Online Prehabilitation for Patients Awaiting Liver Transplantation

A multicentre randomized control trial to reduce physical frailty and improve health outcomes

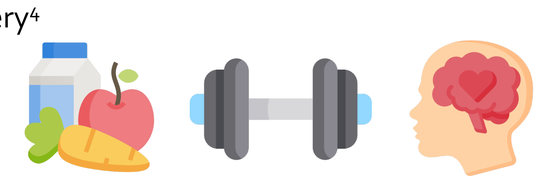
Christofer Cruz, Carla M Prado, Margaret McNeely*, Puneeta Tandon* on behalf of all OPAL Investigators

UNIVERSITY OF ALBERTA

(1) Introduction

- Liver transplantation is the only curative option for patients with decompensated liver cirrhosis[1]
- Physical frailty is common in patients awaiting liver transplantation and has been associated with poor health outcomes[2]

- Approximately 1 in 4 transplant-listed patients either die while waiting for liver transplant or are de-listed because they are too ill or physically deconditioned for the stressors of transplantation[3]
- Given the unpredictable wait time for liver transplant for many individuals, **multidimensional prehabilitation programs** have gained attention to combat frailty prior to surgery[4]



- Current literature of prehabilitation in cirrhosis are limited to small and short studies and no randomized control trials have evaluated digital or app based solutions for prehabilitation

(2) Objectives

Primary Objective: To determine the benefits of a 12-week virtually supervised and web platform-based prehabilitation program in patients awaiting liver transplant (n=177) across five major transplant programs compared to usual care on functional capacity as measured by the sit-to-stand test (time to do 5 chair stands)

Secondary Objectives:

- Determining the benefits on liver frailty, covert hepatic encephalopathy, and quality of life
- Assess whether behavioural factors will predict adherence to program exercise and nutrition goals
- Explore the impact on malnutrition, sarcopenia, virtual testing outcomes, wait list outcomes, post-transplant outcomes and cost of care

(3) Methods

Setting

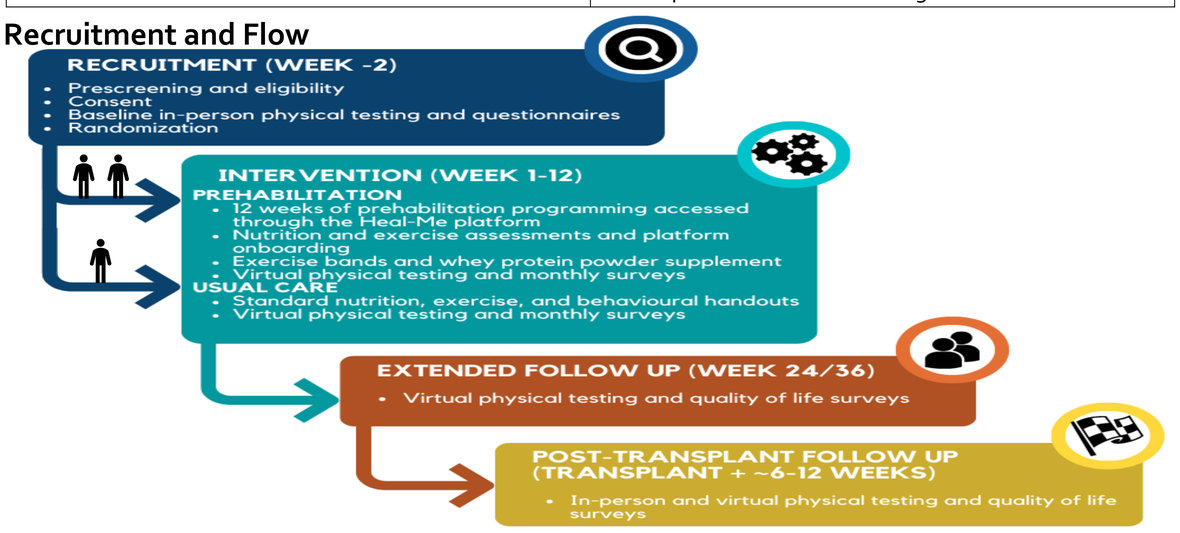
This multi-centre randomized controlled trial will be completed across six major liver transplant programs in Canada

