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Protocol of a multi-phase study on telemedicine for older adults in primary care

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Protocol of a multi-phase study on telemedicine for older adults in primary care

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ABSTRACT

Introduction Telemedicine (TM) has been adopted by many health authorities to limit unnecessary exposure during COVID-19. Prior to the pandemic, TM was associated with improvement of quality of life of older patients, low hospital admissions and nursing home placement, and high overall patients' satisfaction due to convenience. However, older adults may face challenges to access TM, such as hearing, visual and cognitive decline, and limited access to Internet and devices. Ongoing vaccination campaign and sanitary measures are keeping the pandemic under control, but new variants threaten public safety. Specific recommendations on TM use in high-risk populations, such as older adults, are therefore required. **Methods and analysis** To assess the challenges of TM use in the routine primary healthcare practice of older adults. The research objective is to examine the potential effect of TM; 1) to describe the evidence of TM, 2) to understand the patients, caregivers, and clinicians' experiences with TM use and 3) to develop practice- and evidence-based recommendations on effective use of TM. Multi-phase design: 1) systematic mixed studies review on the evidence of TM use, 2) qualitative descriptive study on the experiences of the patients, caregivers, and healthcare professionals. Recommendations will be proposed based on the integration of both studies. In accordance with PRISMA statement, the systematic mixed studies review will be conducted through multiple databases search: MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, Cochrane Library. Population studied: Community-dwelling 65 years and older adults using two-way synchronous TM by phone or video in a primary care setting. The qualitative descriptive study will include individual interviews with older adults from four McGill university affiliated primary care practices and focus groups with their healthcare professionals. **Ethics and dissemination** Ethics approval has been received. Results will inform healthcare professionals and policymakers on sustainable use of TM in primary care for older adults.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This will be a first comprehensive multi-phase study on TM in primary care for older adults
- Inclusion of the studies in a systematic review regardless of their design will allow to evaluate various outcomes
- The results of a systematic review will inform a qualitative study to examine TM in more details
- This is the first study that is designed to produce the recommendation for TM for older adults in routine primary care practice
- Exclusion of papers not published in English, French or Russian may miss the important additional findings

INTRODUCTION

The COVID-19 pandemic has considerably transformed the lives of older adults and the delivery of primary care services. The use of telemedicine (TM) is now universal in our healthcare system. The World Health Organization defines TM as a delivery system of health care services using different modalities embedded in the realms of information and communication technologies.[1] The use of TM will most probably remain after the pandemic given its important advantages such as "advance health care ranging from individual to population levels, by allowing exchange of patient information for diagnosis, management, primary care prevention and education of physicians via distance learning".[1] Before the COVID-19 pandemic, TM was used unfrequently as an alternative to the traditional in-person care, but the pandemic has forced a change of paradigm in health care delivery at the speed of sound. All healthcare

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professionals had to face a significant shift in their usual practice for which they were not prepared. The recent report of the American Medical Association anticipates that "after COVID-19, $250 billion in care could shift to telehealth, boosting a new field of research and infrastructure development".[2] In Canada, overall, 50% of patient visits are now virtual, 62% of family physicians state that it has improved access to care for the patients,[17] and 39% of the patients opted for TM to save on the caregiving arrangements.[18]

TM in primary care has potential but at the same time has many challenges. Primary care practice includes not only attention to medical conditions but also to the social aspects of daily life of patients. The traditional in-person visit is at times a challenge for a family physician, so adding a TM visit becomes even more challenging as the technology is now an important component of the care that family physicians have to adapt. The evidence on the use of TM in primary practice is limited due to the low number of the studies. In the narrative review done by Heinzelmann *et al.*[4] in 2005, they found that the use of TM for the medical history and physical examination in general medicine had good sensitivity and specificity. However, they were only able to identify six studies that investigated the impact of TM on the management of multiple chronic diseases. According to their study, TM was associated with improvement of quality of life and functional status of the patients.[5] The patients' satisfaction with TM was overall high due to convenience, comfort with the technology and relationship with the doctor.[5] The possibility of lower hospital admissions and nursing home placement were not excluded. While there is some evidence that TM is associated with improvement of quality of life and functional status of older adults with multiple chronic disases,[5] there are important barriers to TM use that these patients face such as access to Internet, video device, telephone and audio quality, visual and hearing impairment and different degree of cognitive decline. Thus, given the present state of knowledge on the use of TM by older adults, it is imperative that the primary care clinicians be at the forefront on the improvement use of TM for its older population.

METHODS AND ANALYSIS

To assess the challenges of TM use among older adults living in the community, we are planning to conduct a multi-phase study. The research objective of the study is to examine the potential effect of TM use in the care of older adults. Specifically, we want to

1) describe the evidence of TM use for the older adults living in the community: *What is the evidence on the types of TM use for older adults? What is the impact of TM use on health and social needs?*

2) understand the patients, caregivers, and clinicians' experiences with TM use: *What is the experience of TM use by older adults, caregivers and clinicians? What are the enablers and barriers of TM use in the care of older adults and their caregivers?*

3) develop practice- and evidence-based recommendations on effective use of TM for older adults and their caregivers.

Methods: This study is framed according to the Chronic Care Model which is an evidence-based policy response devoted to improving the quality of chronic care at the level of primary care.[6] It uses a multi-component strategy taking into account multiple factors such as: the continuous relationship of patients with their care team; individualization of care according to patients' needs; care that anticipates patients needs; and services based on scientific evidence and cooperation among clinicians. The Chronic Care Model is based on the six components: health care organization and linkages with community resources and policies are the prerequisites for delivery system design, decision support, support for self-management and clinical information systems. Our research study will target three components of the model: organization of healthcare (research question 1, 2), support for self-management (research question 3) and delivery system design (research question 4) (figure 1).

Figure 1: The Chronic care model[6] with the integration of the research questions

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We will apply a multi-phase design which is composed of a systematic mixed studies review on the evidence of TM use (**phase 1**) followed by a qualitative descriptive study on the experiences of the patients, caregivers and healthcare professionals (**phase 2**) (figure 2). Finally, we will integrate the results of both studies to propose the recommendations.

Figure 2: Overview of the research project

Patient and Public Involvement: We will use a participatory research approach by involving the main stakeholders to all phases of the research project. This includes discussions to finalize the objectives, make interpretation and validation of the findings and development of the recommendations. The main stakeholders include the principal investigators, collaborators, family physicians, as well as older adults and caregivers. We already convened a group of 16 older adults as well as adults living with dementia (ALWD), caregivers and research partners. They will participate in the discussion of the systematic review findings, refining of the research questions of the qualitative study, an interview guide development and interpretation of the results. We are planning to organize four meetings: (i) presentation of the preliminary results of the review; (ii) presentation of the refined interview guide for the qualitative study; (iii) presentation of the qualitative study results; (iv) finalizing of the recommendations.

PHASE 1: A systematic mixed studies review
Research question 1: *What is the evidence on the types of TM use for older adults?*
Research question 2: *What is the impact of TM use on health and social needs?*

To answer the first and second research questions, we will conduct a systematic mixed studies review. This type of the review includes the studies of the different designs which is appropriate to answer a research question on a relatively new method of the care delivery. The review protocol has been recorded at the PROSPERO, CRD42021237686 (www.crd.york.ac.uk/prospero).

Inclusion criteria: To be included in the review, the studies should meet the following criteria: 1) TM should target community-dwelling older adults, ALWD and/or their informal caregivers; 2) the age of the patients using TM should be 65+; 3) TM should be provided by the primary care practice that involves a family physician, a nurse, or any other healthcare professional of the clinic; 4) TM should be provided via a two-way synchronous communication using either a phone or a web camera; 5) TM should be a core method of delivering the intervention; 6) any type of study design; 7) the outcomes of the studies - the effect of TM on the healthcare needs expressed by the patients, caregivers or identified by the healthcare professionals (e.g., frequency of ER visits).

Exclusion criteria: We will not include the studies on TM: 1) provided by the specialized services (e.g., psychiatry) or facilities (e.g., hospitals); 2) focused exclusively on the after discharge from the hospital care; 3) provided to the patients in the nursing homes; 4) with no involvement of the family physician or a nurse from the primary care practice; 5) provided with no two-way synchronous communication (e.g., e-mail); 6) focused exclusively on the physical rehabilitation/exercises/psychotherapy; 7) focused on the vital signs only (e.g., blood pressure).

Search strategy and study selection: In accordance with PRISMA statement standards,[7] a literature search has been performed by a specialized librarian; publications in English, French or Russian listed in MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, the Cochrane Library published before November 2020, were searched. A search in the above-mentioned databases showed 3594 records that are being analyzed. The key words are presented at Appendix 1.

Based on the eligibility criteria, relevant titles, abstracts, and full-text articles are being selected independently by 2 reviewers. The full articles relating to any identified conference abstracts will be

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obtained whenever possible. Literature search results will be uploaded to the Endnote X9. The quality of the studies will be assessed using the validated Mixed Methods Appraisal Tool.[8]

Data Extraction and synthesis: Two researchers will independently extract the following information from each study: characteristics of the study participants (e.g., sample size), type of TM (e.g., phone visit), description of the family medicine practice (e.g., solo vs team-based), characteristics of the study (e.g., design), and outcomes (e.g., frequency of ER visits).

Due to expected heterogeneity of the studies, a narrative approach will be applied to describe the types of TM, its impact on the health needs and the experiences of the patients, caregivers and healthcare providers. We will conduct a sub-group analysis for ALWD as they represent a particularly vulnerable group experiencing specific needs in terms of TM use, barriers and facilitators. We will use a qualitative and narrative description of the results.[9]

Expected outcomes: We expect to identify the impact on the individual outcomes (e.g., satisfaction with the care, control of the diseases, social isolation, education on the disease) and system outcomes (e.g., access to primary care provider). Moreover, we anticipate identifying the qualitative studies on the experiences of the older adults and healthcare professionals related to TM (e.g., type of TM use).

PHASE 2: Qualitative descriptive study
Research question 3: *What is the experience of TM use by older adults, caregivers and clinicians?*
Research questions 4: *What are the enablers and barriers of TM use in the care of older adults and their caregivers?*

To answer the third and forth research questions, we will conduct a qualitative descriptive study. For the study we will use the individual interviews with the patients and their caregivers (when available) and a focus group with healthcare professionals.

Participants: We will recruit the participants from four McGill University family medicine sites – Herzl clinic of the Jewish General hospital, CLSC-CDN, CLSC-Park Extension and CLSC-Metro.

Recruitment process: We will ask each family medicine practice to provide a list of the patients 65+ seen at least once via teleconsultation from March 2020 to March 2021. A trained research nurse will screen the electronic medical records of the patients to identify the participants seen either by a family physician or a nurse. The target sample is 10-12 patients from each site with a total sample of 40-48 participants. We are planning to recruit a contrasted sample of patients based on sex, age and functional status to achieve data.

Data collection: The individual interviews with the participants will take via zoom meeting or by phone. The format of the interview will be semi-structured, as a pre-developed interview guide will be utilized to capture various components that we have targeted to discuss (open ended questions with the specific questions derived from the results of the first study). The interview guide presented at Appendix 2. One focus group with healthcare professionals will be held at the end of the study. One focus group per family medicine practice will be conducted. Demographic and clinical characteristics of the patients will be collected from their electronic medical records and summarized by family medicine practice units. The following parameters will be collected: age, gender, educational level, spoken language, presence of caregiver as well as comorbidities.

Analyses: The interviews will be audio-recorded, transcribed verbatim, and analyzed with the support of the software package N-Vivo.[10] Data will be analysed iteratively, following the phases of thematic analysis.[11] The initial step will involve two independent trained researchers becoming familiar with the data, reading the first three transcripts and generating initial codes. Codes will be then analysed and collated into potential themes and further reviewed to generate a thematic map of the analysis. The researchers will meet on four occasions to agree on refinements of major themes. To enhance intra-coder reliability and verify emergent themes, three transcripts will be randomly chosen and analysed

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independently by a third researcher. All these measures ensure the rigor and trustworthiness of the findings. We will conduct a sub-group analysis for ALWD.

Expected outcomes: We expect to identify the themes on the attitude towards TM use (e.g., convenience), enablers (e.g., decreased cost) and barriers (e.g., lack of face-to-face contact for phone-based TM, technical challenges) to optimal use of TM by the older adults and clinicians. The Ethics approval has been obtained (August 2021).

