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Geriatrics (A Faye and S Katz, Section Editor)

The Use of Telemedicine in Older Patients with Gastrointestinal Diseases

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Abstract

Purpose of Review The COVID-19 pandemic helped us understand that telemedicine provides an alternative way to manage patients remotely, with an added benefit of saving time and travel costs. However, barriers may exist in an older population of patients such as inadequate technology availability and knowledge, and lack of internet connectivity. This systematic review and analysis of data at an academic medical center examines the current literature and investigates the efficacy of telemedicine for older adults requiring gastrointestinal care.

Recent Findings In the systematic review, we included 22 manuscripts from an initial 120 that were identified based on inclusion and exclusion criteria. In this existing literature, telemedicine visits were equivalent or better than in-person visits based on many metrics, including patient satisfaction, time and money saved, and standard patient outcomes. At a rural academic medical center, there was a steady decrease in the failure rate of

telemedicine visits from April 2020 to May 2022 in all age groups, including the 65+age group, from 17% in April 2020 to 3% in May 2022.
Summary Telemedicine offers a comparable alternative to in-person visits that is convenient, low-cost, and does not compromise quality of care for older patients obtaining GI care. The COVID-19 pandemic has accelerated progress and uptake of telemedicine, and the successful use by all ages including older patients opens the broader conversation about the continued use of telemedicine for care in various areas of medicine.

Introduction

While the concept of telemedicine is not new, it was not until the coronavirus disease of 2019 (COVID-19) pandemic that the use of telemedicine for routine clinical care became necessary across the world. As a result, virtual visits dramatically increased, including virtual visits to gastroenterology (GI) clinics. Patients with a broad range of GI illnesses including liver and pancreatic diseases, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), and motility disorders had to quickly adapt if they wanted to successfully continue care with their gastroenterologists. While medical centers had entire information technology (IT) departments immediately dedicated to facilitating virtual care, patients were isolated at home with whatever technology they had available at that time. There was not much concern that technologically savvy people would be able to engage in telemedicine visits, but certain populations were certainly at risk of not being able to adequately stay connected to the healthcare system.

One at risk group is the older patient population. They form a subset of patients with unique needs and limitations regarding the successful use of telemedicine. This includes limited transportation, geographic isolation, lack of adequate electronic devices and internet connectivity and lower technological confidence [1]. In addition, this patient group was among the most at risk from COVID-19, so keeping them at home and away from health care facilities was a priority. Therefore, the patients that could benefit most from the use of telemedicine was also the patient population with the highest chance of disengaging from health care due to lack of capability to attend telemedicine visits. To examine how older patients seeking GI care engage with telemedicine services, we took two approaches. We have conducted a systematic review of older patients' use of telemedicine in GI clinics, and also examined the real-world trends in telemedicine visits by age in a rural, academic health care setting. Our goals are to describe how telemedicine services impact outcomes of GI care, to understand the ability of an older patient population to use telemedicine services for GI care, and to examine how this changed throughout the COVID-19 pandemic.

Methods

To better understand the effectiveness of using telemedicine for GI services for an older patient population, we set out to perform both a high-level overview and a more specific analysis at a single medical center during the COVID-19 pandemic. The overview was accomplished through a systematic review of the published literature and the real-world analysis was done using data from the Dartmouth-Hitchcock Medical Center (DHMC). DHMC is a rural academic medical center in New Hampshire, USA performing a mix

of primary, secondary and tertiary care for Northern New England. The Section of Gastroenterology and Hepatology performs over 15,000 patient visits annually and sees patients from New Hampshire, Vermont, and Maine. For both the systematic review and analysis of DHMC data, older age was defined as over the age of 65 years.

Systematic Review of Literature

Search criteria for the systematic literature review using the PICO (patient, intervention, comparison, outcome) method included **Patients** (adults over 65 requiring GI care), **Intervention** (telemedicine for GI clinics), **Comparison** (in-person healthcare in GI clinics and **Outcome** (equal or improved outcomes in care in GI).

The research terms are summarized in the Table 1. The final advanced search combined the domains of telemedicine, GI and older patient population and restricted it to the years 2016–2022. Databases searched included PubMed, Medline, and Scopus. The resulting manuscripts were then sorted using the following inclusion/exclusion criteria: GI-related telemedicine must be mentioned for at least a couple of paragraphs; Older patients should make up a portion of their cohort studied, and should be included in the discussion; and Telemedicine should be compared to standard in-person care or should be a main form of healthcare provided. After a full text screening, the necessary data were extracted from the resulting manuscripts. Quality of evidence was analyzed, and pertinent information was synthesized.

