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A Smart Homes Concept for Transitional Apartments

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Purpose:

Smart technologies to support the delivery of mental health care services, such as smartphone applications, have been found to be useful for people living with mental illness in the community (Forchuk et al., 2015). For some individuals with more serious and persistent symptoms of illnesses, such technologies may need to be built into the lived environment rather than portable devices. However, two reviews have revealed that there is a lack of evaluation of smart technology within a health care context (Garafalo & Nathan-Roberts, 2016; Martin et al., 2008). The objective of this exploratory study is to gain insight into the use of a smart homes concept for individuals with mental illness. This study will employ transitional hospital-based apartments for prototype testing and to prepare people for discharge. After a successful previous trial by Corring, Campbell and Rudnick (2012), this study is currently investigating the feasibility of implementing further smart home based technology to determine whether further modifications are required prior to wide-scale community use. This innovative use of technology may be one such strategy in increasing lines of communication between participants and their health care providers, and to provide prompts and reminders related to activities of living particularly for persons with cognitive deficits associated with their mental illness. This study will provide and test smart technology devices to support mental functions such as memory, and enhance independence through self-assessment. In our prior studies, an increase in cognitive functioning and a significant increase in perceptions of community integration were reported by participants provided with mobile devices in residential mental health programs (Corring et al., 2015). In addition, it is hypothesized that the intervention will assist participants nearing discharge into the community with greater support for successful integration by facilitating independence. This has also been supported in previous research after one study provided mobile devices equipped with the Lawson SMART Record to adults with mental illness. The results indicated a 48.6% reduction in hospitalizations and 57% fewer outpatient visits after 18 months. Moreover, the number of arrests and encounters with the judicial system dropped to only 1.1% of the sample at 18 months, compared to 6.8% at baseline (Forchuk et al., 2015).

Methods:

Up to 20 participants (aged 18-85) who are inpatients and requiring a transitional period prior to discharge in order to determine eligibility for independent community living will be recruited. This study will include participants with psychotic or mood disorders. Participants will be provided with screen devices such as smartphones, tablets and smart mirrors which will allow for video-conferencing capabilities. The devices

will be installed with the Collaborative Health Record program, developed by InputHealth, which can send self-completed questionnaires and assessments directly to their health care providers. These smart technologies will be linked to the Lawson Integrated DataBase which is programmed to transmit reminders and prompts to the participant in conjunction with their unique care plan. Prompts can include reminders to take medication at the prescribed times, assistance with routines for personal and environmental hygiene, reminders of appointments with health care providers or any other message that the client thinks would be helpful. Health adjunct Bluetooth-enabled monitors such as blood pressure monitors, heart rate monitors, weigh scales, glucometers, medication dispensers, and sensor floor mats will also be made available as required. Participants are allowed to select their preferred screen devices and health adjunct monitors based on their health needs. The research team will use a mixed-methods design consisting of quantitative and qualitative research methods to assess the perceptions and health of the participants, as well as the feasibility of the technology. Upon a one week minimum stay in the apartment, participants will complete a semi-structured interview with research staff. It is anticipated based on previous tenants that participants will average approximately one month in the transitional apartment. This will be followed up with a 6-month interview post-discharge. Focus groups will be conducted with hospital staff to further evaluate the feasibility of the smart technologies.

Results:

The transitional apartments at two psychiatric inpatients facilities will be fully equipped with the smart technology by January 2018. Both of these facilities operate under the same mental health program. Quantitative findings will include an analysis of the Perception of Smart Technology tool, the Housing History Survey Form, the Community Integration Questionnaire, the EQ-5D Health Utilities Index, Short Form-36, and the Health, Social, Justice Service Use Questionnaire. These measures will be analysed to indicate potential changes in self-reported health, perceptions of community integration, experiences with social service and judicial systems. Qualitative findings will be observed using thematic analysis of the open-ended questions from the participant interviews and focus group discussions with hospital staff. Themes identified from these interviews and focus groups will inform the research team of the specific advantages and disadvantages the smart technologies provide.