Integration phase: development of practice- and evidence-based recommendations

To integrate the results from both studies we will use the thematic analysis to form the common themes. We will match the findings from a systematic review (phase 1) with the themes of the qualitative study (phase 2) using the methods of comparison and contrast. The integration of the results from both studies will be done by their joint presentation to identify the commonalities and required actions (what should be put in place to ensure quality and sustainability of TM for older adults). The integration of the phases will give us an opportunity to understand the researched phenomenon in more depth. This step has the fundamental goal of producing the practice- and evidence-based recommendations that will address current gaps on TM use for older adults including ALWD. These recommendations are urgent and timely considering lack of the guidance for the family physicians to provide TM to these vulnerable populations. To develop the practice- and evidence-based recommendations on TM we will follow the criteria of the Appraisal of Guidelines, Research and Evaluation (AGREE) tool that is an appraisal instrument for clinical practice guideline development.[12] A working group will be created to generate an initial list of items based on the results of both phases to make sure that they address the main domains of the AGREE guidelines: scope and purpose, stakeholder involvement, rigour of development, clarity and presentation. The working group will include the principal investigators, collaborators, family physicians, as well as older adults, ALWD and caregivers.

DISCUSSION

This will be a first multi-phase study on TM use for older adults in routine primary care practice. As TM has become a valuable tool for care delivery during the pandemic and will most probably remain as an important way to provide primary care services after the pandemic, this study will lead to a sustainable and appropriate use of TM for older adults. The produced recommendations will help family physicians to provide the quality of care that these vulnerable populations deserve regardless of the method of delivery (TM, in-person care or hybrid). In turn, this study will contribute to the improvement of the continuity of care, timely management of chronic conditions and their exacerbation, decrease of ED visits for conditions that could be managed in primary care, better use of scarce healthcare resources and potentially decrease healthcare costs.

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FIGURE LEGENDS

Figure 1. The Chronic care model[6] with the integration of the research questions

Figure 2. Overview of the research project

AUTHORS' CONTRIBUTIONS

Vladimir Khanassov – design of the study, overall supervision of the study conduct, Ethics submission, communication with the clinical sites.

Marwa Ilali - collection and analysis for the mixed studies review (phase 1), participation in the refinement of the questionnaire for the qualitative study (phase 2);

Isabelle Vedel – guidance on the study design and its conduct, assistance with communication with the collaborators.

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COMPETING INTERESTS STATEMENT

None to declare

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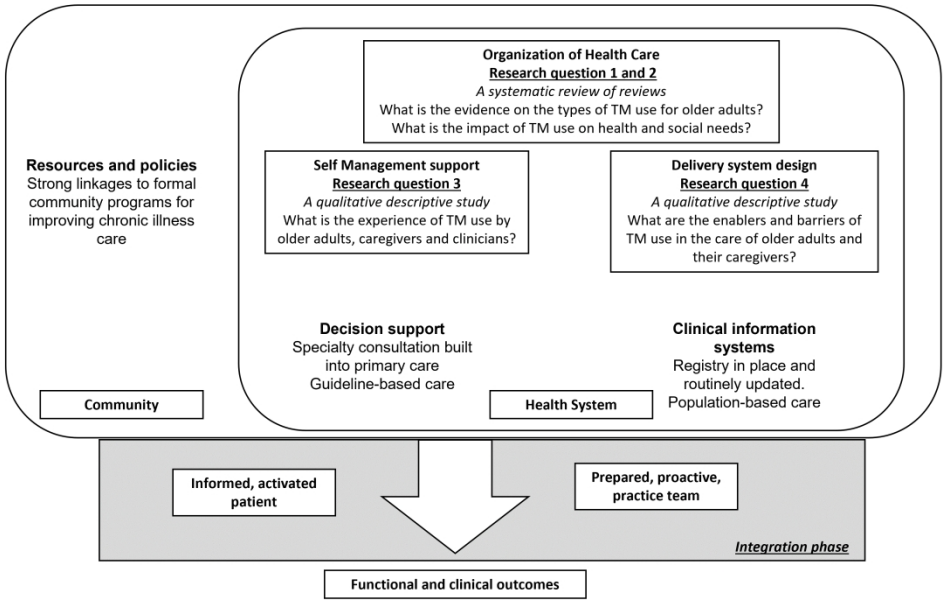

Figure1. The Chronic care model with the integration of the research questions

701x427mm (130 x 130 DPI)

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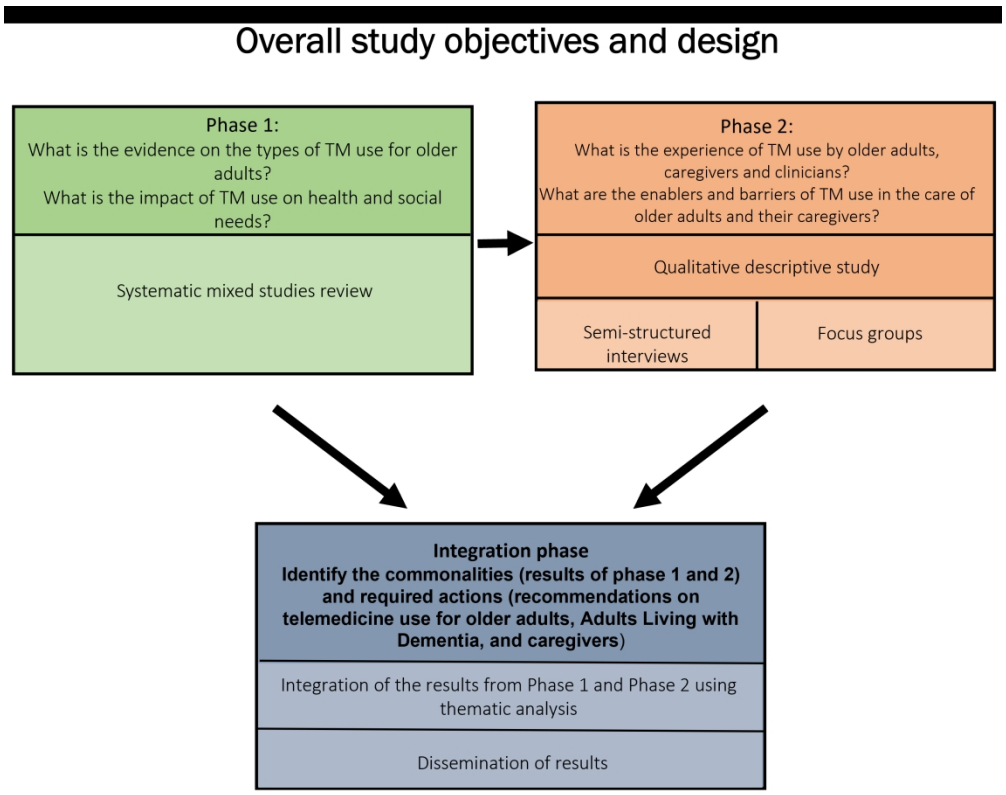

Figure2. Overview of the research project

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Appendix 1. Example of search strategy

Database: Embase Classic+Embase Search Strategy: ---------- 1 telemedicine.mp. (33037)
2 distance counsel*.mp. (18)
3 remote consult*.mp. (674)
4 telehealth.mp. (11717)
5 etherap*.mp. (19)
6 E-Counsel*.mp. (277)
7 health mobile.mp. (126)
8 mHealth.mp. (4757)
9 eHealth.mp. (4387)
10 telecare.mp. (938)
11 teleconsult*.mp. (10858)
12 ehealth*.mp. (4418)
13 teleguide*.mp. (7)
14 telemed*.mp. (33537)
15 Remote video*.mp. (187)
16 Video conferenc*.mp. (1449)
17 Video chat.mp. (120)
18 Video visit*.mp. (203)
19 telephone.mp. (93893)
20 Video consultat*.mp. (462)
21 tele-coach*.mp. (16)
22 Virtual provider*.mp. (8)
23 Virtual appointment*.mp. (28)
24 Virtual consult*.mp. (194)
25 Skype.mp. (793)
26 Telehealthcare.mp. (106)
27 E-health.mp. (4075)
28 Econsult*.mp. (228)
29 Health Informatic*.mp. (2886)
30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (146752)
31 Elderly.mp. (580606)
32 aging.mp. (634135)
33 Geriatric*.mp. (158008)
34 Older Adult*.mp. (107225)
35 Senior*.mp. (60434)
36 ageing.mp. (64194)
37 31 or 32 or 33 or 34 or 35 or 36 (1326974)
38 primary healthcare.mp. (7883)
39 Family Practice.mp. (10065)
40 Family physician*.mp. (19413)
41 General practice.mp. (102902)
42 Primary Care.mp. (162973)
43 Primary health care.mp. (80279)
44 38 or 39 or 40 or 41 or 42 or 43 (312072)
45 30 and 37 and 44 (1083)

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Appendix 2. Interview guide for semi-structured interviews with the patients and caregivers

HUMAN DIMENSION	
User habits	Tell me about your experience of use of phone or video for medical consultations during the pandemic: Please specify if patient does not mention phone or video Are you comfortable using phone/video services for medical consultations with family physician or nurse?* How did you feel about using phone/video services for your medical consultations?* *Optional if patient experience both phone and video* Would you prefer a phone or video consultation? Why?
Equipment	Do you have easy access to phone/video devices at home (e.g. Phone, computer, tablet etc.)? Did you have to purchase any device for your medical consultations during the pandemic (e.g. Phone, computer, tablets, headphones, hearing aids, etc.)*
Skills and Knowledge TM	How comfortable are you with using phone/video for medical consultations with your family physician or nurse?* Did you need help from a family member/friend? How did your health status affect/influence your experience with the use of phone/video for medical consultations (e.g. Hearing/Visual/Memory)? Did you experience any challenges hearing/seeing/remembering information giving by your family physician or nurse?
User Preferences/ convenience	What do you like in these medical consultations? Do you think that video/phone medical consultations help to follow-up your health better? Why? Do you think that video/phone medical consultations can improve your quality of life? How? Do you think that video/phone medical consultations could decrease your visits to the emergency room? Why? What do you dislike in these medical consultations? Do you trust technology to be reliable for your medical consultations? Why?

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	Are you concerned about confidentiality by using teleconsultation? Why? If you had the choice, what would you prefer for your medical consultations, in-person, or phone/video consultations? Why? What do you think about a combination of the consultations (e.g., in person for routine exam, urgent visit and by phone or video for a follow-up on the results)? What would you change in phone or video consultations? What could be done differently by your family medicine practice to provide a better service? In general, would you prefer to discuss your health issue with a nurse or with your family physician?* When you have urgent medical needs, how important is it for you to have easy access to consult your family physician or nurse by phone/video? If it is not possible to consult with your usual family physician or nurse, would you accept having rapid access to any family physician or nurse?*
SYSTEM DIMENSION	
Interoperability/multi-disciplinary team	Do you use phone/video medical consultations outside of your family medicine clinic?* If yes, for what other medical services (e.g., medical, social worker, dietician, therapist)? How was your experience?
ENVIRONMENTAL DIMENSION	
Quality of life/care	During the pandemic, do you think family physician or nurses were qualified/trained enough to provide you with the best care using phone/video consultation?* Why? Do you think the current healthcare system is well adapted for video/phone medical consultations? Why?
Conclusion	Would you recommend phone/video medical consultations to your family member or friend? Why? Do you have any other comments on video/phone medical consultations?

