Application of the International Classification of Functioning, Disability, and Health (ICF) on interdisciplinary Case Management for Healthcare Service Delivery for Individuals with Disabilities

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1. Introduction

Conventional community-based rehabilitation services for people with disabilities are often not delivered in a client-centered or timely manner to meet the service users' needs. Different professional disciplines often plan and provide interventions separately. This proposed study thus aims to integrate the Rehab-Cycle® case management model, based on the International Classification of Functioning, Disability, and Health (ICF) framework proposed by the World Health Organization (WHO), into interdisciplinary case management and services. In view of the societal needs to enhance the communication rehabilitation service management for people with intellectual disability, this study aims to establish an ICF-based case management inspired by the Rehab-Cycle® for service users with intellectual disabilities in the community centers run by the non-governmental organizations. The participants' rehabilitation outcomes and interdisciplinary management team effectiveness will be examined to assess the efficacy of the interdisciplinary ICF-based case management.

According to the American Psychiatric Association (APA, 2013), a person with an intelligence quotient (IQ) between 50 and 69 would be classified as having a mild intellectual disability. The comorbidity of ID and ASD is 3.8 to 8.6 per 1000 births (Van Naarden Braun et al., 2015). Another study conducted by Buckley et al. (2020) showed that the comorbidity of ID and ADHD was found to be 30%. From a pathological perspective, intellectual disabilities arise from genetic and neurodevelopmental factors leading to cognitive dysfunctions and maladaptive behaviors (Leonard et al., 2022; Reddihough et al, 2021). In spite of variations across individuals, these would include difficulties with reasoning, problem-solving, communication, and independent living skills. These deficits may not be static but alter across time and depend on social interaction of a person with intellectual disabilities and environmental influence. For the

environmental aspect, individuals with intellectual disabilities often face barriers in education, employment, and community participation. The biopsychosocial model emphasizes that supportive environments—such as inclusive schooling, accessible workplaces, and family/community engagement—can mitigate functional limitations and enhance participation, while stigmatizing or inaccessible contexts exacerbate disability (Norwich, 2016; Whelpley et al., 2023)

One of the challenges in community-based rehabilitation in Hong Kong is that training and services may not be delivered in a personalized or comprehensive manner to meet the needs of service users with various disabilities, including those with intellectual disabilities. Conventional care management may not enable interdisciplinary professionals to assess, set goals and provide interventions conjointly. The Persons with Disabilities and Rehabilitation Programme Plan (RPP; Rehabilitation Advisory Committee, 2020) published by the Hong Kong SAR Government recommends the application of International Classification of Functioning, Disability, and Health (ICF) in various social welfare and rehabilitation services planning. The use of ICF can promote more comprehensive and interdisciplinary services to meet the personalized needs of people with various disabilities living in the community. As proposed by WHO (2001), the ICF framework enables a holistic assessment of healthcare service users' bodily functions, level of activity, capacity to participate and physical and personal contexts (Bickenbach et al., 1999; Reinhardt et al., 2010). It conceptualizes human disability as a continuum of problems in functioning, varying across life situations and environments. This can help determine the service needs of people with disabilities and prioritize services.

The ICF system provides an integrated framework to describe health conditions by considering biology, functional and psychosocial environmental factors and to

promote the integration of multifaceted perspectives, rather than a single diagnostic orientation. Further studies should be conducted to standardize relevant categories in ID core sets for clinical research and care (Bölte et al., 2021). The ICF framework has been applied in different healthcare contexts to provide a more holistic understanding of different populations with special needs in the community, such as people with spinal cord injury, the ageing population, neurological conditions and chronic conditions (Alford et al., 2015; Arnadottir et al., 2011). Studies also suggested that the ICF framework and the ICF-based assessments for bodily functions, activity and participation levels would serve as useful tools to provide researchers, clinicians and policymakers with profiles of functions for different people with various disabilities and socioeconomic statuses (Scherer & Dicowden, 2008; Schraner et al., 2008; Stucki et al., 2002). In the Asia regions, the development of the ICF framework is relatively mature in Taiwan. Before 2007, disability assessment was mainly driven by the medical model. Since 2012, under the Rights Protection Act, eligibility for disability benefits has been determined based on the ICF framework. Chiu et al. (2013) designed the evaluation tool: Functional Scale of Disability Evaluation System (FUNDES) based on ICF/ICF-CY, WHO Disability Assessment Schedule 2.0 (WHODAS 2.0) and the Child and Family Follow-up Survey (CFFS). Under the new system, different welfare services were allocated to patients (basic welfare, parking permits, financial support, assistive technologies, caregiver support, nursing/rehab at home, etc.). The results suggest that using ICF provides a common language that links evaluation, needs assessment, and reallocation of welfare resources.