Conclusion:

This study is being conducted to assess the feasibility and practicability of using smart technology for individuals with mental illness. It is envisaged that this study will provide vital information that will enhance the intervention prior to wide-scale adoption of the technology among participants in the community. The implications of this study could inform health policy and decision makers to adopt smart home concepts into mental health care and/or treatment plans. This study could change how mental health care is delivered and could allow for greater efficiency by allowing health care providers to serve more individuals. It is hoped that providing the smart homes may increase the participants' autonomy and community tenure as well as allowing earlier interventions to prevent crises such as psychiatric emergency room visits and re-admissions.

Title:

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Keywords:

Mental Health, Mobile Health and Smart Technology

References:

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Abstract Summary:

A study investigating the implementation of a Smart Homes concept to support inpatients with mental illness living in transitional apartments in a hospital setting. This study will aim to demonstrate the uses of smart technology and how these can support successful community reintegration and improve self-reported health outcomes.

Content Outline:

Introduction

The objective of this study is to assess the feasibility of the technology and to ascertain potential improvements to the intervention prior to community deployment. Furthermore the study will assess to what degree the intervention can assist participants with successful community integration.

Main Body

Participants will be provided with smart technology devices including smartphones, tablets, and smart mirrors. These devices will be equipped with software that allows for messaging, self-assessments and secure video-conferencing with health care providers. This study aims to investigate the feasibility of the technology and the software provided.

The study will also help participants to prepare for independent living upon discharge into the community. The addition of smart technology will be assessed to ascertain their usefulness for successful integration.

The study will adopt a mixed-methods design to assess feasibility and evaluate the perception of technology use among patients and health care providers. Quantitative findings will include an analysis of the Perception of Smart Technology tool, the Housing History Survey Form, the Community Integration Questionnaire, the EQ-5D Health Utilities Index, Short Form-36, and the Health, Social, Justice Service

Use Questionnaire. Thematic analysis will be used for open-ended questions and focus group discussions. This will provide the researchers with quantitative and qualitative data as to the feasibility and efficacy of the smart technologies. These results will be discussed.

Conclusions

It is envisaged that this study will enhance the intervention before wider-scale adoption of the technology in the community and encourage greater independence for participants. Long term implications could include being able to effectively serve more individuals with mental illness, and prevent homelessness and criminalization of the population under study. This concept could also inform future nursing research including the reduction of staff burnout through reduced travel times and the number of psychiatric emergency room visits.

First Primary Presenting Author

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Cheryl Forchuk, PhD, RN
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Professional Experience: Dr. Cheryl Forchuk was inducted in 1988 and in 1995 received an Excellence in Nursing Leadership Award from Iota Omicron Chapter. Dr. Forchuk was co-chair for the National Nursing Research Conference which was jointly sponsored by the Canadian Association of Schools of Nursing and Iota Omicron Chapter of Sigma Theta Tau, held in London Ontario in 2004. Dr. Forchuk's research has focused on therapeutic relationships.
Author Summary: Dr. Forchuk is a Scientist and Assistant Director for the Lawson Health Research Institute. She is a Distinguished University Professor and Associate Director of Nursing Research at the Arthur Labatt Family School of Nursing (Western University). Her research explores systems issues related to mental health care including implementation of the transitional discharge model, housing/homelessness issues, poverty, community integration and the use of technology in mental health.

Second Author

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Professional Experience: 2017-Present - Vice President of Research, Thunder Bay Regional Health Sciences Centre, Ontario, Canada. 2017-2021 - External Adjunct Professor, Department of Health Sciences, Faculty of Health and Behavioural Sciences, Lakehead University, Ontario, Canada. 2016 - Fellowship, Canadian Psychiatric Association, Toronto, Ontario, Canada. 2015 - Michael Smith Research Award, Schizophrenia Society of Canada, Ottawa, Ontario, Canada. 2014-2018 - Adjunct Professor, School of Leadership Studies, Faculty of Social and Applied Sciences, Royal Roads University, Victoria, British Columbia.
Author Summary: Dr. Abraham (Rami) Rudnick is a Canadian-based certified psychiatrist and a PhD-

trained philosopher with an extensive research background in psychosocial rehabilitation, bioethics, mental health ethics, and social determinants of mental health. Dr. Rudnick has published widely on bioethics and psychiatric/psychosocial rehabilitation, including the use of smart technology for, by and with people who have serious mental illness.