*- questions derived from a systematic mixed studies review (preliminary data)

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Protocol of a multi-phase study on telemedicine for older adults in primary care

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ABSTRACT

Introduction Telemedicine (TM) has been adopted by many health authorities to limit unnecessary exposure during COVID-19. Prior to the pandemic, TM was associated with improvement of quality of life of older patients, low hospital admissions and nursing home placement, and high overall patients' satisfaction due to convenience. However, older adults may face challenges to access TM, such as hearing, visual and cognitive decline, and limited access to Internet and devices. Ongoing vaccination campaigns and sanitary measures are keeping the pandemic under control, but new variants threaten public safety. Specific recommendations on TM use in high-risk populations, such as older adults, are therefore required. **Methods and analysis** To assess the challenges of TM use in the routine primary healthcare practice of older adults. The research objective is to examine the potential effect of TM; 1) to describe the evidence of TM, 2) to understand the patients, caregivers, and clinicians' experiences with TM use and 3) to develop practice- and evidence-based recommendations on effective use of TM. Multi-phase design: 1) systematic mixed studies review on the evidence of TM use, 2) qualitative descriptive study on the experiences of the patients, caregivers, and healthcare professionals. Recommendations will be proposed based on the integration of both studies. In accordance with PRISMA statement, the systematic mixed studies review will be conducted through multiple databases search: MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, Cochrane Library. Population studied: Community-dwelling 65 years and older adults using two-way synchronous TM by phone or video in a primary care setting. The qualitative descriptive study will include individual interviews with older adults from four McGill university affiliated primary care practices and focus groups with their healthcare professionals. **Ethics and dissemination** Ethics approval has been received. Results will inform healthcare professionals and policymakers on sustainable use of TM in primary care for older adults.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This will be a first comprehensive multi-phase study on TM in primary care for older adults
- Inclusion of the studies in a systematic review regardless of their design will allow to evaluate various outcomes
- The results of a systematic review will inform a qualitative study to examine TM in more details
- This is the first study that is designed to produce the recommendation for TM for older adults in routine primary care practice
- Exclusion of papers not published in English, French or Russian may miss the important additional findings

INTRODUCTION

The COVID-19 pandemic has considerably transformed the lives of older adults and the delivery of primary care services. The use of telemedicine (TM) is now universal in our healthcare system. The World Health Organization defines TM as a delivery system of health care services using different modalities embedded in the realms of information and communication technologies.(1)The use of TM will most probably remain after the pandemic given its important advantages such as "advance health care ranging from individual to population levels, by allowing exchange of patient information for diagnosis, management, primary care prevention and education of physicians via distance learning".(1) Before the COVID-19 pandemic, TM was used infrequently as an alternative to the traditional in-person care, but the pandemic has forced a rapid change in health care delivery. Many healthcare professionals

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had to face a significant shift in their usual practice for which they were not prepared.(2) The recent report of the American Medical Association anticipates that "after COVID-19, $250 billion in care could shift to telehealth, boosting a new field of research and infrastructure development". (3) In Canada, overall, 50% of patient visits are now virtual.(4) Sixty two percent of family physicians state that it has improved access to care for the patients, (5) and 39% of the patients opted for TM to save on the caregiving arrangements.(4)

TM in primary care has potential but at the same time has many challenges. Primary care practice includes not only attending to medical conditions but also to the social aspects of daily life of patients. A family physician may find the traditional in-person visit difficult at times. Adding a TM visit becomes more challenging as technology becomes a more important component of care that family physicians must respond to. The evidence on the use of TM in primary practice is limited due to the low number of the studies. For example, in the narrative review done by Heinzelmann *et al. (6)* and De Albornoz *et al.* (7), they found that the use of TM for the medical history and physical examination in general medicine had good sensitivity and specificity. However, they were only able to identify six studies that investigated the impact of TM on the management of multiple chronic diseases. According to their study, TM was associated with improvement of quality of life and functional status of the patients.(8) The patients' satisfaction with TM was overall high due to convenience, comfort with the technology and relationship with the doctor.(9) The possibility of lower hospital admissions and nursing home placement were not excluded. TM is associated with improvement of quality of life and functional status of older adults with multiple chronic diseases.(8) However, these patients may confront health-related obstacles, such as vision and hearing problems, as well as varying degrees of cognitive loss. Patients may also face significant technological challenges when using TM, such as Internet connection, video or phone devices, and audio or video quality. Given the current level of knowledge regarding the use of TM by older adults, primary care clinicians must be at the forefront of efforts to improve TM use among the older adults.

METHODS AND ANALYSIS

To assess the challenges of TM use among older adults living in the community, we are planning to conduct a multi-phase study. The research objective of the study is to examine the potential effect of TM use in the care of older adults. Specifically, we want to

1) Describe the evidence of TM use for the older adults living in the community: *What is the evidence on the types of TM use for older adults? What is the impact of TM use on health and social needs?*

2) Understand the patients, caregivers, and clinicians' experiences with TM use: *What is the experience of TM use by older adults, caregivers, and clinicians? What are the facilitators and barriers of TM use in the care of older adults and their caregivers?*

3) Develop practice- and evidence-based recommendations on effective use of TM for older adults and their caregivers.

Methods: This study is framed according to the Chronic Care Model.(10) The Chronic Care Model is based on the six components: health care organization and linkages with community resources and policies are the prerequisites for delivery system design, decision support, support for self-management and clinical information systems. Our research study will target three components of the model: organization of healthcare (research question 1, 2), support for self-management (research question 3) and delivery system design (research question 4) (figure 1).

Figure 1: The Chronic care model(10) with the integration of the research questions

We will apply a multi-phase design which is composed of a systematic mixed studies review on the evidence of TM use (**phase 1**) followed by a qualitative descriptive study on the experiences of the patients, caregivers and healthcare professionals (**phase 2**) (figure 2). Finally, we will integrate the results

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of both studies to propose the recommendations to primary care clinicians. Specifically, we will propose recommendations on how to provide the quality of care to these vulnerable populations regardless of the method of delivery (TM, in-person care or hybrid). The start date for the study is October 2021 and the estimated date for completion is set to August 2022.

Figure 2: Overview of the research project

Framework of the analysis: To understand contextual factors influencing TM use in primary care practice, we will use the Consolidated Framework for Implementation Research (CFIR) that will allow us to integrate the results of both phases.(11) CFIR framework consists of 39 constructs associated with successful implementation of interventions. We will target to identify patient-perceived barriers associated with specific CFIR constructs (Table 1).

Table 1: Example of CFIR constructs and questions for individual interviews

CFIR construct	Individual interview questions
Relative advantage: Do older adults see the need to have telemedicine?	In your opinion, should primary care practice continue to provide telemedicine visits?
Adaptability: Do older adults believe telemedicine can be sufficiently adapted or tailored to meet their needs?	What kind of changes do you think the telemedicine provided by your primary care practice need to make to meet your needs?
Complexity: Do older adults believe that telemedicine is complex based on their perception of the way it is provided?	What did you find most complex about participating in telemedicine? How can primary care practice help with this in future?
Patient needs and resources: Are older patient needs on telemedicine accurately known?	Tell me about your experiences with telemedicine. What barriers did you encounter?
Knowledge and beliefs: Do older adults have negative attitudes towards telemedicine?	What benefit did you receive from telemedicine?
Self-efficacy: Do older adults have confidence in their capabilities to complete telemedicine visit?	How confident are you in use of telemedicine?
Individual state of change: Are older adults enthusiastic about using telemedicine in a sustained way?	Would you recommend telemedicine use to others? Why or why not?

Patient and Public Involvement: We will use a participatory research approach by involving the main stakeholders in all phases of the research project. This includes discussions to finalize the objectives, make interpretation and validation of the findings and development of the recommendations. The main stakeholders include the principal investigators, collaborators, family physicians, as well as older adults and caregivers. We already convened a group of 16 older adults as well as adults living with dementia (ALWD), caregivers and research partners. They will participate in the discussion of the systematic review findings, refining of the research questions of the qualitative study, an interview guide development and interpretation of the results. We are planning to organize four meetings: (i) presentation of the preliminary results of the review; (ii) presentation of the refined interview guide for the qualitative study; (iii) presentation of the qualitative study results; (iv) finalizing of the recommendations.

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BOX 1 - PHASE 1

PHASE 1: A systematic mixed studies review
Research question 1: *What is the evidence on the types of TM use for older adults?*
Research question 2: *What is the impact of TM use on health and social needs?*

To answer the first and second research questions of phase 1 (Box 1), we will conduct a systematic mixed studies review. This type of the review includes the studies of the different designs which is appropriate to answer a research question on a relatively new method of the care delivery. The review protocol has been recorded at the PROSPERO, CRD42021237686 (www.crd.york.ac.uk/prospero).

Inclusion criteria: To be included in the review, the studies should meet the following criteria: 1) TM should target community-dwelling older adults, ALWD and/or their informal caregivers; 2) the age of the patients using TM should be 65+; 3) TM should be provided by the primary care practice that involves a family physician, a nurse, or any other primary healthcare professional of the clinic; 4) TM should be provided via a two-way synchronous communication using either a phone or a web camera; 5) TM should be a core method of delivering the intervention; 6) any type of study design; 7) the outcomes of the studies - the effect of TM on the healthcare needs expressed by the patients, caregivers or identified by the healthcare professionals; 8) outcomes included are: satisfaction, readiness, acceptability, number of TM consultation, frequency of ER visits and clinical visits.

Exclusion criteria: We will not include the studies on TM: 1) provided by the specialized services (e.g., psychiatry) or facilities (e.g., hospitals); 2) focused exclusively on the after discharge from the hospital care; 3) provided to the patients in the nursing homes; 4) with no involvement of the family physician or a nurse from the primary care practice; 5) provided with no two-way synchronous communication (e.g., e-mail); 6) focused exclusively on the physical rehabilitation/exercises/psychotherapy; 7) focused on the vital signs only (e.g., blood pressure).

Search strategy and study selection: In accordance with PRISMA statement standards,(12) a literature search has been performed by a specialized librarian; publications in English, French or Russian listed in MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, the Cochrane Library published before December 2021, were searched. A search in the above-mentioned databases showed 3594 records that are being analyzed. The key words are presented at Appendix 1. We will update the search of the articles published in 2021 by conducting additional search.

Based on the eligibility criteria, relevant titles, abstracts, and full-text articles are being selected independently by 2 reviewers. Any disagreements will be resolved by consensus or the involvement of an additional reviewer. The full articles relating to any identified conference abstracts will be obtained whenever possible. Literature search results will be uploaded to the Endnote X9. The quality of the studies will be assessed using the validated Mixed Methods Appraisal Tool.(13)

Data Extraction and synthesis: Two researchers will independently extract the following information from each study: characteristics of the study participants (e.g., sample size), type of TM (e.g., phone visit), description of the family medicine practice (e.g., solo vs team-based), characteristics of the study (e.g., design), and outcomes (e.g., frequency of ER visits).

Due to expected heterogeneity of the studies, a narrative approach will be applied to describe the types of TM, its impact on the health needs and the experiences of the patients, caregivers and healthcare providers. We will conduct a sub-group analysis for ALWD as they represent a particularly vulnerable group experiencing specific needs in terms of TM use, barriers and facilitators. We will use a qualitative and narrative description of the results.(14)

Expected outcomes: We expect to identify the impact on the individual outcomes (e.g., satisfaction with the care, control of the diseases, social isolation, education on the disease) and system outcomes (e.g., access to primary care provider). Moreover, we anticipate identifying the qualitative studies on the experiences of the older adults and healthcare professionals related to TM (e.g., type of TM use).

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BOX 2 - PHASE 2

PHASE 2: Qualitative descriptive study
Research question 3: *What is the experience of TM use by older adults, caregivers and clinicians?*
Research questions 4: *What are the facilitators and barriers of TM use in the care of older adults and their caregivers?*

To answer the third and fourth research questions of phase 2 (Box 2), we will conduct a qualitative descriptive study. For the study we will use the individual interviews with the patients and their caregivers (when available) and a focus group with healthcare professionals.

Participants: We will recruit the participants from four McGill University family medicine sites – Herzl clinic of the Jewish General hospital, CLSC-CDN, CLSC-Park Extension and CLSC-Metro.

Recruitment process: We will ask each family medicine practice to identify the patients 65+ seen at least once via teleconsultation from March 2020 to March 2021, then a coordinator of each site will contact the participants to inquire on their interest to participate in the study. The list of the participants who agree to participate will be given to the research team who will explain the study in detail and consent them. The target sample is 10-12 patients from each site with a total sample of 40-48 participants. We are planning to recruit a contrasted sample of patients based on sex, age and functional status to achieve representative data. The Ethics approval has been obtained (August 2021).

Data collection: The individual interviews with the participants will take via zoom meeting or by phone. The format of the interview will be semi-structured, as a pre-developed interview guide will be utilized to capture various components that we have targeted to discuss (open ended questions with the specific questions derived from the results of the first study). The interview guide presented at Appendix 2. One focus group with healthcare professionals will be held at the end of the study. One focus group per family medicine practice will be conducted. Demographic and clinical characteristics of the patients will be collected from their electronic medical records and summarized by family medicine practice units. The following parameters will be collected: age, gender, educational level, spoken language, presence of caregiver as well as comorbidities.

Analyses: The interviews will be audio-recorded, transcribed verbatim, and analyzed with the support of the software package N-Vivo.(15) Data will be analysed iteratively, following the phases of thematic analysis(16) The initial step will involve two independent trained researchers becoming familiar with the data, reading the first three transcripts, and generating initial codes. Codes will be then analysed and collated into potential themes and further reviewed to generate a thematic map of the analysis. The researchers will meet on four occasions to agree on refinements of major themes. To enhance intra-coder reliability and verify emergent themes, three transcripts will be randomly chosen and analysed independently by a third researcher. All these measures ensure the rigor and trustworthiness of the findings. We will conduct a sub-group analysis for ALWD.

Expected outcomes: We expect to identify the themes on the attitude towards TM use (e.g., convenience), facilitators (e.g., decreased cost) and barriers (e.g., lack of face-to-face contact for phone-based TM, technical challenges) to optimal use of TM by the older adults and clinicians.

The Ethics approval has been obtained (August 2021).

Integration phase: development of practice- and evidence-based recommendations

To integrate the results from both studies we will use the thematic analysis to form the common themes. We will match the findings from a systematic review (phase 1) with the themes of the qualitative study (phase 2) using the methods of comparison and contrast. The integration of the results from both studies will be done by their joint presentation to identify the commonalities and required actions (what should be put in place to ensure quality and sustainability of TM for older adults).