The process of Rehab-Cycle®, and its former version, the Rehabilitation Cycle, were first brought up by Stucki and Sangha (1998). Steiner et al. (2002) developed a "Rehabilitation Problem-Solving Form" (RPS-Form) by extending the application of

Rehab-Cycle®. The RPS-Form serves as an assessment sheet which therapists can adapt to examine the patient's bodily functions. In recent years, based on the article on “How to apply the ICF for rehabilitation management in clinical practice” by Rauch et al., (2008), WHO also proposed the case management process of the Rehab-Cycle®. It provides guidelines to integrate ICF-based assessments, profiles and interventions in interdisciplinary clinical practice and offers the ICF-based tools for interdisciplinary teams to obtain the functioning of clients to plan functioning-oriented rehabilitation services.

Recently, the Social Welfare Department of the Hong Kong Government advocates the incorporation of the ICF framework in the social welfare and rehabilitation services based on the RPP’s recommendation. Yet, studies on the allocation of social or healthcare services using the ICF in Hong Kong are limited. The study’s mission will be to apply the ICF framework to understand the needs of people with disabilities and provide comprehensive healthcare interventions and services to people with disabilities in the community based on the guidelines and procedures suggested in the Rehab-Cycle® (Rauch et al., 2008). A few studies have reported the benefits of applying the ICF framework or the Rehab-Cycle® to case management for community-based clients (Rauch et al., 2008; Schiariti et al., 2015; Thyson et al., 2024). The results suggested that applying the ICF framework has the potential to identify client service needs for social and rehabilitation services, thereby providing more personalized treatment for individuals with various disabilities. Yet, the ICF framework has not been commonly applied on a widespread basis to the social welfare or healthcare system.

1.1 Significance of the Proposed Study

The short-term impact of this proposed study is that ICF-based interdisciplinary care management will be trialed in the community rehabilitation services in NGOs in line with the ICF-based applications encouraged by the Social Welfare Department.

The mid-term impact would be that the needs of service users will be more personalized by providing them with more timely and tailor-made interventions. Their functioning levels in the community would be enhanced and their burden on social services would be alleviated.

The long-term impact would be that the ICF-application on rehabilitation and social services in various NGOs would be promoted. The experiences in different NGOs will inform the HKSAR Government to advance the reforms of the rehabilitation and social welfare services in Hong Kong and to meet the international healthcare policy standard as promoted by the WHO.

1.2 Objectives

The objectives of the study will be:

1. To establish the ICF-based assessments using WHO core-sets for clients with intellectual disabilities receiving community-based rehabilitation in non-government organizations;
2. To establish the procedure of the interdisciplinary ICF-based care management based on the procedure of the Rehab-Cycle® (Rauch et al., 2008);
3. To implement interdisciplinary ICF-based case management for the clients with intellectual disabilities, including client assessment, goal setting, intervention planning, and outcome evaluation;
4. To evaluate the effectiveness of interdisciplinary ICF-based case management on the activity level and participation level of clients with intellectual disability;

5. To examine the effectiveness of interdisciplinary teams under the ICF-based case management approach.

2. Methods

2.1 Design

A randomized controlled trial design with two-point pre- and post-measurements of the selected outcomes will be adopted for this study. A total of 120 participants with intellectual disabilities will be randomized into (1) ICF-based care management group with interdisciplinary Rehab-Cycle® process (Rauch et al., 2008) (n = 60) and (2) conventional care management group without interdisciplinary Rehab-Cycle® process (n = 60). ICF-based functional status and life satisfaction outcomes will be captured before and after both groups have received services. The team effectiveness of the interdisciplinary professions in case management will also be obtained before and after both types of interventions.

Participants

Both service users and serving professionals will be recruited to the study.

