Using Technology-Enabled AVOID Frailty Care Model to Promote Brain Health Sun, W., Quevedo, A., Sarah, P., Sara, E,. & Inguino, R. *Gerontechnology* 25(s)

Purpose Frailty is a common clinical syndrome in older adults that carries an increased risk for poor health outcomes including falls, incident disability, hospitalization, and mortality [1]. It is estimated that more than 1.1 million Ontario older adults may be living with frailty by 2040, requiring more than 3.7 million health care visits annually, a volume well-beyond current service supply [2]. Recent literature revealed that individuals with pre-frailty and frailty were at a higher risk of dementia incidence even after adjusting for a wide range of confounding factors [1]. Older adults living with dementia are at high risk of experiencing cognitive frailty, which is a combination of physical frailty and cognitive impairment and is associated with functional decline in older adults [3]. Therefore, it is imperative that early multi-domain preventive and management strategies of cognitive frailty are required to decrease further functional decline and promote independence in older adults living with dementia. **Method** In September 2019, Canadian Frailty Network (CFN) launched the Activity & Exercise, Vaccination, Optimization of medications, Interaction & Socialization, and Diet & Nutrition (AVOID) Frailty public health campaign to promote assessing and reducing risk factors leading to the development of frailty. Using the principles of AVOID Frailty Program for Healthy Aging from CFN, our project focuses on strengthening the integration of evidence-based AVOID Frailty solutions into Durham Region Adult Day Program and Long-Term Care (LTC), with the aim of evaluating the effectiveness of using technology and innovations to promote the management and prevention of frailty for diverse groups of people with dementia (PWD). Using mixed methods through pre-post Quasi-Experimental Design and qualitative interviews, we will conduct co-design sessions and pilot testing on the usability and clinical efficacy of multi-modal AVOID prototypes on the reduction of frailty for PWD and their caregivers in the physical, cognitive and psycho-social domains, with the following research questions: What is the clinical effectiveness of technology-enabled AVOID Frailty interventions on the level of physical and cognitive frailty among older adults with mild to moderate stage of dementia as measured by Clinical Frailty Scale and Montreal Cognitive Assessment (MoCA)? The target dosage of 30-minute for each intervention will be implemented 5x per week for a duration of 4 weeks for a sample size of 10 participants in LTC. **Results** 1**. Activity**: Tai Chi was found to be an effective form of exercise to reduce markers of frailty in older age. A virtual reality (VR)-based Tai Chi exergaming were used for PWD and caregivers and allowed for cooperative play to promote social interaction. This rehabilitative intervention includes digital coaching, education, and self-monitoring of Tai-Chi exercise program to reduce functional decline, depressive symptoms, with improvements in mobility and frailty, while Fitbit Sense is used to keep track of their activity levels and sleep hygiene. 2**. Vaccinate**: Frailty increases the susceptibility to influenza and respiratory infections. We utilized infection control exergame for PWD to educate handwashing practices and promote Influenza vaccine uptake. This exergame employed virtual reality-based motion sensor to elicit user engagement with feedback provided to PWD to facilitate handwashing, while delivering educational content to address vaccine hesitancy. 3. **Optimize Meds**: EMPOWER educational resources were found to be effective to support deprescribing by reducing harmful medications, such as benzodiazepines in community-dwelling older adults with mild cognitive impairment. We utilized EMPOWER Deprescribing App to educate PWD about deprescribing of inappropriate medications to address polypharmacy and support medication optimization, in partnership with the Canadian Medication Appropriateness and Deprescribing Network. 4**. Interact:** Frailty was found to be associated with cognitive impairment and memory decline. Reminiscence therapy is an effective cognitive rehabilitation treatment for PWD and we developed a virtual reality reminiscence application for PWD to promote their cognitive function and memory recall. Virtual reality reminiscence experiences facilitated the management of responsive behaviors, which can enrich therapeutic conversations, and support positive social interactions. 5. **Diet and Nutrition**: Reduced sodium intake is an important target for dietary intervention of frailty. We utilized a web-based dietary sodium screening tool for personalized assessment and feedback of diet and nutrition, as well as assessing the amount and sources of sodium in PWD's diet to promote healthy nutrition. **Discussion** Our project seeks to co-create, implement and evaluate a holistic, evidence-informed AVOID Frailty Care Model with the goal of building capacity through participatory co-design processes and translation of evidence-based practices to promote healthy aging and dementia care. This research will provide evidence for the clinical effectiveness of a non-pharmacological intervention model of care, focusing on prevention and reduction of physical and cognitive frailty for people living with dementia. It will also promote our understanding about the potential impact of using Activity, Vaccination, Optimizing Meds, Interaction, Diet and Nutrition as a bundled approach to maximizing the use of non-pharmacological interventions with the goal of improving the quality of life for older Canadians living with dementia, including the challenges related to their risks for falls, sleep hygiene, responsive behaviors, depression, social isolation, polypharmacy, chronic and infectious diseases.

References

1.Provincial Geriatrics Leadership Ontario (2024). Frailty Estimates by Census Division and Ontario Health Region. https://geriatricsontario.ca/resources/frailty-estimates-by-census-division-and-ontario-health-region/
2.Wang X, Hu J, Wu D. Risk factors for frailty in older adults. Medicine (Baltimore). 2022 Aug 26;101(34):e30169. doi: 10.1097/MD.0000000000030169. PMID: 36042657; PMCID: PMC9410572.
3.Bai, G., Wang, Y., Kuja-Halkola, R. et al. Frailty and the risk of dementia: is the association explained by shared environmental and genetic factors?. BMC Med 19, 248 (2021).

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