

High-Intensity Telemedicine: An Innovative Healthcare Delivery Model to Reduce Emergency Department Visits for Seniors

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ABSTRACT

Seniors are four times more likely to visit the emergency department (ED) than younger populations. A case series study by Shah et al. examined the use of high-intensity telemedicine for older, community-dwelling adults to reduce ED visits. The results of the study indicated fewer visits to and decreased time spent in the ED. However, the current literature on telemedicine as a health care delivery model has shown mixed results. Future research needs to identify the appropriate type of patients, health systems, and program factors that can predict the success of this health care delivery model.

KEYWORDS: *emergency department, telemedicine, older adults, health care delivery*

Telemedicine is the use of health information technology for clinical care when distance and time separate the patient and healthcare provider. It can range from low intensity, which includes only video conferencing, to high-intensity.¹ High-intensity telemedicine is an innovative health care delivery model designed by Shah et al. for non-urgent complaints that may not require emergency department (ED) resources.¹ In this model, patients' medical complaints on the telephone are triaged by either a nurse or primary care physician to high-intensity telemedicine or traditional care. The medical complaint is assigned one of six clinical protocols—skin, fever, shortness of breath, pain, altered mental status, or other—that guides certified telemedicine assistants (CTAs) in gathering the clinical data that is required during the visit. CTAs are trained in practical skills and equipped with necessary digital tools to complete the visit at the patient's home (Table 1). The information gathered is collected by CTAs into a telemedicine electronic medical record (EMR). The EMR is accessed by telemedicine providers—physicians and nurse practitioners—who are notified of a completed home visit by a CTA and access the information remotely from any internet-enabled computer at any time. The telemedicine provider then completes the EMR, provides prescriptions, electronic orders, and a written discharge sheet to both the patient and primary care provider.¹

Telemedicine emergency care services have already shown effectiveness for children in school centers,^{2,3} and seniors in the context of stroke and nursing homes.^{4,5} Older adults are often unable to obtain same-day primary care, and when available,

they face barriers related to transportation.^{6,7} This leads to increased ED visits and ambulance transportation. Based on a qualitative evaluation of the high-intensity telemedicine model, clinicians, patients, and caregivers may benefit from improved diagnostic ability and more timely treatment.⁸

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With a high-intensity telemedicine model, clinicians, patients, and caregivers would benefit from improved diagnostic ability and more timely treatment.

Research in telemedicine has shown mixed results over recent years. A recent randomized controlled trial by Takahashi et al.⁹ studied a video conferencing telemedicine system with blood pressure, weight, glucose, pulse oximeter, and peak flow data monitoring. The study looked at patients with multiple co-morbidities and determined that there was no difference between patients receiving telemonitoring vs. usual care with respect to hospitalisation rates and ED visits. Furthermore, a study by Chaudhry et al.¹⁰ focused on telemonitoring in patients with heart failure which found it did not improve outcomes or decrease ED visits. There are further studies focusing on disease management and intensive care unit monitoring which contribute to a growing body of literature that suggests home telemedicine does not reduce ED visits or admission rates.^{11,12} Despite this evidence, telemedicine has been shown to be highly variable and context specific with possible success in certain population groups such as the elderly.¹³

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Table 1. High-Intensity Telemedicine Capabilities¹

Communication with patient
Telephone or video conferencing
Real-time model and store-and-forward model
History Taking
Protocol driven data collection
Access resources including caregivers and facility staff
Perform medical reconciliation
Physical exam
Digital Images (e.g. skin, tympanic membrane, throat edema)
Video (e.g. respiratory effort, gait, joint range of motion)
Audio (e.g. lung, heart, bowel sounds)
Equipment
Digital stethoscope
Digital otoscope
12 lead electrocardiogram
Supplies to collect blood and urine samples
Digital pulse oximeter
High resolution digital camera
Web camera linked to a laptop computer
Diagnostic testing
Pulse oximetry
Electrocardiogram
Phlebotomy
Limited point-of-care (e.g. urinalysis, rapid strep)
Collaboration with mobile radiology