For service users, 120 participants with intellectual disabilities will be recruited from community-based centres (such as District Support Centres, Vocational Advancement Centres, Day Centres and hostels) operated by collaborative non-governmental organizations (NGOs). The inclusion criteria of the participants will be: (1) between the age of 18 and 60 years old, (2) intellectual disability with mild grade (IQ 50-69) or moderate grade (IQ 35-49) as confirmed by medical doctors, (3) ability to communicate verbally in Cantonese or English. The exclusion criteria will be: (1) acute and unstable medical conditions (such as seizures), (2) Current or recent diagnosis of

severe psychiatric disorders (e.g., active psychosis, major depressive episode within the past 12 months, or other conditions that significantly impair participation). Individuals with well-managed or stable mental health conditions will not be excluded. Their caregivers will provide proxy consent if the participants with intellectual disability were unable to give the informed consent. On the other hand, professionals in the interdisciplinary rehabilitation team will be recruited from the collaborative NGOs. Fifteen healthcare team members with professional disciplinaries from the participating NGOs. The professional professors will include (but will not be limited to) social workers, occupational therapists, physiotherapists, speech therapists, nurses and clinical psychologists.

Ethics approval will be obtained through the Departmental Ethics Committee (Ref: XXXXX) before the commencement of the proposed study.

2.3 Procedure

The ICF-based assessments and interventions in this study will be developed based on the Rehab-Cycle® (Rauch et al., 2008). The processes will include (1) establishment of ICF core set and clinical assessments, (2) participants allocation to the ICF-based group and the conventional group, (3) description of a client's problems and assets, (4) establishment of mutually agreed rehabilitation goals and (5) formulation and implementation of interdisciplinary interventions.

(1) Establishment of ICF Core Set - The Neurodevelopment Core Set for Intellectual Condition is formed based on the ICF core sets from "Autism Comprehensive", "Autism Common Brief", "Autism Adult Brief", "ADHD Comprehensive", "ADHD Common Brief" and "ADHD Adult Brief". The relevant ICF items will be selected by expert panels with different professional disciplines, including physiotherapists, occupational therapists, nurses

and healthcare researchers. A comprehensive list of items will be developed to evaluate. The experts will conduct at least two rounds of panel review of selected ICF items of the established ICF Core Sets using the Delphi method (Hasson et al. 2025) to identify representative ICF items and achieve consensus. In each round, an anonymous online questionnaire will be sent to the experts through Qualtrics. The questionnaire would collect the options of the experts on the appropriateness of the selected core sets; related items of the selected core sets; and assessments which are suitable to measure the core sets. Assessments applied by participating NGOs recently are also adopted for consideration, such as WHODAS 2.0. After collecting the data, statistical analysis will be undertaken to highlight areas of consensus and divergence. Finally, a concise consensus report is produced to list items with achieved consensus, which will be applied in this study.

(2) Participant allocation to the ICF-based group and the conventional group – The study will be conducted at the participants' current training facilities. This is a randomized controlled trial; participants will be randomly assigned to an experimental group or a control group. Following the Rehab-Cycle®, the experimental group will receive interdisciplinary ICF-related interventions integrated into their daily training context. On the other hand, those who are allocated to the control group will receive conventional training offered by different healthcare professionals.

(3) Description of a client's problems and assets - Participants will be assessed by the outcome measures on body functions, activity and participation level and environmental influence before and after the intervention. For the experimental group, the standardized assessments on activity capacity and participation engagement will be selected based on the newly established ICF Core Set. In order to develop the ICF Category Profile of each participant's function status, interviews and standardized assessments of the selected ICF items will be conducted by the interdisciplinary teams. The assessment sheet will include a

"conversion chart" to align all professionals' scoring. For the control group, the same assessments will be implemented by different professionals, but no ICF Category Profile will be generated by the subsequent interdisciplinary intervention planning.

(4) Establishment of mutually agreed rehabilitation goals – For the participants in the experimental group, based on the profile of the functioning identified and interviews with a client, an interdisciplinary meeting will be conducted among participating healthcare team members to set the personal goals of the interdisciplinary individualized treatment plans for a client. Based on personal goals, different professional disciplines will determine and prioritize the short- and long-term rehabilitation goals, which will be further confirmed and agreed upon by the client as the service user. This interdisciplinary ICF-based intervention planning enables different disciplinary teams to work in a conjoint manner to enhance and/or maintain the functioning and environmental aspects for facilitating each service user's activity and participation levels. For the participants in the control group, the goal setting will be developed individually by different healthcare professionals.