The integration of the results will be done within CFIR framework.(11) Based on the findings of the systematic review, individual interviews with older adults and focus groups with healthcare professionals, we will select CFIR constructs to guide the development of the recommendations on TM

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use (Table 2). A working group will be created to generate a potential list of CFIR constructs based on the results of both phases. The working group will include the principal investigators, collaborators, family physicians, as well as older adults, ALWD and caregivers.

Table 2: Example of the recommendations based on the CFIR framework

CFIR constructs	Appropriate for telemedicine	Inappropriate for telemedicine
Patient related		
Relative advantage	Older adult with a simple medical condition that could be safely assessed and treated using TM (e.g., shingles, uncomplicated urinary tract infection)	Older adults with dementia in delirium
Primary care facility related		
Complexity	Availability of a coordinator to book telemedicine visit and navigate the patient on the process of telemedicine	Inadequate support of the family physicians by the support staff of the clinic
Technology related		
Adaptability	User-friendly platform with simple access to TM visit	Multistep process to access TM visit

DISCUSSION

This will be a first multi-phase study on TM use for older adults in routine primary care practice. TM has become a valuable tool for care delivery, and the American Medical Association anticipates that telehealth as a field will continue to grow.

This study will seek to address the challenges associated with TM provided to older adults in routine primary care based on the existing evidence (phase 1 of the study) and experiences of older adults with feedback of primary care healthcare professionals (phase 2). The integration of the results from both phases using the implementation framework will allow to produce the recommendations on how to provide the quality of care to these vulnerable populations regardless of the method of delivery (TM, in-person care or hybrid).

In addition, we hope that this study will contribute to the improvement of access and continuity of primary care as well as timely management of chronic conditions.

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AUTHORS' CONTRIBUTIONS

Vladimir Khanassov – design of the study, overall supervision of the study conduct, Ethics submission, communication with the clinical sites.

Marwa Ilali - collection and analysis for the mixed studies review (phase 1), participation in the refinement of the questionnaire for the qualitative study (phase 2);

Isabelle Vedel – guidance on the study design and its conduct, assistance with communication with the collaborators.

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COMPETING INTERESTS STATEMENT

None to declare

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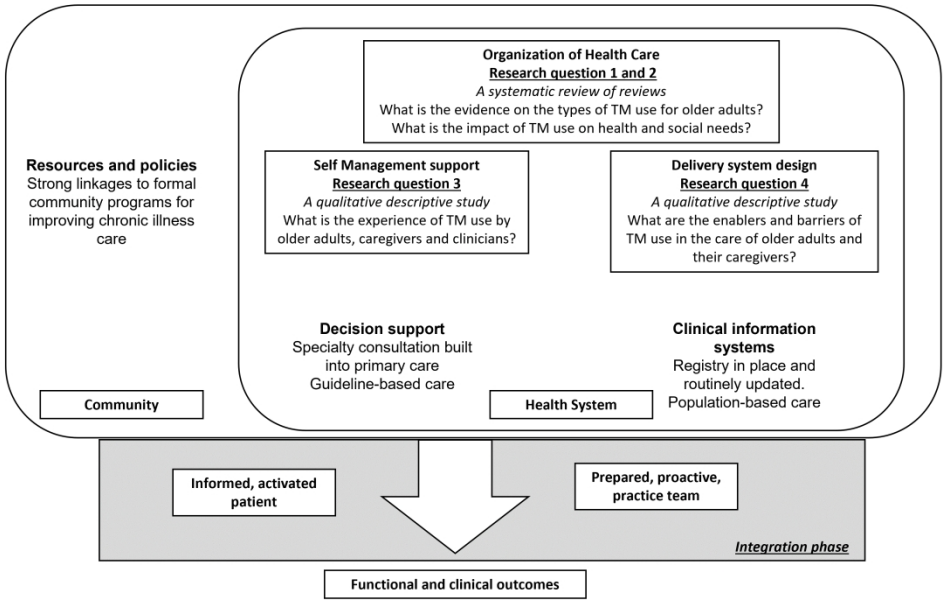

Figure1. The Chronic care model with the integration of the research questions

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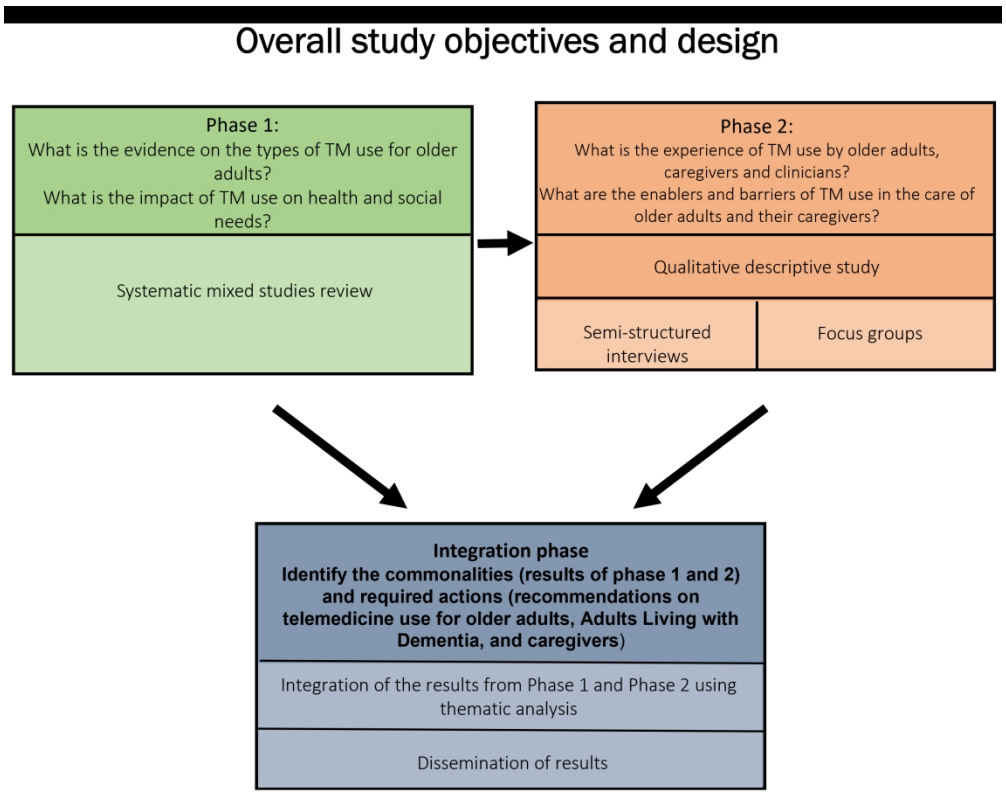

Figure2. Overview of the research project

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Appendix 1. Example of search strategy

Database: Embase Classic+Embase Search Strategy: ---------- 1 telemedicine.mp. (33037)
2 distance counsel*.mp. (18)
3 remote consult*.mp. (674)
4 telehealth.mp. (11717)
5 etherap*.mp. (19)
6 E-Counsel*.mp. (277)
7 health mobile.mp. (126)
8 mHealth.mp. (4757)
9 eHealth.mp. (4387)
10 telecare.mp. (938)
11 teleconsult*.mp. (10858)
12 ehealth*.mp. (4418)
13 teleguide*.mp. (7)
14 telemed*.mp. (33537)
15 Remote video*.mp. (187)
16 Video conferenc*.mp. (1449)
17 Video chat.mp. (120)
18 Video visit*.mp. (203)
19 telephone.mp. (93893)
20 Video consultat*.mp. (462)
21 tele-coach*.mp. (16)
22 Virtual provider*.mp. (8)
23 Virtual appointment*.mp. (28)
24 Virtual consult*.mp. (194)
25 Skype.mp. (793)
26 Telehealthcare.mp. (106)
27 E-health.mp. (4075)
28 Econsult*.mp. (228)
29 Health Informatic*.mp. (2886)
30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (146752)
31 Elderly.mp. (580606)
32 aging.mp. (634135)
33 Geriatric*.mp. (158008)
34 Older Adult*.mp. (107225)
35 Senior*.mp. (60434)
36 ageing.mp. (64194)
37 31 or 32 or 33 or 34 or 35 or 36 (1326974)
38 primary healthcare.mp. (7883)
39 Family Practice.mp. (10065)
40 Family physician*.mp. (19413)
41 General practice.mp. (102902)
42 Primary Care.mp. (162973)
43 Primary health care.mp. (80279)
44 38 or 39 or 40 or 41 or 42 or 43 (312072)
45 30 and 37 and 44 (1083)

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Appendix 2. Interview guide for semi-structured interviews with the patients and caregivers

HUMAN DIMENSION	
User habits	Tell me about your experience of use of phone or video for medical consultations during the pandemic: Please specify if patient does not mention phone or video Are you comfortable using phone/video services for medical consultations with family physician or nurse?* How did you feel about using phone/video services for your medical consultations?* *Optional if patient experience both phone and video* Would you prefer a phone or video consultation? Why?
Equipment	Do you have easy access to phone/video devices at home (e.g. Phone, computer, tablet etc.)? Did you have to purchase any device for your medical consultations during the pandemic (e.g. Phone, computer, tablets, headphones, hearing aids, etc.)*
Skills and Knowledge TM	How comfortable are you with using phone/video for medical consultations with your family physician or nurse?* Did you need help from a family member/friend? How did your health status affect/influence your experience with the use of phone/video for medical consultations (e.g. Hearing/Visual/Memory)? Did you experience any challenges hearing/seeing/remembering information giving by your family physician or nurse?
User Preferences/ convenience	What do you like in these medical consultations? Do you think that video/phone medical consultations help to follow-up your health better? Why? Do you think that video/phone medical consultations can improve your quality of life? How? Do you think that video/phone medical consultations could decrease your visits to the emergency room? Why? What do you dislike in these medical consultations? Do you trust technology to be reliable for your medical consultations? Why?

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	Are you concerned about confidentiality by using teleconsultation? Why? If you had the choice, what would you prefer for your medical consultations, in-person, or phone/video consultations? Why? What do you think about a combination of the consultations (e.g., in person for routine exam, urgent visit and by phone or video for a follow-up on the results)? What would you change in phone or video consultations? What could be done differently by your family medicine practice to provide a better service? In general, would you prefer to discuss your health issue with a nurse or with your family physician?* When you have urgent medical needs, how important is it for you to have easy access to consult your family physician or nurse by phone/video? If it is not possible to consult with your usual family physician or nurse, would you accept having rapid access to any family physician or nurse?*
SYSTEM DIMENSION	
Interoperability/multi-disciplinary team	Do you use phone/video medical consultations outside of your family medicine clinic?* If yes, for what other medical services (e.g., medical, social worker, dietician, therapist)? How was your experience?
ENVIRONMENTAL DIMENSION	
Quality of life/care	During the pandemic, do you think family physician or nurses were qualified/trained enough to provide you with the best care using phone/video consultation?* Why? Do you think the current healthcare system is well adapted for video/phone medical consultations? Why?
Conclusion	Would you recommend phone/video medical consultations to your family member or friend? Why? Do you have any other comments on video/phone medical consultations?

