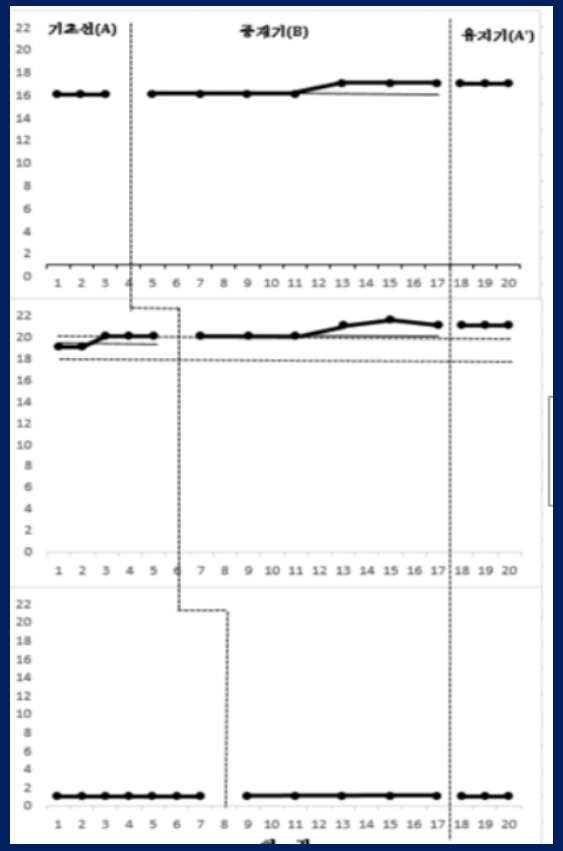
Study Results



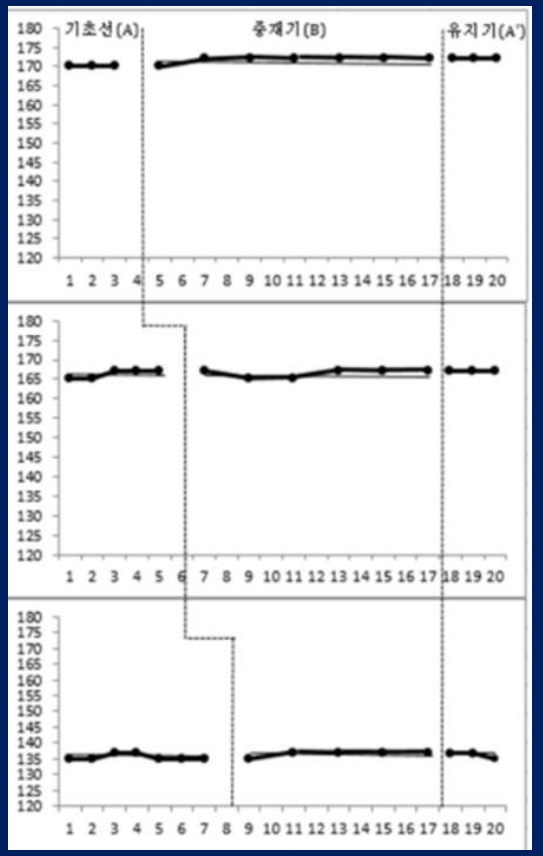
Perceived Health Status



UE Function



Strength



ROM

Study Results

Participant	Baseline (A)	Intervention (B)	Follow-up (A')
	M±SD	M±SD	M±SD
A	25.67±2.89	60.00±6.45	
			63.33±2.89
B	59.00±2.24	84.17±12.80	
			78.30±2.89
C	45.00±5.00	66.00±4.18	
			43.33±5.77

- Participant reported promoted health feeling and flexibility of body movement through tele-rehabilitation from self-reported health scale assessment
- No significant difference found in quantitative outcome measure
- Previous study (Giallauria, 2016) showed similar results in improvement of QoL after tele-rehabilitation including email feedback provided by therapists.

Summary

- Tele-rehabilitation can enhance opportunity for people with disabilities to engage in more occupation as well as more rehabilitation services with affordable cost.
- Participants showed a great amount of interest in new technology and thought tele-rehabilitation is affordable and convenient for their community based rehabilitation
- This new technology will change therapist and client collaborative strategy for occupational therapy
- Tele-rehabilitation (TR) can be a promising solution for future community based occupational therapy practice

Implementation

- Effective interpersonal communication skills
- Knowledge of emerging practice and technologies
- Standardization of OT Electronic Documentation
- Digitalization of OT practical and evaluation process
- Importance of the transition from medical model to social model (Community based rehabilitation) including real client's environment

Acknowledgement

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Thank You

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