Third Author

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Professional Experience: 1996-Present - Owner and Operator of Client Perspectives, provides consultant services to a variety of customers regarding mental health care service delivery. 2016-2017 - Consultant at St. Joseph's Health Care and Project lead for Operational Feasibility stage of MH Feasibility Project. 1982-2015 - Project Lead, Mental Health Transformation & Clinical Program Director at St. Joseph's Health Care
Author Summary: Dr. Corring has worked in the mental health care field since 1972, as a clinician, an administrator and as a researcher. Dr. Corring has tested the use of smart technology in a simulated apartment within a tertiary care facility where clients were readying themselves for discharge, and has evaluated the use of web based software that was designed to provide cognitive cues using smartphones to residents in a treatment rehabilitation residence in the community.

Fourth Author

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Professional Experience: 2014-Present - Adjunct Professor, Western University, London, Ontario, Canada. 2013-Present - Chief Medical Officer, InputHealth Systems Inc, Toronto, Ontario, Canada. 2013-Present - Founder/Chief of Division, Woodstock General Hospital, Hospitalist Department, Woodstock, Ontario, Canada. 2011-2013 - Part Time Associate Professor, McMaster University, Hamilton, Ontario, Canada.
Author Summary: Dr. Puneet Seth is a physician and Chief Medical Officer for InputHealth Systems Inc. Dr. Seth and his team have developed a software program that enhances communication between patients and health care providers through secure video conferencing, self-assessment questionnaires, and messaging.

Any relevant financial relationships? Yes

Relationship	Description of Potential Conflict
Product	Company of employment, InputHealth Systems Inc, developed and provided the software to be used in this study.

Signed on 12/08/2017 by *Puneet Seth*

Fifth Author

Elisabeth Van Bussel, MD
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Professional Experience: 2010-Present - Associate Professor, Department of Psychiatry, Division of Geriatric, Schulich School of Medicine & Dentistry, Western University. 2000-Present - Psychiatrist, St. Joseph's Health Care / Regional Mental Health Care-London, Geriatric Psychiatry Program, London, Ontario, Canada.
Author Summary: Dr. Elisabeth Van Bussel is involved with academic pursuits in the areas of interprofessional education research and knowledge translation, evaluation of technology implementation to support individuals with mental illness, and service delivery models for senior mental health care. Dr. Van Bussel has expertise in understanding clinical and functional ability of individuals with mental illness and how implementation of technology may support them in their environment.

Sixth Author

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Professional Experience: Present - Associate Professor, Western University, London, Ontario, Canada. 2013 - First rank for the clinical effectiveness in the National Clinical Governance in Iran. 2011-2015 - Lecturer and instructor, Module in Medical Ethics, Faculty of Medicine, MUMS, Mashhad, Iran. 2010-2015 - Course Director of Morning Reports, Ibn-e-Sina University Hospital, MUMS, Mashhad, Iran. 1999 - Top rank in the National Psychiatry Board Exam, Tehran, Iran.
Author Summary: Dr. Naghmeh Mokhber is currently involved in academic pursuits in the areas of forensic psychiatry and neurocognition. Her recent research has focused on the executive function of patients with schizophrenia, the prevalence of adult attention-deficit hyperactivity disorder among forensic psychiatry inpatients, and violence and mania induced by antidepressant medications. Dr. Mokhber's previous research has also investigated depression, post-traumatic stress disorder, and anxiety as well as dementia and stroke.