*- questions derived from a systematic mixed studies review (preliminary data)

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Protocol of a multi-phase study on telemedicine for older adults in primary care

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ABSTRACT

Introduction Telemedicine (TM) has been adopted by many health authorities to limit unnecessary exposure during COVID-19. Prior to the pandemic, TM was associated with improvement of quality of life of older patients, low hospital admissions and nursing home placement, and high overall patients' satisfaction due to convenience. However, older adults may face challenges to access TM, such as hearing, visual and cognitive decline, and limited access to Internet and devices. Ongoing vaccination campaigns and sanitary measures are keeping the pandemic under control, but new variants threaten public safety. Specific recommendations on TM use in high-risk populations, such as older adults, are therefore required. **Methods and analysis** To assess the challenges of TM use in the routine primary healthcare practice of older adults. The research objective is to examine the potential effect of TM; 1) to describe the evidence of TM, 2) to understand the patients, caregivers, and clinicians' experiences with TM use and 3) to develop practice- and evidence-based recommendations on effective use of TM. Multi-phase design: 1) systematic mixed studies review on the evidence of TM use, 2) qualitative descriptive study on the experiences of the patients, caregivers, and healthcare professionals. Recommendations will be proposed based on the integration of both studies. In accordance with PRISMA statement, the systematic mixed studies review will be conducted through multiple databases search: MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, Cochrane Library. Population studied: Community-dwelling 65 years and older adults using two-way synchronous TM by phone or video in a primary care setting. The qualitative descriptive study will include individual interviews with older adults from four McGill university affiliated primary care practices and focus groups with their healthcare professionals. **Ethics and dissemination** Ethics approval has been received. Results will inform healthcare professionals and policymakers on sustainable use of TM in primary care for older adults.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This will be a first comprehensive multi-phase study on TM in primary care for older adults
- Inclusion of the studies in a systematic review regardless of their design will allow to evaluate various outcomes
- The results of a systematic review will inform a qualitative study to examine TM in more details
- This is the first study that is designed to produce the recommendation for TM for older adults in routine primary care practice
- Exclusion of papers not published in English, French or Russian may miss the important additional findings

INTRODUCTION

The COVID-19 pandemic has considerably transformed the lives of older adults and the delivery of primary care services. The use of telemedicine (TM) is now universal in our healthcare system. The World Health Organization defines TM as a delivery system of health care services using different modalities embedded in the realms of information and communication technologies.(1)The use of TM will most probably remain after the pandemic given its important advantages such as "advance health care ranging from individual to population levels, by allowing exchange of patient information for diagnosis, management, primary care prevention and education of physicians via distance learning".(1) Before the COVID-19 pandemic, TM was used infrequently as an alternative to the traditional in-person care, but the pandemic has forced a rapid change in health care delivery. Many healthcare professionals

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had to face a significant shift in their usual practice for which they were not prepared.(2) The recent report of the American Medical Association anticipates that "after COVID-19, $250 billion in care could shift to telehealth, boosting a new field of research and infrastructure development". (3) In Canada, overall, 50% of patient visits are now virtual.(4) Sixty two percent of family physicians state that it has improved access to care for the patients, (5) and 39% of the patients opted for TM to save on the caregiving arrangements.(4)

TM in primary care has potential but at the same time has many challenges. Primary care practice includes not only attending to medical conditions but also to the social aspects of daily life of patients. A family physician may find the traditional in-person visit difficult at times. Adding a TM visit becomes more challenging as technology becomes a more important component of care that family physicians must respond to. The evidence on the use of TM in primary practice is limited due to the low number of the studies. For example, in the narrative review done by Heinzelmann *et al. (6)* and De Albornoz *et al.* (7), they found that the use of TM for the medical history and physical examination in general medicine had good sensitivity and specificity. However, they were only able to identify six studies that investigated the impact of TM on the management of multiple chronic diseases. According to their study, TM was associated with improvement of quality of life and functional status of the patients.(8) The patients' satisfaction with TM was overall high due to convenience, comfort with the technology and relationship with the doctor.(9) The possibility of lower hospital admissions and nursing home placement were not excluded. TM is associated with improvement of quality of life and functional status of older adults with multiple chronic diseases.(8) However, these patients may confront health-related obstacles, such as vision and hearing problems, as well as varying degrees of cognitive loss. Patients may also face significant technological challenges when using TM, such as Internet connection, video or phone devices, and audio or video quality. Furthermore, despite the gradual emergence of new recommendations for the implementation of TM, a patient-centered approach is required to comprehend the long-term impacts of TM on older people.(10) Given the current level of knowledge regarding the use of TM by older adults, primary care clinicians must be at the forefront of efforts to improve TM use among the older adults.

METHODS AND ANALYSIS

To assess the challenges of TM use among older adults living in the community, we are planning to conduct a multi-phase study. The research objective of the study is to examine the potential effect of TM use in the care of older adults. Specifically, we want to

1) Describe the evidence of TM use for the older adults living in the community: *What is the evidence on the types of TM use for older adults? What is the impact of TM use on health and social needs?*

2) Understand the patients, caregivers, and clinicians' experiences with TM use: *What is the experience of TM use by older adults, caregivers, and clinicians? What are the facilitators and barriers of TM use in the care of older adults and their caregivers?*

3) Develop practice- and evidence-based recommendations on effective use of TM for older adults and their caregivers.

Methods: This study is framed according to the Chronic Care Model.(11) The Chronic Care Model is based on the six components: health care organization and linkages with community resources and policies are the prerequisites for delivery system design, decision support, support for self-management and clinical information systems. Our research study will target three components of the model: organization of healthcare (research question 1, 2), support for self-management (research question 3) and delivery system design (research question 4) (figure 1).

Figure 1: The Chronic care model(11) with the integration of the research questions

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We will apply a multi-phase design which is composed of a systematic mixed studies review on the evidence of TM use (**phase 1**) followed by a qualitative descriptive study on the experiences of the patients, caregivers and healthcare professionals (**phase 2**) (figure 2). Finally, we will integrate the results of both studies to propose the recommendations to primary care clinicians. Specifically, we will propose recommendations on how to provide the quality of care to these vulnerable populations regardless of the method of delivery (TM, in-person care or hybrid). Our recommendations will aim to inform clinical practice guidelines, rooted in stakeholders' perspectives. The start date for the study is October 2021 and the estimated date for completion is set to August 2022.

Figure 2: Overview of the research project

Framework of the analysis: To understand contextual factors influencing TM use in primary care practice, we will use the Consolidated Framework for Implementation Research (CFIR) that will allow us to integrate the results of both phases.(12) CFIR framework consists of 39 constructs associated with successful implementation of interventions. The deductive thematic analysis was performed using the CFIR constructs model (Table 1).

Table 1: Example of CFIR constructs and questions for individual interviews (12)

CFIR construct	Individual interview questions
Relative advantage: Do older adults see the need to have telemedicine?	In your opinion, should primary care practice continue to provide telemedicine visits?
Adaptability: Do older adults believe telemedicine can be sufficiently adapted or tailored to meet their needs?	What kind of changes do you think the telemedicine provided by your primary care practice need to make to meet your needs?
Complexity: Do older adults believe that telemedicine is complex based on their perception of the way it is provided?	What did you find most complex about participating in telemedicine? How can primary care practice help with this in future?
Patient needs and resources: Are older patient needs on telemedicine accurately known?	Tell me about your experiences with telemedicine. What barriers did you encounter?
Knowledge and beliefs: Do older adults have negative attitudes towards telemedicine?	What benefit did you receive from telemedicine?
Self-efficacy: Do older adults have confidence in their capabilities to complete telemedicine visit?	How confident are you in use of telemedicine?
Individual state of change: Are older adults enthusiastic about using telemedicine in a sustained way?	Would you recommend telemedicine use to others? Why or why not?

Patient and Public Involvement: We will use a participatory research approach by involving the main stakeholders in all phases of the research project. This includes discussions to finalize the objectives, make interpretation and validation of the findings and development of the recommendations. The main stakeholders include the principal investigators, collaborators, family physicians, as well as older adults and caregivers. We already convened a group of 16 older adults as well as adults living with dementia (ALWD), caregivers and research partners. They will participate in the discussion of the systematic review findings, refining of the research questions of the qualitative study, an interview guide development and interpretation of the results. We are planning to organize four meetings: (i) presentation

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of the preliminary results of the review; (ii) presentation of the refined interview guide for the qualitative study; (iii) presentation of the qualitative study results; (iv) finalizing of the recommendations.

BOX 1 - PHASE 1

PHASE 1: A systematic mixed studies review
Research question 1: *What is the evidence on the types of TM use for older adults?*
Research question 2: *What is the impact of TM use on health and social needs?*

To answer the first and second research questions of phase 1 (Box 1), we will conduct a systematic mixed studies review. This type of the review includes the studies of the different designs which is appropriate to answer a research question on a relatively new method of the care delivery. The review protocol has been recorded at the PROSPERO, CRD42021237686 (www.crd.york.ac.uk/prospero).

Inclusion criteria: To be included in the review, the studies should meet the following criteria: 1) TM should target community-dwelling older adults, ALWD and/or their informal caregivers; 2) the age of the patients using TM should be 65+; 3) TM should be provided by the primary care practice that involves a family physician, a nurse, or any other primary healthcare professional of the clinic; 4) TM should be provided via a two-way synchronous communication using either a phone or a web camera; 5) TM should be a core method of delivering the intervention; 6) any type of study design; 7) the outcomes of the studies - the effect of TM on the healthcare needs expressed by the patients, caregivers or identified by the healthcare professionals; 8) outcomes included are: satisfaction, readiness, acceptability, number of TM consultation, frequency of ER visits and clinical visits.

Exclusion criteria: We will not include the studies on TM: 1) provided by the specialized services (e.g., psychiatry) or facilities (e.g., hospitals); 2) focused exclusively on the after discharge from the hospital care; 3) provided to the patients in the nursing homes; 4) with no involvement of the family physician or a nurse from the primary care practice; 5) provided with no two-way synchronous communication (e.g., e-mail); 6) focused exclusively on the physical rehabilitation/exercises/psychotherapy; 7) focused on the vital signs only (e.g., blood pressure).

Search strategy and study selection: In accordance with PRISMA statement standards,(13) a literature search has been performed by a specialized librarian; publications in English, French or Russian listed in MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, the Cochrane Library published before December 2021, were searched. A search in the above-mentioned databases showed 3594 records that are being analyzed. The key words are presented at Appendix 1. We will update the search of the articles published in 2021 by conducting additional search.

Based on the eligibility criteria, relevant titles, abstracts, and full-text articles are being selected independently by 2 reviewers. Any disagreements will be resolved by consensus or the involvement of an additional reviewer. The full articles relating to any identified conference abstracts will be obtained whenever possible. Literature search results will be uploaded to the Endnote X9. The quality of the studies will be assessed using the validated Mixed Methods Appraisal Tool.(14)

Data Extraction and synthesis: Two researchers will independently extract the following information from each study: characteristics of the study participants (e.g., sample size), type of TM (e.g., phone visit), description of the family medicine practice (e.g., solo vs team-based), characteristics of the study (e.g., design), and outcomes (e.g., frequency of ER visits).

Due to expected heterogeneity of the studies, a narrative approach will be applied to describe the types of TM, its impact on the health needs and the experiences of the patients, caregivers and healthcare providers. We will conduct a sub-group analysis for ALWD as they represent a particularly vulnerable group experiencing specific needs in terms of TM use, barriers and facilitators. We will use a qualitative and narrative description of the results.(15)

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Expected outcomes: We expect to identify the impact on the individual outcomes (e.g., satisfaction with the care, control of the diseases, social isolation, education on the disease) and system outcomes (e.g., access to primary care provider). Moreover, we anticipate identifying the qualitative studies on the experiences of the older adults and healthcare professionals related to TM (e.g., type of TM use).

BOX 2 - PHASE 2

PHASE 2: Qualitative descriptive study
Research question 3: *What is the experience of TM use by older adults, caregivers and clinicians?*
Research questions 4: *What are the facilitators and barriers of TM use in the care of older adults and their caregivers?*

To answer the third and fourth research questions of phase 2 (Box 2), we will conduct a qualitative descriptive study. For the study we will use the individual interviews with the patients and their caregivers (when available) and a focus group with healthcare professionals.

Participants: We will recruit the participants from four McGill University family medicine sites – Herzl clinic of the Jewish General hospital, CLSC-CDN, CLSC-Park Extension and CLSC-Metro.

Recruitment process: We will ask each family medicine practice to identify the patients 65+ seen at least once via teleconsultation from March 2020 to March 2021, then a coordinator of each site will contact the participants to inquire on their interest to participate in the study. The list of the participants who agree to participate will be given to the research team who will explain the study in detail and consent them. The target sample is 10-12 patients from each site with a total sample of 40-48 participants. We are planning to recruit a contrasted sample of patients based on sex, age and functional status to achieve representative data. The Ethics approval has been obtained (August 2021).

Data collection: The individual interviews with the participants will take via zoom meeting or by phone. The format of the interview will be semi-structured, as a pre-developed interview guide will be utilized to capture various components that we have targeted to discuss (open ended questions with the specific questions derived from the results of the first study). The interview guide presented at Appendix 2. One focus group with healthcare professionals will be held at the end of the study. One focus group per family medicine practice will be conducted. Demographic and clinical characteristics of the patients will be collected from their electronic medical records and summarized by family medicine practice units. The following parameters will be collected: age, gender, educational level, spoken language, presence of caregiver as well as comorbidities.

Analyses: The interviews will be audio-recorded, transcribed verbatim, and analyzed with the support of the software package N-Vivo.(16) Data will be analysed iteratively, following the phases of thematic analysis(17) The initial step will involve two independent trained researchers becoming familiar with the data, reading the first three transcripts, and generating initial codes. Codes will be then analysed and collated into potential themes and further reviewed to generate a thematic map of the analysis. The researchers will meet on four occasions to agree on refinements of major themes. To enhance intra-coder reliability and verify emergent themes, three transcripts will be randomly chosen and analysed independently by a third researcher. All these measures ensure the rigor and trustworthiness of the findings. We will conduct a sub-group analysis for ALWD.

