Project Title

Efficacy, Feasibility and Cost-effectiveness of Parent Coaching via Telerehabilitation for Autism in Early Childhood

Project Lead and Members

Project lead: : A/Prof Isaac Sia Efficacy, Feasibility and Cost-effectiveness of Parent Coaching via Telerehabilitation for Autism in Early Childhood

Project members: A/Prof Chong Shang Chee, Dr Kang Ying Qi, Dr Aishworiya Ramkumar, Evania Yeo, Lee Huijun, Philina Lai

Organisation(s) Involved

Khoo Teck Puat-National University Children's Medical Institute, National University Health System

Healthcare Family Group(s) Involved in this Project

Medical, Allied Health

Applicable Specialty or Discipline

Pediatrics, Healthcare Administrator

Project Period

Start date: 1 January 2019

Completed date: 31 May 2023

Aims

- Is telerehabilitation as effective as standard care in improving short term outcomes for children with autism and their parents?
- How feasible and acceptable is telerehabilitation?
- Is telerehabilitation cost-effective relative to standard care?

Background

- Global increase in autism prevalence, with 1 in 100 children in Singapore with autism autism.
- Robust and growing evidence base demonstrating effectiveness of Naturalistic
- Developmental Behavioural Interventions 2, 3, 4
- Telerehabilitation has increased access to intervention services in rural or geographically large settings settings5. Other benefits include remote guided practice of therapeutic strategies strategies6 and reduced costs
- Preliminary evidence that telerehabilitation is comparable with face face-to -face intervention intervention7

Methods

See poster appended/ below

Results

See poster appended/ below

Conclusion

See poster appended/ below

Project Category

Technology

Digital Health, Telehealth, Tele-rehabilitation, Tele-consultation

Care & Process Redesign

Productivity, Cost Saving, Manhour Saving, Value Based Care, Functional Outcome

Care Continuum

Quality of Life

Keywords

Tele-rehabilitation, Proof of value, Functional outcome, Autism, Early Childhood

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Efficacy, Feasibility and Cost-effectiveness of Parent Coaching via Telerehabilitation for Autism in Early Childhood

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AIMS

- Is telerehabilitation as effective as standard care in improving short term outcomes for children with autism and their parents?
- How feasible and acceptable is telerehabilitation?
- Is telerehabilitation cost-effective relative to standard care?

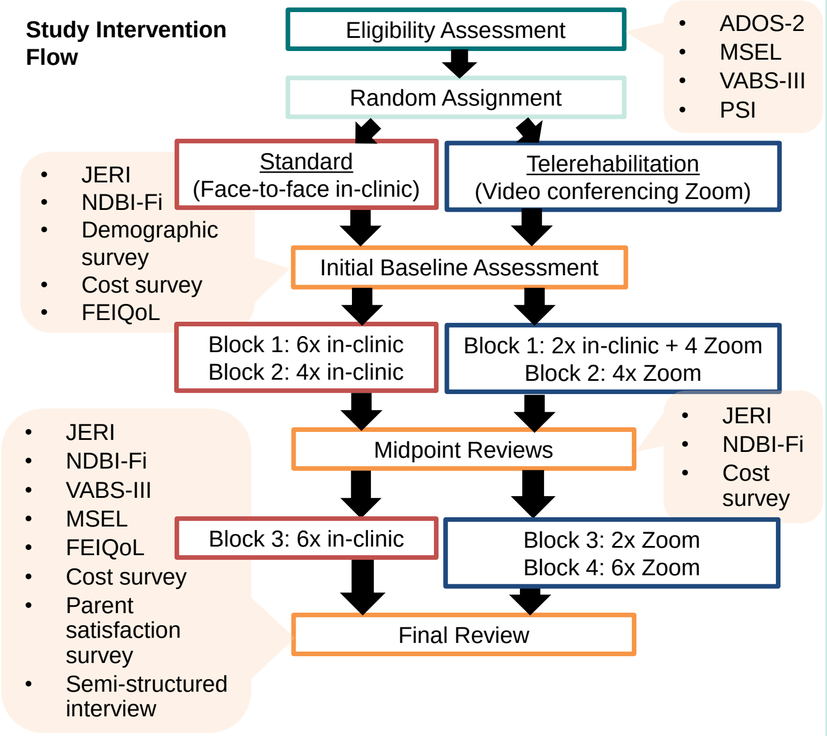
BACKGROUND

- Global increase in autism prevalence, with 1 in 100 children in Singapore with autism[1]
- Robust and growing evidence base demonstrating effectiveness of Naturalistic Developmental Behavioural Interventions[2, 3, 4]
- Telerehabilitation has increased access to intervention services in rural or geographically large settings[5]. Other benefits include remote guided practice of therapeutic strategies[6] and reduced costs
- Preliminary evidence that telerehabilitation is comparable with face-to-face intervention[7]

METHODOLOGY

- A parallel-group, randomised, controlled, non-inferiority trial was conducted from January 2019 to May 2023 (Published trial protocol)[8]
- Inclusion criteria: a) Children aged 15 – 48 months, b) Diagnosis of autism based on ADOS-2, c) At least one parent with access to the internet and is digitally literate
- Therapists coached parents on intervention strategies using an in-house therapy program based on the Foundational Skills Curriculum[9]

Study Intervention Flow



ADOS-2: Autism Diagnostic Observation Schedule-2
Primary outcome measure:
MSEL: Mullen Scales of Early Learning
Secondary outcome measures:
VABS-III: Vineland Adaptive Behaviour Scales
PSI: Parental Stress Index
JERI: Joint Engagement Rating Inventory
NDBI-Fi: Implementation fidelity of NDBI strategies by caregiver
FEIQoL: Families in Early Intervention Quality of Life
All other outcome measures were designed in accordance to study needs.

