Sustainability of home telehealth programs: A systematic review

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Introduction & Background: As part of the Medicare Care Transitions Act of 2009, the federal government mandated reductions in re-hospitalizations through better care coordination and follow up services. Remote monitoring technologies such as telehealth has emerged as a potential solution to reduce re-hospitalization and healthcare utilization costs and manage chronic diseases in the home health community. However, sustainability of home telehealth programs remains a major challenge with unclear understanding of factors contributing to discontinued or sustained telehealth use. Earlier systematic reviews have focused on the effectiveness of home telehealth programs for physiological or behavioral outcomes [1-4], but they have not addressed such programs' sustainability.

Methods: To address this knowledge gap, we present here a systematic review of articles published from 1996 to 2013 within the databases of CINAHL, Pubmed / Medline, PsychInfo, Web of Science, Cochrane Reviews to identify barriers to and facilitators for sustained telehealth use by home health patients and clinicians for chronic physiological disease management. For this review, we used the search terms of *telehealth*, *telemonitoring*, *telecare*, *telemedicine*, and *telehomecare* and adapted Cradduck's [5] definition of sustainability for telehealth services as the use of home telehealth services that holds the promise of being absorbed into routine health-care delivery including an increasing demand for those services, as well as acceptance of such services among healthcare providers along with a commitment to invest in them. Articles were included if they reported on longitudinal investigations of telehealth usage by home health agencies and addressed the management of chronic cardiovascular disease, diabetes, and obstructive pulmonary disease in older adults age 65 years or above. Data extraction using PRISMA guidelines and quality appraisal using Mixed Methods Appraisal Tool (MMAT) was conducted on relevant empirical studies. Thematic analysis across the studies and narrative summaries were used to synthesize the findings from the included studies. From the final articles, the following data were extracted: (1) study design; (2) study quality; (3) characteristics of the participants, including demographics, diagnoses, and role in the telehealth program; (4) data collection methods; (5) description of the telehealth program model, and (6) determinants of the sustainability of home telehealth programs.

Results: The initial 3920 citations were reduced to 943 after applying the initial search criteria and eliminating duplicates. After title and abstract search, we abstracted 142 full articles of which 18 articles [6-23] of moderate quality met the inclusion criteria. Full-texts were retrieved by a graduate research assistant and reviewed by the first two authors. Majority of the studies were conducted in UK (9) & US (7), with 1in Canada and the Netherlands each. The articles are recent; 12 of the 18 studies were published after 2010. Twelve of the studies had qualitative designs; these included case study, phenomenological, and ethnographic approaches, as well as 3 process evaluations of randomized controlled trials. The other studies included five quantitative studies which included 1 descriptive usability study, 1 survey and 3 secondary analyses of retrospective data; and 1 mixed methods study. Sample sizes ranged from 12 to 82 for the qualitative studies and from 132 to 403 for the survey and secondary analysis studies. Participants included only patients (10 studies), only clinicians (4), or mixed samples of both patients and clinicians (4). Patient diagnoses targeted by the telehealth programs included only heart failure (5 studies), only COPD (5), only diabetes (2), or any of those three chronic diseases (7). Major themes that on sustainability of home telehealth programs included: user perceptions on effectiveness of home telehealth programs for achieving intended outcomes, tailoring of home telehealth programs to patient characteristics and needs, communication and collaboration among telehealth users, home health organizational processes and culture, and technology usability and innovation.

Discussion: In summary, to realize the potential of telehealth services for chronic disease management, future program redesign must (1) recognize formal reorganization of work between the staffs of home health service settings to include partnership and accountability negotiation, system interoperability, and shared visions for patient care management; (2) identify criteria for patient characteristics to enable telehealth service delivery tailored to individual patients' capabilities and context; (3) include clear guidelines and protocols for patient teaching, mechanisms for feedback and response, and negotiation of patient responsibilities, empowering patients to become self-reliant in their care management; (4) include stakeholder input during program implementation for improved incorporation within workflow and life routines; (5) improve technical quality of communication; and (6) enhance device usability tailored to elder use.

Conclusion: The findings of this systematic review have important implications for sustained usage of telehealth programs by home health service settings and can help realize the potential of telehealth for chronic disease management.

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