Dartmouth-Hitchcock Medical Center Data

Data on all telemedicine visits in the DHMC Section of Gastroenterology and Hepatology from March 2020 to May 2022 were collected and analyzed. All patients were at least 18 years of age and had to have had at least one telemedicine visit scheduled within the electronic medical record (EMR) system. The

Table 1 Summary of research terms

	#1: Telemedicine	#2: GI/IBD	#3: Older patients
Terms/subheadings	“Telemedicine"[Mesh] OR	"Digestive System Diseases"[Mesh] OR "Inflammatory Bowel Diseases"[Mesh] OR	"Aged"[Mesh] OR "Health Services for the Aged"[Mesh] OR "Geriatrics"[Mesh] OR
Textwords	Telemedicine[tiab] OR Virtual provider*[tiab] OR Virtual appointment*[tiab] OR Virtual consult*[tiab] OR Virtual visit*[tiab]	Inflammatory Bowel Disease*[tiab] OR Ulcerative colitis[tiab] OR Crohn disease[tiab]	Older population*[tiab] OR Older adult*[tiab] OR Older person*[tiab] OR Advanced age [tiab]

EMR database was queried to identify the number of patients scheduled for telemedicine visits, age of patients, proportion of visits that were video or telephone only, and failure rate of the telemedicine visit. Failure rate is defined as the proportion of telemedicine visits that were intended to be delivered via a two-way audio-visual connection but were delivered via an audio-only connection due to a technical barrier that prevented the use of video.

Results

Systematic Review

One hundred-twenty manuscripts were identified from the literature search with 22 meeting inclusion criteria.

The mean age of patients studied in the 22 manuscripts meeting inclusion criteria was 52 years. A total of 3/22 publications had a median patient age over 65. In 21/22 manuscripts included in this analysis, patients aged 65 and over were within one standard deviation of the mean or median age, making up at least 15% of the population studied. A summary of the ages of patients studied can be found in Table 2.

Use of Telemedicine for Specific GI Disorders

IBD Care

Review of the literature shows that telemedicine for IBD care has been used for many years with success to provide high-quality care and measure disease progression. Telemedicine provides an alternative to in-person visits for many aspects of IBD care that do not require a physical exam such as medication adjustments (biological therapy, corticosteroids, and anti-inflammatory agents). Additionally, it offers more flexible timing and saves costs for patients who may be prohibited from traveling to outpatient appointments due to money or time restraints. Li et al. found that telemedicine IBD clinics allowed patients to save on average $62 of out-of-pocket costs, while de Jong et al. found that telemedicine lowered the annual cost of IBD care for patients by $612 without lowering quality life adjusted years [2, 3]. Furthermore, Ruf et al. found that before telemedicine for IBD care was available to their cohort of patients, the mean travelling distance (for both ways) was 310.1 km with a mean overall travel time of 318.2 min; telemedicine thus saved an average of US$36.61 in potential travelling cost per appointment [4•].

The preferred modality of telemedicine slightly differs among patients; older patients are more likely to complete telephone visits rather than videoconferencing visits despite availability of both [1]. Among IBD patients, both telephone visits and videoconferencing visits are appropriate for routine follow-up care during remission, although patients prefer in-person visits during flares [1]. Telemedicine was also positively viewed among all age groups

Table 2 Age of patients in studies

GI subspecialty	Median or mean age of patients	Reference
IBD	52	Rodriguez et al., 2021 [1]
	42	Li et al., 2017 [2]
	44	de Jong et al., 2020 [3]
	46	Ruf et al., 2020 [4•]
	41	Shah et al., 2022 [5]
	40.5	Srinivasan et al., 2020 [6•]
	51	Appel et al., 2022 [7]
	43	Lahat et al., 2021 [8]
Hepatology	32	Efe et al., 2020 [9]
	51	Schulz et al., 2020 [10]
	57.5	Talal et al., 2019 [11]
	52	Serper et al., 2020 [12]
	59	Louissaint et al., 2021 [13•]
	60	Wegermann et al., 2022 [14•]
GI-related cancer	61	Barsom et al., 2021 [15]
	64.5	Edwards et al., 2020 [16]
	46	Furniss et al., 2021 [17]
	72.1	Haase et al., 2021 [18]
Motility	57	Collins et al., 2021 [19]
	81.65	Burns et al., 2019 [20]
	67.5	Morrell et al., 2017 [21]
	50.9	Bednarski et al., 2018 [22]

with IBD; in one study 96% of patients reported a meaningful discussion during the visit, 98% reported the time allotted was adequate, 91% reported they perceived that their physician understood their disease state, 77% understood the follow-up plan after the visit, and 77% of patients would use telemedicine as their preferred method of follow-up [2]. Additionally, the video component of an IBD telemedicine visit significantly contributes to quality and satisfaction of the visit [5]. In patients with Crohn's disease, one study found that those who were treated using telemedicine had higher success rates compared to in-person care as measured through biomarker remission (fecal calprotectin), disease monitoring, and treatment de-escalation [6•]. Patient-reported outcome-based telemedicine follow-up for patients with IBD has also shown a reduction in outpatient visits for patients with mild or no disease activity. [7]

Overall, telemedicine shortened the time to treatment success relative to standard outpatient care [6•]. Across all gastroenterology departments, Lahat et al. found that IBD patients were the most likely to accept the virtual meeting and 86% of patients assessed their telemedicine experience as 'good' or 'excellent.' [8] Age once again played a difference; patients who

supported long-term telemedicine were 10 years younger than those who did not (42 years versus 52 years) [8].

