

Background: Agitation and aggression (AA) occur frequently in patients with dementia (PwD), and cause distress to PwD and caregivers. This study will investigate whether physiological parameters, such as actigraphy, heart rate variability, temperature, and electrodermal activity, measured via wearable sensors, correlate with AA in PwD. It will also explore whether these parameters could be compiled to create a pre-agitation biometric marker capable of predicting episodes of AA in PwD.

Methods: This study will take place at Ontario Shores Centre for Mental Health Sciences. Thirty inpatient participants who are inpatients, males, and females, aged 60 or older, with clinically significant AA, and diagnosis of Major Neurocognitive Disorder will be recruited. Participants will wear the device for 48 to 72 hours on three occasions during an 8-week study period. Participant demographics and clinical measures used to assess behavior will be collected at specific time intervals during the study period.

Ceiling mounted cameras and clinical data are collected to annotate episodes of AA, which will allow identification of peripheral physiological markers “signature” unique to the patient

Results: the algorithm connecting wearable devices, cloud and cameras was tested on healthy volunteers and demonstrated feasibility and reliability. The feasibility of implementation in PwD has been demonstrated in our sample of PwD previously in a sample of 6 participants. Feasibility in this larger sample will be assessed. Correlation analysis between physiological measures, camera capture of agitation onset and clinical measures will be calculated to identify agitation events and pre-agitation triggers. Various machine learning and features extraction/exploration techniques will be used to test whether physiological measures can detect exact time of agitation and predict pre-agitation triggers. This study will provide a reasonable estimation of sample size needed to detect a meaningful effect size, which will be determined from the prediction model.

Conclusion: Early detection of AA in PwD will allow caregivers to offer timely and personalized interventions which will help avoid crises and critical incidents and improve quality of life in PwD and their caregivers.

Using Simulation-Based Learning (Gamified Educational Network) to Provide Micro-credentialing for Dementia Care Workers

Authors: Sun, Winnie, Chiu, Mary, & Burhan, A.M.

Background: Dementia care is a critical area of need in the community and institutional settings, with estimated one-third of seniors younger than 80 years of age with dementia living in institutional settings and this proportion increases to 42% for those 80 years and older in Canada. It is of critical importance to promote excellence and best practices in dementia care by preparing for well-trained dementia workforce through capacity building.

Methods: This project developed a dementia care micro-credential education to enable competency development of new graduates and upskilling of workers through simulation-based learning. This micro-credential program leveraged interdisciplinary partnership, to develop nine core modules related to best practices in dementia care, facilitated with a Gamified Educational Network (GEN). GEN is an evidence-based learning management platform that provides learners with a simulated and immersive experience to engage them in a virtual learning environment that allows for rich experiential interaction with other users and its content.

Outcome: Face and content validity was established by an inter-professional committee including geriatric psychiatry, nursing, social work, occupational therapy, behavioral therapy, knowledge mobilization and simulation education experts. Next phase will begin to establish construct validity. It is expected that GEN will have a positive impact on increasing learner’s motivation and engagement in the educational tasks, as well as improving learner’s competencies

and outcomes through its multi-modal approaches, including gamification (usage of game-based elements in a non-game context to engage learners and promote learning), active observational practice, independent hands-on practice, case-based discussion, peer-to-peer assessment, expert facilitated feedback, skills debriefing and reflective practice.

Conclusion: This micro-credential program will provide an enhanced dementia care curriculum for building capacity of existing workers, and those entering into the workforce to promote a dementia-friendly environment for older adults.

Using Virtual Reality to Facilitate Reminiscence Therapy for People with Dementia

Authors: Sun, Winnie. & Burhan, Amer .M.

Background: Reminiscence therapy (RT) is a multi-sensory treatment that uses a combination of sight, touch, taste, smell and sound to help people with dementia (PWD) remember events, people and places from their past lives. Currently, digital technologies such as mobile applications and immersive solutions including virtual and augmented reality, are gaining momentum as supplementary tools for RT. This paper presents a usability study of a web-based and virtual reality application to understand the limitations and opportunities of digital platforms for facilitating engaging experiences for PWD towards recalling memories, while easing the therapy process for the caregivers.

Methods: A total of fifteen healthcare caregivers were recruited from the Geriatric Dementia Unit and Geriatric Transitional Unit in Ontario Shores Center for Mental Health Sciences, Ontario Canada. Usability feedback from the caregivers were collected from the interviews after the completion of the System Usability Scale (SUS) questionnaire.

Results: Healthcare caregivers found both web-based and virtual reality (VRRT) usable with SUS score above average (68/100), but required improvements related to the onboarding training of caregivers. The interview revealed four overarching themes related to the VRRT: (1) Ease of use; (2) Positive impact on caregiving; (3) Potential reduction in behavioral symptoms; (4) Feasibility of promoting social connection during COVID-19 pandemic.

Conclusion: Next steps will focus on improving the user experience and expanding the application for immersive VR supporting head-mounted displays, hand tracking, and physiological measures, as well as conducting a usability study with PWD to expand our understanding of using RT digital tools with various levels of immersion.

Virtual reality to provide caregiver skill development and problem solving

Authors: Chiu, Mary and Burhan Amer M.

Background: Caring for persons with dementia (PWD) leads to disproportionate vulnerability to physical, mental, and social adverse health consequences among caregivers (CGs). The VR-SIMS CARERS Initiative aims to engage Knowledge Users (KUs), older adults and community stakeholders in the co-design of a Virtual Reality (VR) simulation training environment for dementia caregivers, and to explore end-user's perspectives, design and implementation challenges and opportunities (e.g. digital literacy, technology readiness, VR acceptability), to ensure that the resulting "Minimally Viable Prototype" is clinically efficacious, scalable and sustainable.

Objectives & Methodology: The specific objectives of this study are to:

1. employ a co-design approach to develop and validate an immersive VR simulation training environment for CGs to be in touch with realities of caregiving, practice communications and behavioural management of PWD based on the well-established CARERS Program;