KEY FINDINGS

200 children (Mean age = 28.41 months, SD = 8.15; 69% male) were randomised into telerehabilitation (n=102) and standard care (n=98). Quantitative data used for analysis included data from the standard (n=68) and telerehabilitation (n=50) arms.

- *MSEL*: Improvement was observed in receptive language and overall Early Learning Composite (ELC). Telerehabilitation is **non-inferior based on 3 of 4 MSEL subscales (visual reception, fine motor and receptive language)**. It is **inconclusive** if telerehabilitation is non-inferior to standard care based on ELC and Expressive Language scores.

	Standard				Telerehabilitation			
	Baseline (n=98)	Final (n=68)	p	Cohen's d	Baseline (n=102)	Final (n=50)	p	Cohen's d
MSEL T-Score, Mean(SD)								
Visual Reception	31.2 (10.8)	35.1 (15.9)	0.438	0.29	31.4 (11.6)	34.2 (16.2)	0.082	0.20
Fine Motor	31.7 (11.6)	35.3 (16.0)	0.494	0.26	31.9 (11.9)	31.9 (16.1)	0.328	0.00
Receptive Language	26.4 (9.3)	32.9 (13.9)	**<0.001**	0.55	26.8 (9.7)	31.1 (12.6)	**<0.001**	0.38
Expressive Language	26.0 (9.4)	30.6 (10.4)	**<0.001**	0.46	26.5 (8.6)	27.8 (10.2)	0.237	0.14
Early Learning Composite (ELC)	62.5 (12.7)	70.7 (22.9)	**0.009**	0.44	61.6 (13.2)	67.2 (21.3)	**0.012**	0.32

- *VABS-III*: Strong evidence that telerehabilitation is **comparable** to standard care based on overall Adaptive Behaviour Composite and all subdomains of VABS-III, including the socialization subdomain.

	Standard				Telerehabilitation				p
	Baseline (n=98)	Final (n=68)	p	Cohen's d	Baseline (n=102)	Final (n=50)	p	Cohen's d	Difference
VABS-III, Mean (SD)									
Adaptive Behaviour Composite	69.1 (11.3)	78.5 (12.3)	**<0.001**	0.80	66.9 (10.8)	74.6 (12.3)	**<0.001**	0.67	0.948
Communication	61.6 (17.9)	77.5 (16.8)	**<0.001**	0.92	60.1 (18.6)	70.6 (18.3)	**<0.001**	0.57	0.728
Daily Living Skills	74.0 (15.4)	85.1 (14.7)	**<0.001**	0.74	70.6 (14.1)	82.9 (13.7)	**<0.001**	0.88	0.707
Socialisation	74.4 (12.5)	78.5 (12.4)	0.051	0.33	71.3 (11.0)	74.4 (12.3)	**0.004**	0.27	0.681

- *JERI*: Parents in both groups significantly and **comparatively** improved in joint engagement, an important precursor to language and social communication.
- *FEIQoL*: Increase in QoL **across both arms**, especially in access to information.
- *PSI*: No pre-post difference in parenting stress **across both arms**.
- *NDBI-Fi*: Parents in the telerehabilitation arm have **reached or are close to reaching fidelity** in carrying out the different NDBI strategies.

Cost	Standard	Telerehab
Therapy	$752.00	$602.80
Transportation	$296.90	$34.90
Productivity Loss from Transportation Time	$388.30	$49.20
Productivity Loss from Therapy Time	$419.00	$265.30
Total Program Cost	$1,856.20	$952.20
Interventionist Time	$1,267.00	$898.00
Space Rental	$61.00	$26.00
Total Healthcare System Cost	$1,328.00	$924.00

- **Overall cost reduction of 48.8% and 30.4% for telerehabilitation** in total program and healthcare system costs respectively.
  a) **Direct (i.e. therapy) and indirect (i.e. transportation and productivity loss) cost savings**
  b) **Manpower time and rental cost savings** for healthcare provider

Qualitative themes from interview	
High acceptability	Reduced cost, time and travel
	Eliminated challenges of commuting
	Positive experience with therapist's guidance
Limited feasibility	Home environment: Familiar but unconducive
	Video conferencing: Constraints in therapist's guidance, difficulties in observing interaction, distracted by device

- Telerehabilitation was **highly acceptable** to parents with **some limitations in feasibility**
- *Parent satisfaction survey*: **Majority** of parents in telerehab **agreed that the program helped their child's learning**

CONCLUSION

- Telerehabilitation was largely comparable to standard care (face-to-face intervention) based on child, parent and parent-child outcomes
- This alternative platform for coaching parents of children with autism has cost savings and is acceptable to parents
- Future studies could explore designing a hybrid program to optimise the benefits of both face-to-face and telerehabilitation sessions for parent coaching

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