¹Adapted from Shah MN, Gillespie SM, Wood N, Wasserman EB, Nelson DL, Dozier A, et al. High-Intensity Telemedicine-Enhanced Acute Care for Older Adults: An Innovative Healthcare Delivery Model. *J Am Geriatr Soc.* 2013;61(11):2000-7

Seniors are four times more likely to visit the ED than younger populations and have extended wait times of 4 hours, compared with only 2.5 hours for adults age 20 to 64.^{14,15} Of those ED visits, 20 per cent did not require ED services, but led to higher admission rates and more extensive diagnostic workups.^{16,17} Once in the ED, seniors are more susceptible to acquiring delirium and falls and have increased rates of future repeat visits.^{18,19} This increases the economic burden despite an already high age-related health care cost of \$30.9 billion in Canada in 2010.¹⁵ Gaps in care for seniors that contribute to unnecessary ED visits have been attributed to ambulatory care-sensitive problems that may be treated outside the ED and self-care issues related to activities of daily living (ADLs) and instrumental activities of daily living (IADLs).²⁰

High-intensity telemedicine may prevent unnecessary ED visits by seniors. A study by Shah et al.¹ looked at the use of high-intensity telemedicine for older community dwelling adults. This case series study included 388 patients with a median age of 85, predominantly female (74%) and of white race (90.5%). Patients were from assisted living facilities (40.2%) or

lived independently (59.8%). The authors employed the high intensity telemedicine model as described above. Follow-up surveys of patients' caregivers indicated that telemedicine saved a visit to an after-hours clinic or an ED 88 per cent of the time and saved an estimated 3.5 hours of time. Patients indicated that telemedicine saved a visit to an after-hours clinic or an ED 91 per cent of the time and saved an estimated 3 hours of time. Both residents and caregivers reported great satisfaction with the high-intensity telemedicine program.

This study was a case series with no control group to compare rates of ED visits to those with traditional care, thus limiting the quality of evidence. Furthermore, it did not examine important outcomes related to cost-effectiveness or health outcomes that would strengthen the practicality of high-intensity telemedicine. The results may not be generalizable to other populations since the study participants were predominantly female and of white race. Additionally, nursing home patients were not included in this study due to their access to medical services.

High-intensity telemedicine provides healthcare providers the opportunity to address issues related to ambulatory care and shows increased diagnostic potential. Due to its available technologies and thorough data collection, providers are able to obtain more information to make proper diagnoses and treatment plans. They can also identify patient issues related


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to ADLs/IADLs and make appropriate referrals to allied health professionals and home nursing care. Previous integrated telemedicine approaches were found successful for elderly patients with complex co-morbidities and lead to decreased length of hospital stays, ED visits and improved patient satisfaction.²¹ An analysis of geriatric telemedicine strategies found an overall paucity of evidence within this population. However, there were successful telemedicine strategies in populations with chronic respiratory disease, diabetes and hypertension management with consistent qualitative reporting of high patient satisfaction within the elderly population.²² With these promising results, the addition of a high-intensity model may address the identified care gaps leading to an appropriate context for success in telemedicine.

Limitations to a high-intensity telemedicine model do exist. At the systems level, telemedicine for the geriatric

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population is often not considered a priority and requires organizational policy in order to normalize the intervention.²³ Similarly, innovative program implementation would be challenging, as organizations are largely resistant to change.^{24,25} The start-up cost of technology and training a new health care professional (i.e. CTA) is costly and resource intensive and may be a considerable barrier to implementation. However, the long-term economic impact of reduced ED visits may prove high-intensity telemedicine a worthwhile investment. Currently, there is a lack of research regarding the long-term economic impact of telemedicine.

High-intensity telemedicine has shown promise in reducing ED visits in older adults with high patient satisfaction. However, evidence relating to telemedicine continues to produce mixed results. Further research needs to identify the appropriate type of patients, health systems, and program factors that predict telemedicine program success. Study outcomes such as cost effectiveness and individual-level health outcomes need to be examined to determine the concrete benefits of this model before its wide spread implementation. 

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