(5) Formulation and Implementation of interdisciplinary *interventions* - For the experimental group, using the ICF Interventions Table (Rauch et al., 2008), interventions, roles and resources within an interdisciplinary team could be planned and implemented in a coordinated manner for each service user. The introduction of the ICF training programme would coordinate with concurrent training. For example, clients with four days of conventional training will increase to five days of training, while one day is ICF-based training. Regular interdisciplinary meetings will be conducted to evaluate the effectiveness of the implemented rehabilitative interventions. For the control group, the interventions will be provided by different healthcare professionals without the conjoint manner.

2.4 Outcome Measures

Outcome measures will be used to obtain the body functions, activity capacity and performance and environmental influence of the participants with intellectual disability as the service users and the effectiveness of the interdisciplinary team members before and after the ICF-based rehabilitative plan will be implemented.

(1) *ICF-based assessments of the core set items.* The selected core set items will be used to assess (a) body functions (b117 intellectual function), (b) activity capacity and participation performance in daily living (e.g. basic interpersonal interactions) and (c) environmental and personal influence (e.g. e310 immediate family). The ICF 5-point qualifier will be used based on the converted results of the corresponding assessments with a scale from 0 (no problem) to 4 (complete problem).

(2) *Satisfaction with Life Scale (SWLS).* The SWLS a brief 5-item self-report measure assessing global cognitive judgments of life satisfaction (Diener et al., 1985). Each item is rated on a **7-point Likert scale** from 1 ("strongly disagree") to 7 ("strongly agree"), producing a total score between 5 and 35, with higher scores reflecting greater satisfaction. The scale captures cognitive judgments rather than emotional states, making it suitable for diverse populations. Research consistently demonstrates strong **psychometric properties**, including high internal consistency, good test–retest reliability, and solid construct validity across cultures and age groups. With its robust measurement performance, the SWLS is a widely used tool in health, rehabilitation, and social science research.

(3) *World Health Organization Quality of Life Scale - Brief Version (WHOQOL-BREF)*. The WHOQOL-BREF assesses four domains of quality of life, including physical health, psychological health, social relationships, and environment (The WHOQOL Group, 1998). It is a 26-item self-report measure that assesses perceived

quality of life across four domains: physical health, psychological well-being, social relationships, and environment. Items are rated on a 5-point Likert scale, with domain scores transformed to a 0–100 scale, where higher scores indicate better quality of life. Developed for cross-cultural applicability, the WHOQOL-BREF has been validated internationally and demonstrates strong psychometric properties, including good internal consistency, stable factor structure, and solid construct validity across diverse populations.

(4) *Provider-Perceptions of Team Effectiveness (Provider-PTE)* - to assess healthcare providers' perceptions of the effectiveness of the interdisciplinary team in the context of ICF-based implementation (Kilpatrick, 2019). It is a brief self-report measure designed to assess healthcare providers' perceptions of how well their interprofessional team functions in delivering coordinated, high-quality care. The scale evaluates key dimensions such as communication, role clarity, shared goals, collaboration, and overall team functioning, typically using Likert-type response options that capture the degree to which providers agree with statements about team processes and performance. Research demonstrates that the Provider-PTE has solid psychometric properties, including good internal consistency and construct validity, and is sensitive to variations in team dynamics across clinical settings. Its brevity, clarity, and focus on frontline provider experience make it a practical tool for evaluating team-based care initiatives and monitoring improvements in interprofessional collaboration.

2.6 Statistical Analysis

Descriptive analysis will be used to calculate the mean and standard deviation of age, gender, comorbidity of the participants with ID. Repeated measures ANOVA with a model of

group × time will be computed to examine the main and interaction effects of the ICF-based interventions on participants with intellectual disability and healthcare professional team in terms of the outcomes, i.e. ICF-based assessments of the core set items, SWLS, WHOQOL-BREF and Provider-PTE

3. Safety

The rehabilitation services will not cause any risk to participants with intellectual disability. Participants may experience emotional fluctuation and fatigue during the study. They will be given breaks whenever they need them. Other risk minimization measures include regular monitoring, scheduled interdisciplinary meetings, and adaptive interventions.

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