Expected outcomes: We expect to identify the themes on the attitude towards TM use (e.g., convenience), facilitators (e.g., decreased cost) and barriers (e.g., lack of face-to-face contact for phone-based TM, technical challenges) to optimal use of TM by the older adults and clinicians.

The Ethics approval has been obtained (August 2021).

Integration phase: development of practice- and evidence-based recommendations

To integrate the results from both studies we will use the thematic analysis to form the common themes. We will match the findings from a systematic review (phase 1) with the themes of the qualitative study (phase 2) using the methods of comparison and contrast. The integration of the results from both

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studies will be done by their joint presentation to identify the commonalities and required actions to inform clinical practice guidelines from the perspectives of main stakeholders (what should be put in place to ensure quality and sustainability of TM for older adults).

The integration of the results will be done within CFIR framework.(12) Based on the findings of the systematic review, individual interviews with older adults and focus groups with healthcare professionals, we will select CFIR constructs to guide the development of the recommendations on TM use (Table 2). A working group will be created to generate a potential list of CFIR constructs based on the results of both phases. The working group will include the principal investigators, collaborators, family physicians, as well as older adults, ALWD and caregivers.

Table 2: Example of the recommendations based on the CFIR framework

CFIR constructs	Appropriate for telemedicine	Inappropriate for telemedicine
Patient related		
Relative advantage	Older adult with a simple medical condition that could be safely assessed and treated using TM (e.g., shingles, uncomplicated urinary tract infection)	Older adults with dementia in delirium
Primary care facility related		
Complexity	Availability of a coordinator to book telemedicine visit and navigate the patient on the process of telemedicine	Inadequate support of the family physicians by the support staff of the clinic
Technology related		
Adaptability	User-friendly platform with simple access to TM visit	Multistep process to access TM visit

DISCUSSION

This will be a first multi-phase study on TM use for older adults in routine primary care practice. TM has become a valuable tool for care delivery, and the American Medical Association anticipates that telehealth as a field will continue to grow.

This study will seek to address the challenges associated with TM provided to older adults in routine primary care based on the existing evidence (phase 1 of the study) and experiences of older adults with feedback of primary care healthcare professionals (phase 2). The integration of the results from both phases using the implementation framework will allow to produce the recommendations on clinical practice guidelines to provide the quality of care to these vulnerable populations, based on their perspectives, regardless of the method of delivery (TM, in-person care or hybrid).

In addition, we hope that this study will contribute to the improvement of access and continuity of primary care as well as timely management of chronic conditions.

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AUTHORS' CONTRIBUTIONS

Vladimir Khanassov – design of the study, overall supervision of the study conduct, Ethics submission, communication with the clinical sites.

Marwa Ilali - collection and analysis for the mixed studies review (phase 1), participation in the refinement of the questionnaire for the qualitative study (phase 2);

Isabelle Vedel – guidance on the study design and its conduct, assistance with communication with the collaborators.

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COMPETING INTERESTS STATEMENT

None to declare

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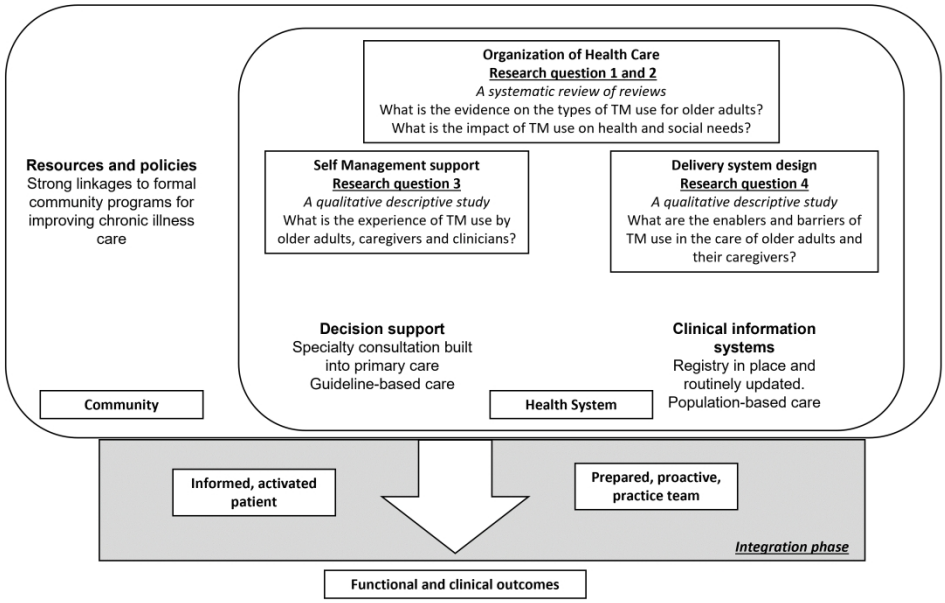

Figure1. The Chronic care model with the integration of the research questions

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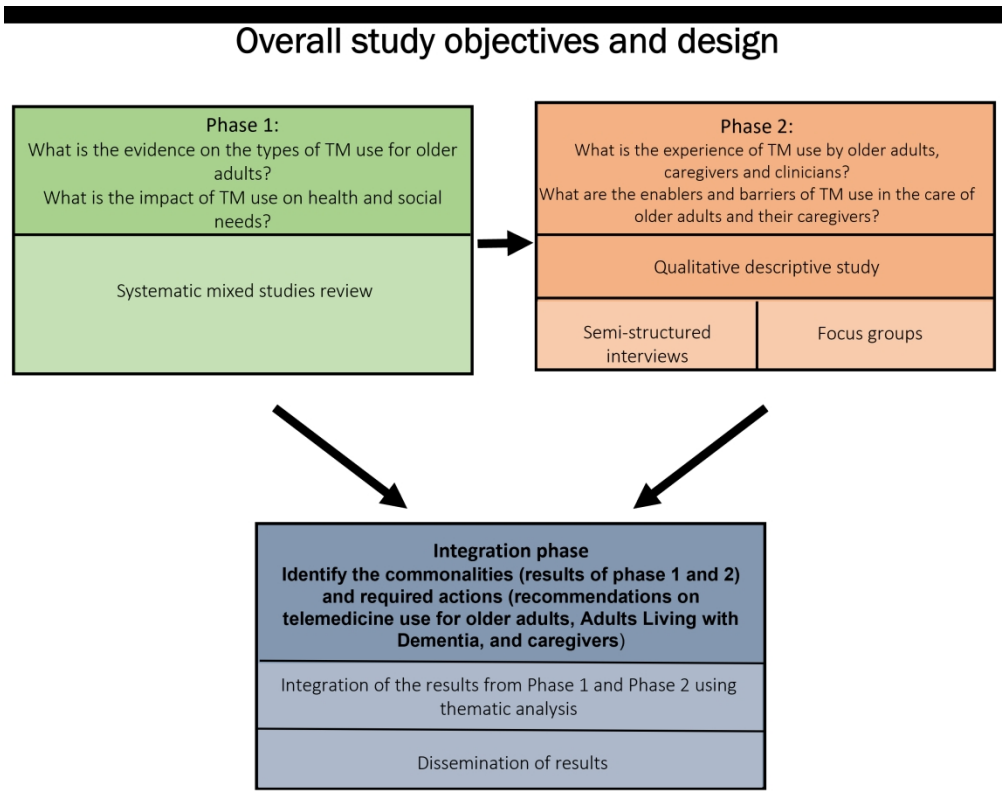

Figure2. Overview of the research project

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Appendix 1. Example of search strategy

Database: Embase Classic+Embase Search Strategy: ---------- 1 telemedicine.mp. (33037)
2 distance counsel*.mp. (18)
3 remote consult*.mp. (674)
4 telehealth.mp. (11717)
5 etherap*.mp. (19)
6 E-Counsel*.mp. (277)
7 health mobile.mp. (126)
8 mHealth.mp. (4757)
9 eHealth.mp. (4387)
10 telecare.mp. (938)
11 teleconsult*.mp. (10858)
12 ehealth*.mp. (4418)
13 teleguide*.mp. (7)
14 telemed*.mp. (33537)
15 Remote video*.mp. (187)
16 Video conferenc*.mp. (1449)
17 Video chat.mp. (120)
18 Video visit*.mp. (203)
19 telephone.mp. (93893)
20 Video consultat*.mp. (462)
21 tele-coach*.mp. (16)
22 Virtual provider*.mp. (8)
23 Virtual appointment*.mp. (28)
24 Virtual consult*.mp. (194)
25 Skype.mp. (793)
26 Telehealthcare.mp. (106)
27 E-health.mp. (4075)
28 Econsult*.mp. (228)
29 Health Informatic*.mp. (2886)
30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (146752)
31 Elderly.mp. (580606)
32 aging.mp. (634135)
33 Geriatric*.mp. (158008)
34 Older Adult*.mp. (107225)
35 Senior*.mp. (60434)
36 ageing.mp. (64194)
37 31 or 32 or 33 or 34 or 35 or 36 (1326974)
38 primary healthcare.mp. (7883)
39 Family Practice.mp. (10065)
40 Family physician*.mp. (19413)
41 General practice.mp. (102902)
42 Primary Care.mp. (162973)
43 Primary health care.mp. (80279)
44 38 or 39 or 40 or 41 or 42 or 43 (312072)
45 30 and 37 and 44 (1083)

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Appendix 2. Interview guide for semi-structured interviews with the patients and caregivers

HUMAN DIMENSION	
User habits	Tell me about your experience of use of phone or video for medical consultations during the pandemic: Please specify if patient does not mention phone or video Are you comfortable using phone/video services for medical consultations with family physician or nurse?* How did you feel about using phone/video services for your medical consultations?* *Optional if patient experience both phone and video* Would you prefer a phone or video consultation? Why?
Equipment	Do you have easy access to phone/video devices at home (e.g. Phone, computer, tablet etc.)? Did you have to purchase any device for your medical consultations during the pandemic (e.g. Phone, computer, tablets, headphones, hearing aids, etc.)*
Skills and Knowledge TM	How comfortable are you with using phone/video for medical consultations with your family physician or nurse?* Did you need help from a family member/friend? How did your health status affect/influence your experience with the use of phone/video for medical consultations (e.g. Hearing/Visual/Memory)? Did you experience any challenges hearing/seeing/remembering information giving by your family physician or nurse?
User Preferences/ convenience	What do you like in these medical consultations? Do you think that video/phone medical consultations help to follow-up your health better? Why? Do you think that video/phone medical consultations can improve your quality of life? How? Do you think that video/phone medical consultations could decrease your visits to the emergency room? Why? What do you dislike in these medical consultations? Do you trust technology to be reliable for your medical consultations? Why?

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	Are you concerned about confidentiality by using teleconsultation? Why? If you had the choice, what would you prefer for your medical consultations, in-person, or phone/video consultations? Why? What do you think about a combination of the consultations (e.g., in person for routine exam, urgent visit and by phone or video for a follow-up on the results)? What would you change in phone or video consultations? What could be done differently by your family medicine practice to provide a better service? In general, would you prefer to discuss your health issue with a nurse or with your family physician?* When you have urgent medical needs, how important is it for you to have easy access to consult your family physician or nurse by phone/video? If it is not possible to consult with your usual family physician or nurse, would you accept having rapid access to any family physician or nurse?*
SYSTEM DIMENSION	
Interoperability/multi-disciplinary team	Do you use phone/video medical consultations outside of your family medicine clinic?* If yes, for what other medical services (e.g., medical, social worker, dietician, therapist)? How was your experience?
ENVIRONMENTAL DIMENSION	
Quality of life/care	During the pandemic, do you think family physician or nurses were qualified/trained enough to provide you with the best care using phone/video consultation?* Why? Do you think the current healthcare system is well adapted for video/phone medical consultations? Why?
Conclusion	Would you recommend phone/video medical consultations to your family member or friend? Why? Do you have any other comments on video/phone medical consultations?