Participants

Participants involved in this study will be liver transplant candidates with cirrhosis who are receiving care at one of the six liver transplant programs

Inclusion Criteria	Exclusion Criteria
• Adults ≥18 with cirrhosis • Listed or worked up with high likelihood to be listed • Pre-frail or frail on liver frailty index • English/French language proficiency • Own an internet connected device	• Listed for living related donor or model for end-stage liver disease score – sodium >26 • Robust on liver frailty index • Unable to provided informed consent • Presence of a clinical condition that makes exercise unsafe or infeasible • Life expectancy <6 months or compassionate care • Recent variceal bleed or not on adequate prophylaxis • Transplant indication is cholangiocarcinoma

Recruitment and Flow



(4) Methods (con't)

Intervention

Intervention Arm (Prehabilitation) - n= ~118

Nutrition

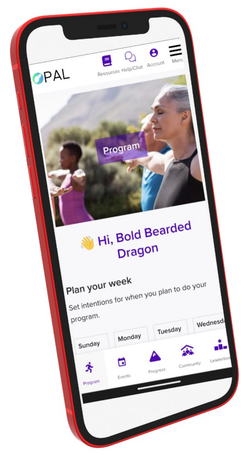
- Customized protein target (1.2-1.5 g/kg/day)
- Nutrition assessment, 5 virtual nutrition classes, Nutrition follow ups based on malnutrition risk
- Whey protein powder supplement with dosage based on malnutrition

Exercise

- 3 exercise sessions weekly (combination of virtual exercise classes and follow along videos)
- Exercise assessment

Acceptance and Commitment Therapy

- Weekly educational videos and content developed by a Registered Psychologist



Control Arm (Usual Care) - n = ~58

- Standard nutrition, exercise, and behavioural handouts

Outcomes and Measures

Primary – Physical function via Sit-to-Stand Test

Secondary

- Liver Frailty via Liver Frailty Index
- Physical function via 6-minute walk test
- Covert Hepatic Encephalopathy via the EncephalApp Stroop Test
- Quality of life via Chronic Liver Disease Questionnaire, EuroQOL EQ-5D-5L and Visual Analog Scale
- Behavioural information via 6-item COM-B survey

Exploratory

- Sarcopenia via calf circumference
- Virtual physical testing (30s sit-to-stand, 2-min step test, single leg balance test)
- Clinical health outcomes
- Economic Evaluation via healthcare usage survey
- Peri- and Post-transplant outcomes
- Malnutrition via PG-SGA and dietary intake
- Adherence to the prehabilitation program
- Adverse Events
- Qualitative Acceptability Data (n=~30)

Data Collection

Quantitative data will be collected at baseline, end of trial at week 12 and every 12 weeks after the trial completion (up to 6 months). A subset of patients who receive liver transplant will also have data collected ~6-12 weeks post transplant.

Qualitative data on participant experiences with the OPAL program will be collected from optional qualitative interviews conducted at the end of study.

Data Analysis

Descriptive statistics will be conducted for all quantitative variables and all analyses will adhere to the intention-to-treat principle. Primary and secondary outcomes will be analyzed by linear models with random effects, adjusted for baseline score as a covariate.

Qualitative data will be analyzed inductively with a theoretical thematic approach.

(5) Results

Recruitment is underway at the Alberta (June 2023), Toronto (April 2024), and London sites (May 2024). Ethics is approved at the Vancouver Site (June 2024) and French translation and ethics review is underway at the Montreal site.

Recruitment Progress

50 participants randomized (58% male)

Average age: 58 years

Average LFI: 4.0

Average Child-Pugh: 8.6

Average MELD-Na: 16.0

(6) Conclusion

This multi-centre study will be the largest CIHR funded prehabilitation randomized controlled trial in patients with cirrhosis awaiting liver transplantation and will help reduce the gaps in the area to improve patient care for future transplant candidates.

(7) Acknowledgements

Funding for this research was provided by a project grant from the Canadian Institutes of Health Research (Proo125367, NCTo5899231). Contact: Chris Cruz @ cdcruz@ualberta.ca

References: https://docs.google.com/document/d/1_a6LFiJKoGQZLBBhUgKWEpJp7peHjl_G/edit?usp=sharing&ouid=115391504866397625703&rtpof=true&sd=true