

S13: Technology enabled care for neuropsychiatric symptoms of dementia: implementation at the point of care

Authors: Amer M. Burhan, Winnie Sun, Mary Chiu, Samira Choudhury, Abeer Badawi, and Khalid Elgazzar

Symposium Overview:

Neuropsychiatric symptoms of dementia (NPSD) are diverse and prevalent group of symptoms that impose significant challenge for people living with dementia (PLWD), their caregivers, and the system of care. Quality standards in all jurisdictions stipulate that individualized, non-pharmacological intervention for NPSD needs to be provided to PLWD before pharmacological interventions are used due to modest effect size and the risks involved in using the latter. Implementation of individualized non-pharmacological plan of care face many challenges including limited staffing, issues with skill development in formal and informal caregivers, difficulty in achieving individualization of behavioral plans with precision, issues with environmental design to name few. To that end, technology has been proposed to address some of these challenges with significant promise at the proof-of-concept level but real-life implementation remains limited.

At the Ontario Shores Centre for Mental Health Sciences in Whitby, Ontario, in collaboration with Ontario Tech University, we have established the “Advancement for Dementia Care Centre”, whereby technological solutions are tested at the point of care considering implementation challenges and engaging formal and informal caregivers in the co-design and implementation of these interventions.

In this symposium, we aim to provide a framework for the successful implementation of different technological solutions for PLWD and NPSD and present the design and preliminary data from four projects that use technology to facilitate standardized, individualized non-pharmacological care for PLWD and their caregivers. The symposium will have 4 talks:

- 1- Rationale and review of technological solutions to detect emotional distress in PLWD
- 2- virtual reality to provide reminiscence therapy for PLWD
- 3- virtual reality to provide caregiver skill development and problem solving
- 4- the use of simulation platform to provide microcredentialing of health care providers

The objectives of this symposium are:

- 1- discuss opportunities and challenges related to implementing technological solutions for NPSD at the point of care
- 2- discuss a framework for co-designing technological solutions with caregivers at the point of care
- 3- discuss rationale and preliminary findings of 4 projects implemented at the point of care for PLWD presenting with NPSD

This symposium is presented by a multi-ethnic, interprofessional panel including earlier career knowledge mobilization caregiver intervention scientist, a mid career nurse PhD scientist, and a senior clinician investigator geriatric psychiatrist representing a large collaboration team including technology developers, caregivers, engineers, knowledge users and clinicians.

Identifying pre-agitation biometric signature in patients with dementia: A feasibility study

Authors: Choudhury, Samira, Badawi, Abeer, Elgazzar, Khalid, and Burhan Amer M.

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