*- questions derived from a systematic mixed studies review (preliminary data)

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Protocol of a multi-phase study on telemedicine for older adults in primary care

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Protocol of a multi-phase study on telemedicine for older adults in primary care

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ABSTRACT

Introduction Telemedicine (TM) has been adopted by many health authorities to limit unnecessary exposure during COVID-19. Prior to the pandemic, TM was associated with improvement of quality of life of older patients, low hospital admissions and nursing home placement, and high overall patients' satisfaction due to convenience. However, older adults may face challenges to access TM, such as hearing, visual and cognitive decline, and limited access to Internet and devices. Ongoing vaccination campaigns and sanitary measures are keeping the pandemic under control, but new variants threaten public safety. Specific recommendations on TM use in high-risk populations, such as older adults, are therefore required. **Methods and analysis** To assess the challenges of TM use in the routine primary healthcare practice of older adults. The research objective is to examine the potential effect of TM; 1) to describe the evidence of TM, 2) to understand the patients, caregivers, and clinicians' experiences with TM use and 3) to develop practice- and evidence-based recommendations on effective use of TM. Multi-phase design: 1) systematic mixed studies review on the evidence of TM use, 2) qualitative descriptive study on the experiences of the patients, caregivers, and healthcare professionals. Recommendations will be proposed based on the integration of both studies. In accordance with PRISMA statement, the systematic mixed studies review will be conducted through multiple databases search: MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, Cochrane Library. Population studied: Community-dwelling 65 years and older adults using two-way synchronous TM by phone or video in a primary care setting. The qualitative descriptive study will include individual interviews with older adults from four McGill university affiliated primary care practices and focus groups with their healthcare professionals. **Ethics and dissemination** Ethics approval has been received. Results will inform healthcare professionals and policymakers on sustainable use of TM in primary care for older adults.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This will be a first comprehensive multi-phase study on TM in primary care for older adults
- Inclusion of the studies in a systematic review regardless of their design will allow to evaluate various outcomes
- The results of a systematic review will inform a qualitative study to examine TM in more details
- This is the first study that is designed to produce the recommendation for TM for older adults in routine primary care practice
- Exclusion of papers not published in English, French or Russian may miss the important additional findings

INTRODUCTION

The COVID-19 pandemic has considerably transformed the lives of older adults and the delivery of primary care services. The use of telemedicine (TM) is now universal in our healthcare system. The World Health Organization defines TM as a delivery system of health care services using different modalities embedded in the realms of information and communication technologies.(1)The use of TM will most probably remain after the pandemic given its important advantages such as "advance health care ranging from individual to population levels, by allowing exchange of patient information for diagnosis, management, primary care prevention and education of physicians via distance learning".(1) Before the COVID-19 pandemic, TM was used infrequently as an alternative to the traditional in-person care, but the pandemic has forced a rapid change in health care delivery. Many healthcare professionals

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had to face a significant shift in their usual practice for which they were not prepared.(2) The recent report of the American Medical Association anticipates that "after COVID-19, $250 billion in care could shift to telehealth, boosting a new field of research and infrastructure development". (3) In Canada, overall, 50% of patient visits are now virtual.(4) Sixty two percent of family physicians state that it has improved access to care for the patients, (5) and 39% of the patients opted for TM to save on the caregiving arrangements.(4)

TM in primary care has potential but at the same time has many challenges. Primary care practice includes not only attending to medical conditions but also to the social aspects of daily life of patients. A family physician may find the traditional in-person visit difficult at times. Adding a TM visit becomes more challenging as technology becomes a more important component of care that family physicians must respond to. The evidence on the use of TM in primary practice is limited due to the low number of the studies. For example, in the narrative review done by Heinzelmann *et al. (6)* and De Albornoz *et al.* (7), they found that the use of TM for the medical history and physical examination in general medicine had good sensitivity and specificity. However, they were only able to identify six studies that investigated the impact of TM on the management of multiple chronic diseases. According to their study, TM was associated with improvement of quality of life and functional status of the patients.(8) The patients' satisfaction with TM was overall high due to convenience, comfort with the technology and relationship with the doctor.(9) The possibility of lower hospital admissions and nursing home placement were not excluded. TM is associated with improvement of quality of life and functional status of older adults with multiple chronic diseases.(8) However, these patients may confront health-related obstacles, such as vision and hearing problems, as well as varying degrees of cognitive loss. Patients may also face significant technological challenges when using TM, such as Internet connection, video or phone devices, and audio or video quality. In contrast to the reviews we cited, we will conduct a mixed-method review focusing on older adults, regardless of their conditions, to capture in depth their TM experience in the primary healthcare system. Furthermore, despite the gradual emergence of new recommendations for the implementation of TM, a patient-centered approach is required to comprehend the long-term impacts of TM on older people.(10) Given the current level of knowledge regarding the use of TM by older adults, primary care clinicians must be at the forefront of efforts to improve TM use among the older adults.

METHODS AND ANALYSIS

To assess the challenges of TM use among older adults living in the community, we are planning to conduct a multi-phase study. The research objective of the study is to examine the potential effect of TM use in the care of older adults. Specifically, we want to

1) Describe the evidence of TM use for the older adults living in the community: *What is the evidence on the types of TM use for older adults? What is the impact of TM use on health and social needs?*

2) Understand the patients, caregivers, and clinicians' experiences with TM use: *What is the experience of TM use by older adults, caregivers, and clinicians? What are the facilitators and barriers of TM use in the care of older adults and their caregivers?*

3) Develop practice- and evidence-based recommendations on effective use of TM for older adults and their caregivers.

Methods: This study is framed according to the Chronic Care Model.(11) The Chronic Care Model is based on the six components: health care organization and linkages with community resources and policies are the prerequisites for delivery system design, decision support, support for self-management and clinical information systems. Our research study will target three components of the model: organization of healthcare (research question 1, 2), support for self-management (research question 3) and delivery system design (research question 4) (figure 1).

Figure 1: The Chronic care model(11) with the integration of the research questions

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We will apply a multi-phase design which is composed of a systematic mixed studies review on the evidence of TM use (**phase 1**) followed by a qualitative descriptive study on the experiences of the patients, caregivers and healthcare professionals (**phase 2**) (figure 2). Finally, we will integrate the results of both studies to propose the recommendations to primary care clinicians. Specifically, we will propose recommendations on how to provide the quality of care to these vulnerable populations regardless of the method of delivery (TM, in-person care or hybrid). Our recommendations will aim to inform clinical practice guidelines, rooted in stakeholders' perspectives. The start date for the study is October 2021 and the estimated date for completion is set to August 2022.

Figure 2: Overview of the research project

Framework of the analysis: To understand contextual factors influencing TM use in primary care practice, we will use the Consolidated Framework for Implementation Research (CFIR) that will allow us to integrate the results of both phases.(12, 13) CFIR framework consists of 39 constructs associated with successful implementation of interventions. The deductive thematic analysis was performed using the CFIR constructs model (Table 1).

Table 1: Example of CFIR constructs and questions for individual interviews (12, 13)

CFIR construct	Individual interview questions
Relative advantage: Do older adults see the need to have telemedicine?	In your opinion, should primary care practice continue to provide telemedicine visits?
Adaptability: Do older adults believe telemedicine can be sufficiently adapted or tailored to meet their needs?	What kind of changes do you think the telemedicine provided by your primary care practice need to make to meet your needs?
Complexity: Do older adults believe that telemedicine is complex based on their perception of the way it is provided?	What did you find most complex about participating in telemedicine? How can primary care practice help with this in future?
Patient needs and resources: Are older patient needs on telemedicine accurately known?	Tell me about your experiences with telemedicine. What barriers did you encounter?
Knowledge and beliefs: Do older adults have negative attitudes towards telemedicine?	What benefit did you receive from telemedicine?
Self-efficacy: Do older adults have confidence in their capabilities to complete telemedicine visit?	How confident are you in use of telemedicine?
Individual state of change: Are older adults enthusiastic about using telemedicine in a sustained way?	Would you recommend telemedicine use to others? Why or why not?

Patient and Public Involvement: We will use a participatory research approach by involving the main stakeholders in all phases of the research project. This includes discussions to finalize the objectives, make interpretation and validation of the findings and development of the recommendations. The main stakeholders include the principal investigators, collaborators, family physicians, as well as older adults and caregivers. We already convened a group of 16 older adults as well as adults living with dementia (ALWD), caregivers and research partners. They will participate in the discussion of the systematic review findings, refining of the research questions of the qualitative study, an interview guide

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development and interpretation of the results. We are planning to organize four meetings: (i) presentation of the preliminary results of the review; (ii) presentation of the refined interview guide for the qualitative study; (iii) presentation of the qualitative study results; (iv) finalizing of the recommendations.

BOX 1 - PHASE 1

PHASE 1: A systematic mixed studies review
Research question 1: *What is the evidence on the types of TM use for older adults?*
Research question 2: *What is the impact of TM use on health and social needs?*

To answer the first and second research questions of phase 1 (Box 1), we will conduct a systematic mixed studies review. This type of the review includes the studies of the different designs which is appropriate to answer a research question on a relatively new method of the care delivery. The review protocol has been recorded at the PROSPERO, CRD42021237686 (www.crd.york.ac.uk/prospero).

Inclusion criteria: To be included in the review, the studies should meet the following criteria: 1) TM should target community-dwelling older adults, ALWD and/or their informal caregivers; 2) the age of the patients using TM should be 65+; 3) TM should be provided by the primary care practice that involves a family physician, a nurse, or any other primary healthcare professional of the clinic; 4) TM should be provided via a two-way synchronous communication using either a phone or a web camera; 5) TM should be a core method of delivering the intervention; 6) any type of study design; 7) the outcomes of the studies - the effect of TM on the healthcare needs expressed by the patients, caregivers or identified by the healthcare professionals; 8) outcomes included are: satisfaction, readiness, acceptability, number of TM consultation, frequency of ER visits and clinical visits.

Exclusion criteria: We will not include the studies on TM: 1) provided by the specialized services (e.g., psychiatry) or facilities (e.g., hospitals); 2) focused exclusively on the after discharge from the hospital care; 3) provided to the patients in the nursing homes; 4) with no involvement of the family physician or a nurse from the primary care practice; 5) provided with no two-way synchronous communication (e.g., e-mail); 6) focused exclusively on the physical rehabilitation/exercises/psychotherapy; 7) focused on the vital signs only (e.g., blood pressure).

Search strategy and study selection: In accordance with PRISMA statement standards,(14) a literature search has been performed by a specialized librarian; publications in English, French or Russian listed in MEDLINE, PsycINFO, EMBASE, CINAHL, AgeLine, the Cochrane Library published before December 2021, were searched. A search in the above-mentioned databases showed 3594 records that are being analyzed. The key words are presented at Appendix 1. We will update the search of the articles published in 2021 by conducting additional search.

Based on the eligibility criteria, relevant titles, abstracts, and full-text articles are being selected independently by 2 reviewers. Any disagreements will be resolved by consensus or the involvement of an additional reviewer. The full articles relating to any identified conference abstracts will be obtained whenever possible. Literature search results will be uploaded to the Endnote X9. The quality of the studies will be assessed using the validated Mixed Methods Appraisal Tool.(15)

Data Extraction and synthesis: Two researchers will independently extract the following information from each study: characteristics of the study participants (e.g., sample size), type of TM (e.g., phone visit), description of the family medicine practice (e.g., solo vs team-based), characteristics of the study (e.g., design), and outcomes (e.g., frequency of ER visits).

Due to expected heterogeneity of the studies, a narrative approach will be applied to describe the types of TM, its impact on the health needs and the experiences of the patients, caregivers and healthcare providers. We will conduct a sub-group analysis for ALWD as they represent a particularly vulnerable group experiencing specific needs in terms of TM use, barriers and facilitators. We will use a qualitative and narrative description of the results.(16)

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Expected outcomes: We expect to identify the impact on the individual outcomes (e.g., satisfaction with the care, control of the diseases, social isolation, education on the disease) and system outcomes (e.g., access to primary care provider). Moreover, we anticipate identifying the qualitative studies on the experiences of the older adults and healthcare professionals related to TM (e.g., type of TM use).

BOX 2 - PHASE 2

PHASE 2: Qualitative descriptive study
Research question 3: *What is the experience of TM use by older adults, caregivers and clinicians?*
Research questions 4: *What are the facilitators and barriers of TM use in the care of older adults and their caregivers?*

To answer the third and fourth research questions of phase 2 (Box 2), we will conduct a qualitative descriptive study. For the study we will use the individual interviews with the patients and their caregivers (when available) and a focus group with healthcare professionals.

Participants: We will recruit the participants from four McGill University family medicine sites – Herzl clinic of the Jewish General hospital, CLSC-CDN, CLSC-Park Extension and CLSC-Metro.

Recruitment process: We will ask each family medicine practice to identify the patients 65+ seen at least once via teleconsultation from March 2020 to March 2021, then a coordinator of each site will contact the participants to inquire on their interest to participate in the study. The list of the participants who agree to participate will be given to the research team who will explain the study in detail and consent them. The target sample is 10-12 patients from each site with a total sample of 40-48 participants. We are planning to recruit a contrasted sample of patients based on sex, age and functional status to achieve representative data. The Ethics approval has been obtained (August 2021).

Data collection: The individual interviews with the participants will take via zoom meeting or by phone. The format of the interview will be semi-structured, as a pre-developed interview guide will be utilized to capture various components that we have targeted to discuss (open ended questions with the specific questions derived from the results of the first study). The interview guide presented at Appendix 2. One focus group with healthcare professionals will be held at the end of the study. One focus group per family medicine practice will be conducted. Demographic and clinical characteristics of the patients will be collected from their electronic medical records and summarized by family medicine practice units. The following parameters will be collected: age, gender, educational level, spoken language, presence of caregiver as well as comorbidities.