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Professional Experience: Present - Assistant Professor in General Psychiatry, Western University, London, Ontario, Canada. 2017-Present - Adult Psychiatrist Strathroy-Middlesex Assertive Community Treatment Team, Strathroy, Ontario, Canada. 2016 - Fellow of The Royal Australian and New Zealand College of Psychiatrists. 2011-2016 - Psychiatry trainee with Royal Australian and New Zealand College

of Psychiatrists. 2010 - Senior Resident Medical Officer, General Rotations, Campbell Town Hospital, Sydney South West Area Health Network, University of Sydney, NSW, Australia.
Author Summary: Dr. Sujata Ojha's current clinical role involves the provision of clinical care to the Strathroy-Middlesex Assertive Community Treatment (ACT) team. The ACT team serves clients with complex severe persistent mental illnesses requiring intensive community support. Dr. Ojha provides inpatient care at Parkwood Institute to the ACT clients when they require psychiatric admission and assistance towards a safe discharge plan to be transitioned back to the community.

Eighth Author

Jodi Younger, MSc, MASc

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Professional Experience: 2017-Present - Vice-President of Patient Care and Quality, St. Joseph's Health Care, London, Ontario, Canada. 2015 - St. Joseph's Miracle Worker Award, St. Joseph's Health Care, Hamilton, Ontario, Canada. 2014 - Champion of Professional Practice Award of Excellence, St. Joseph's Health Care, Hamilton, Ontario, Canada. 2007-Present - Clinical Director, St. Joseph's Health Care, Hamilton, Ontario, Canada. 2000-2007 - Operational Service Manager, St. Joseph's Health Care, Hamilton, Ontario, Canada. 1991-2000 - Psychometrist, Hamilton Psychiatric Hospital, Hamilton, Ontario, Canada.
Author Summary: Jodi Younger is vastly experienced in the field of mental health care. Currently, Ms. Younger's role as Vice-President is to continuously explore new ways of improving and evolving the current health care systems in place and develop impactful yet cost-effective solutions. Ms. Younger has previously worked as a clinical director of general psychiatry and addiction services, and was responsible for withdrawal management, treatment and aftercare addiction programming for men and women across southern Ontario.

Ninth Author

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Professional Experience: 2008-Present - Executive Director, Ontario Peer Development Initiative, Toronto, Ontario, Canada. 2006-2009 - Instructor, Psychosocial Rehabilitation, Mohawk College, Hamilton, Ontario, Canada. 2000-2008 - Executive Director, Mental Health Rights Coalition, Hamilton, Ontario, Canada.
Author Summary: Deborrah Sherman is the Executive Director of the Ontario Peer Development Initiative (OPDI), an organization of consumer/survivor initiatives and peer support organizations for the education and empowerment of consumers and survivors of the Mental Health System across Ontario. The OPDI provides educational and social support of consumer/survivors of the mental health system and opportunities for successful experiences.

Tenth Author

Jeffrey Reiss, MD
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Professional Experience: 2017-present - Chair (Interim), Department of Psychiatry, Schulich School of Medicine & Dentistry, Western University. 2017-present - Chief (Interim), Mental Health Care Programs, London Health Sciences Centre and St. Joseph's Health Care, London, ON. 2012–2016 - Vice Chair, Department of Psychiatry, Schulich School of Medicine & Dentistry, Western University. 2012 – Awarded Distinguished Fellowship status in the Canadian Psychiatric Association for exemplary contributions to Psychiatry. 2007 – Elected to Distinguished Fellowship of the American Psychiatric Association for exceptional contributions to Psychiatry. 2003 – Hero of Mental Health Award, Canadian Mental Health Association, Manitoba Division.

Author Summary: Dr. Reiss has been recognized by both the Canadian and American Psychiatric Associations by them each bestowing upon him the status of Distinguished Fellow. Dr. Reiss pioneered the usage of telemedicine and continues to be engaged in the applications of technology to clinical systems. Throughout his over 30-year career in Psychiatry, he has maintained an active practice in general psychiatry, including being the Medical Director of a program for people with schizophrenia of long-standing duration.