Analyses: The interviews will be audio-recorded, transcribed verbatim, and analyzed with the support of the software package N-Vivo.(17) Data will be analysed iteratively, following the phases of thematic analysis(18) The initial step will involve two independent trained researchers becoming familiar with the data, reading the first three transcripts, and generating initial codes. Codes will be then analysed and collated into potential themes and further reviewed to generate a thematic map of the analysis. The researchers will meet on four occasions to agree on refinements of major themes. To enhance intra-coder reliability and verify emergent themes, three transcripts will be randomly chosen and analysed independently by a third researcher. All these measures ensure the rigor and trustworthiness of the findings. We will conduct a sub-group analysis for ALWD.

Expected outcomes: We expect to identify the themes on the attitude towards TM use (e.g., convenience), facilitators (e.g., decreased cost) and barriers (e.g., lack of face-to-face contact for phone-based TM, technical challenges) to optimal use of TM by the older adults and clinicians.

The Ethics approval has been obtained (August 2021).

Integration phase: development of practice- and evidence-based recommendations

To integrate the results from both studies we will use the thematic analysis to form the common themes. We will match the findings from a systematic review (phase 1) with the themes of the qualitative study (phase 2) using the methods of comparison and contrast. The integration of the results from both

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studies will be done by their joint presentation to identify the commonalities and required actions to inform clinical practice guidelines from the perspectives of main stakeholders (what should be put in place to ensure quality and sustainability of TM for older adults).

The integration of the results will be done within CFIR framework.(12, 13) Based on the findings of the systematic review, individual interviews with older adults and focus groups with healthcare professionals, we will select CFIR constructs to guide the development of the recommendations on TM use (Table 2). A working group will be created to generate a potential list of CFIR constructs based on the results of both phases. The working group will include the principal investigators, collaborators, family physicians, as well as older adults, ALWD and caregivers.

Table 2: Example of the recommendations based on the CFIR framework

CFIR constructs	Appropriate for telemedicine	Inappropriate for telemedicine
Patient related		
Relative advantage	Older adult with a simple medical condition that could be safely assessed and treated using TM (e.g., shingles, uncomplicated urinary tract infection)	Older adults with dementia in delirium
Primary care facility related		
Complexity	Availability of a coordinator to book telemedicine visit and navigate the patient on the process of telemedicine	Inadequate support of the family physicians by the support staff of the clinic
Technology related		
Adaptability	User-friendly platform with simple access to TM visit	Multistep process to access TM visit

DISCUSSION

This will be a first multi-phase study on TM use for older adults in routine primary care practice. TM has become a valuable tool for care delivery, and the American Medical Association anticipates that telehealth as a field will continue to grow.

This study will seek to address the challenges associated with TM provided to older adults in routine primary care based on the existing evidence (phase 1 of the study) and experiences of older adults with feedback of primary care healthcare professionals (phase 2). The integration of the results from both phases using the implementation framework will allow to produce the recommendations on clinical practice guidelines to provide the quality of care to these vulnerable populations, based on their perspectives, regardless of the method of delivery (TM, in-person care or hybrid).

In addition, we hope that this study will contribute to the improvement of access and continuity of primary care as well as timely management of chronic conditions.

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AUTHORS' CONTRIBUTIONS

Vladimir Khanassov – design of the study, overall supervision of the study conduct, Ethics submission, communication with the clinical sites.

Marwa Ilali - collection and analysis for the mixed studies review (phase 1), participation in the refinement of the questionnaire for the qualitative study (phase 2);

Isabelle Vedel – guidance on the study design.

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COMPETING INTERESTS STATEMENT

None to declare

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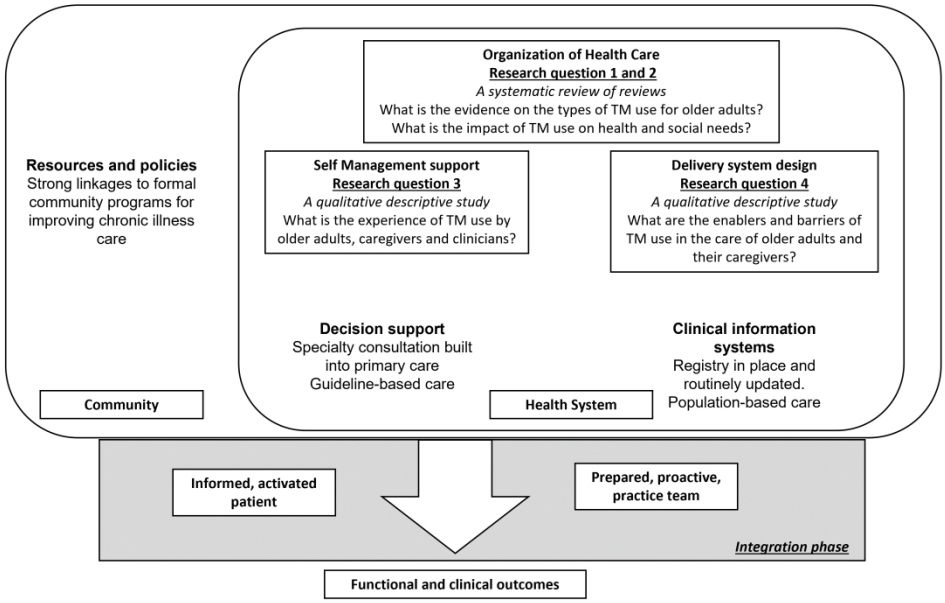

Figure1. The Chronic care model with the integration of the research questions

701x427mm (130 x 130 DPI)

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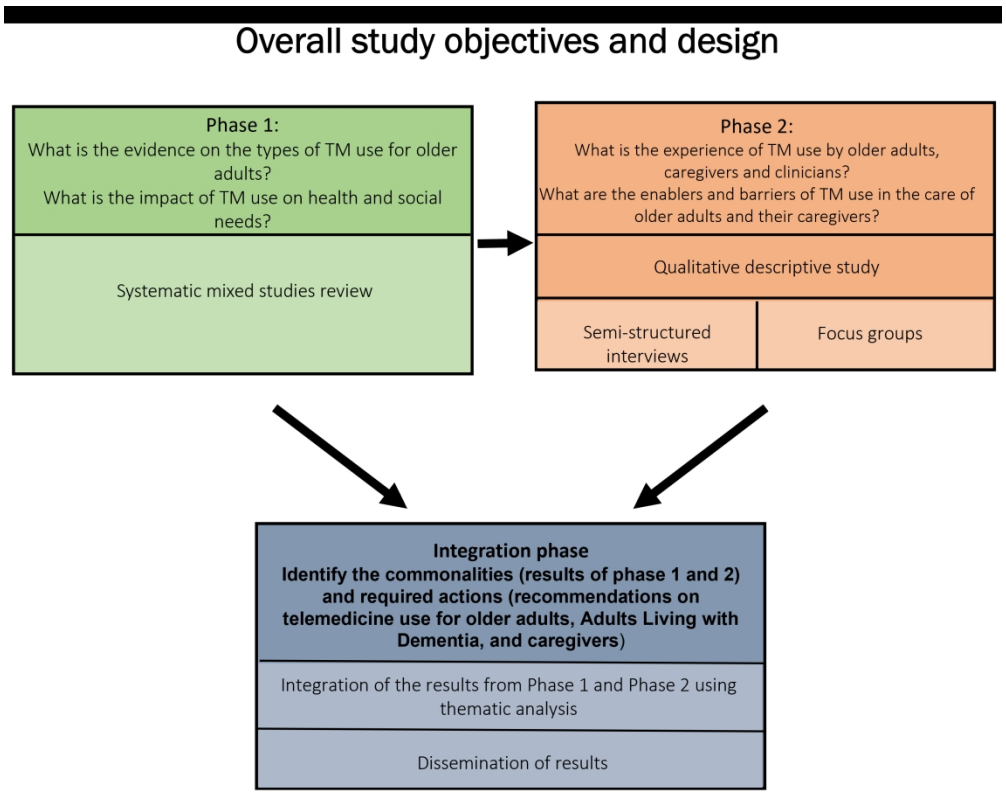

Figure2. Overview of the research project

584x462mm (130 x 130 DPI)

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Appendix 1. Example of search strategy

Database: Embase Classic+Embase Search Strategy: ---------- 1 telemedicine.mp. (33037)
2 distance counsel*.mp. (18)
3 remote consult*.mp. (674)
4 telehealth.mp. (11717)
5 etherap*.mp. (19)
6 E-Counsel*.mp. (277)
7 health mobile.mp. (126)
8 mHealth.mp. (4757)
9 eHealth.mp. (4387)
10 telecare.mp. (938)
11 teleconsult*.mp. (10858)
12 ehealth*.mp. (4418)
13 teleguide*.mp. (7)
14 telemed*.mp. (33537)
15 Remote video*.mp. (187)
16 Video conferenc*.mp. (1449)
17 Video chat.mp. (120)
18 Video visit*.mp. (203)
19 telephone.mp. (93893)
20 Video consultat*.mp. (462)
21 tele-coach*.mp. (16)
22 Virtual provider*.mp. (8)
23 Virtual appointment*.mp. (28)
24 Virtual consult*.mp. (194)
25 Skype.mp. (793)
26 Telehealthcare.mp. (106)
27 E-health.mp. (4075)
28 Econsult*.mp. (228)
29 Health Informatic*.mp. (2886)
30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (146752)
31 Elderly.mp. (580606)
32 aging.mp. (634135)
33 Geriatric*.mp. (158008)
34 Older Adult*.mp. (107225)
35 Senior*.mp. (60434)
36 ageing.mp. (64194)
37 31 or 32 or 33 or 34 or 35 or 36 (1326974)
38 primary healthcare.mp. (7883)
39 Family Practice.mp. (10065)
40 Family physician*.mp. (19413)
41 General practice.mp. (102902)
42 Primary Care.mp. (162973)
43 Primary health care.mp. (80279)
44 38 or 39 or 40 or 41 or 42 or 43 (312072)
45 30 and 37 and 44 (1083)

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Appendix 2. Interview guide for semi-structured interviews with the patients and caregivers

HUMAN DIMENSION	
User habits	Tell me about your experience of use of phone or video for medical consultations during the pandemic: Please specify if patient does not mention phone or video Are you comfortable using phone/video services for medical consultations with family physician or nurse?* How did you feel about using phone/video services for your medical consultations?* *Optional if patient experience both phone and video* Would you prefer a phone or video consultation? Why?
Equipment	Do you have easy access to phone/video devices at home (e.g. Phone, computer, tablet etc.)? Did you have to purchase any device for your medical consultations during the pandemic (e.g. Phone, computer, tablets, headphones, hearing aids, etc.)*
Skills and Knowledge TM	How comfortable are you with using phone/video for medical consultations with your family physician or nurse?* Did you need help from a family member/friend? How did your health status affect/influence your experience with the use of phone/video for medical consultations (e.g. Hearing/Visual/Memory)? Did you experience any challenges hearing/seeing/remembering information giving by your family physician or nurse?
User Preferences/ convenience	What do you like in these medical consultations? Do you think that video/phone medical consultations help to follow-up your health better? Why? Do you think that video/phone medical consultations can improve your quality of life? How? Do you think that video/phone medical consultations could decrease your visits to the emergency room? Why? What do you dislike in these medical consultations? Do you trust technology to be reliable for your medical consultations? Why?

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	Are you concerned about confidentiality by using teleconsultation? Why? If you had the choice, what would you prefer for your medical consultations, in-person, or phone/video consultations? Why? What do you think about a combination of the consultations (e.g., in person for routine exam, urgent visit and by phone or video for a follow-up on the results)? What would you change in phone or video consultations? What could be done differently by your family medicine practice to provide a better service? In general, would you prefer to discuss your health issue with a nurse or with your family physician?* When you have urgent medical needs, how important is it for you to have easy access to consult your family physician or nurse by phone/video? If it is not possible to consult with your usual family physician or nurse, would you accept having rapid access to any family physician or nurse?*
SYSTEM DIMENSION	
Interoperability/multi-disciplinary team	Do you use phone/video medical consultations outside of your family medicine clinic?* If yes, for what other medical services (e.g., medical, social worker, dietician, therapist)? How was your experience?
ENVIRONMENTAL DIMENSION	
Quality of life/care	During the pandemic, do you think family physician or nurses were qualified/trained enough to provide you with the best care using phone/video consultation?* Why? Do you think the current healthcare system is well adapted for video/phone medical consultations? Why?
Conclusion	Would you recommend phone/video medical consultations to your family member or friend? Why? Do you have any other comments on video/phone medical consultations?

*- questions derived from a systematic mixed studies review (preliminary data)

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