Hepatology Care

Telemedicine has also been used successfully in hepatitis C (HCV) and autoimmune hepatitis treatment for many years. In a study that compared biochemical remission and relapse after remission in patients with autoimmune hepatitis, rates were similar in the telemedicine and standard care groups (89.5% vs. 89.1% and 15.8% vs. 25.9%) [9]. The telemedicine group also maintained remission significantly better than the standard care group (100% vs. 77.3%) [9]. Furthermore, one study looking at telemedicine for HCV care found that the median travel avoided for each telehealth consultation was 634 km and sustained virological response was achieved in 88% of those who had a planned telehealth consultation as part of their management [10]. In a subset of patients with opioid use disorders, HCV management via telemedicine integrated into an opioid substitution therapy program was a feasible model with excellent virologic effectiveness [11]. Serper et al. found that in patients with liver cirrhosis and advanced liver disease, telemedicine was rated as uniformly positive in both patient and provider-rated acceptability [12].

Patients overall were very receptive to telemedicine in hepatology clinics; a study looked at video telemedicine patients and found that more than 90% of patients would complete a video visit again in the future [13•]. However, 10% of patients had a failed video visit encounter, and one-fifth agreed to but did not complete a video visit, likely due to low digital health literacy exacerbated by cognitive dysfunction (hepatic encephalopathy, cognitive frailty) that are more prevalent in persons with chronic liver disease [13•]. Similar to IBD care, age plays a role in the modality of telemedicine used in hepatology; one study found that older adults tend to use phone appointments over video (median age of phone appointments was 63 years old, while the median age of video appointments was 58 years old) [14•].

GI-related Cancer Care

In patients with colorectal cancer, the level of satisfaction with the individual performance and professional competence of the healthcare provider was consistently high in both the video telemedicine and face-to-face groups, and 42% of patients chose video telemedicine as their preferred follow-up modality [15]. In patients who underwent resection for stage I to III colorectal cancer, a virtual surveillance clinic increased guideline-concordant endoscopic surveillance after colorectal cancer resection from 30.6 to 50% [16]. One study also expanded the scope of telemedicine into genetic testing for pancreatic cancer. Remote genetic testing with telemedicine-based genetic education for those with a family history of pancreatic ductal adenocarcinoma and a relative with a germline pathogenic variant was performed and demonstrated genetic testing rates over 90% [17]. The high rate of testing may reflect increasing receptiveness to online genetic education and the success of

providing genetic testing through physician-mediated testing. In older survivors of colorectal cancer (mean age of 72.1 years), requested improvements in their survivorship care included increased resources and information from healthcare professionals and the ability for caregivers to be on the call with them [18]. Overall, older patients were receptive to using technology if it would minimize delays to their cancer screening and follow-up schedule [18].

Motility-related Care

In addition to standard patient visits, the COVID-19 pandemic has necessitated the need for innovation and expansion of the scope of practice of telemedicine in GI clinics. Included in these innovations are virtual speech-language pathologist consultations for dysphagia, and multi-disciplinary team consultation appointments completed in one telemedicine visit. In patients who needed speech pathology for swallowing, and nutrition and dietetics counseling post head and neck chemotherapy, the home-based telemedicine model of care was more efficient, with a reduced number and duration of appointments required until discharge as well as significant patient cost savings due to decreased travel requirements [19]. Moreover, in another dysphagia study (mean age of participants = 81.65), cost analysis revealed that the mean total cost of a telemedicine session was $70, compared with $288 for a standard care session [20]. Following a stroke, patients (mean age 67.5) evaluated by bedside and telehealth speech language pathologists found that for both liquid and solid textures, dysphagia evaluation via telemedicine was safe and effective following stroke [21]. However, one limitation of telemedicine dysphagia is the inability to perform laryngeal palpation for clinical swallow evaluations [21]. Another study found a 95% match in treatment in determining the need for anti-motility agents in patients with ileostomies [22]. Additionally, no difference was found when comparing telemedicine assessment and in-person assessment in the assessment of stool consistency [22].

Key Findings at the Dartmouth Hitchcock Medical Center (DHMC)

Primary data from the GI clinic at DHMC was examined. Prior to 2020, telemedicine was being used in the GI clinic, but ranging between 25 and 166 visits annually. As displayed in Fig. 1, since the start of the COVID pandemic in the USA in 2020, the GI clinic at DHMC has seen an appreciable rise in annual telemedicine visits, from 166 virtual visits in 2019 to 7901 virtual visits in 2020, and 8164 virtual visits in 2021.

Failure rates for telemedicine visits have declined among all groups between April 2020 and May 2022. The overall failure rate has declined from 17 to 3% from April 2020 to May 2022. While the 65 + age group had a higher failure rate than other age groups throughout most of this time period, the failure rate has declined from 16 to 0% from April 2020 to May 2022.

Across all age groups, video calls were more frequent than telephone calls during GI visits. As age increases, telephone visits made up a higher

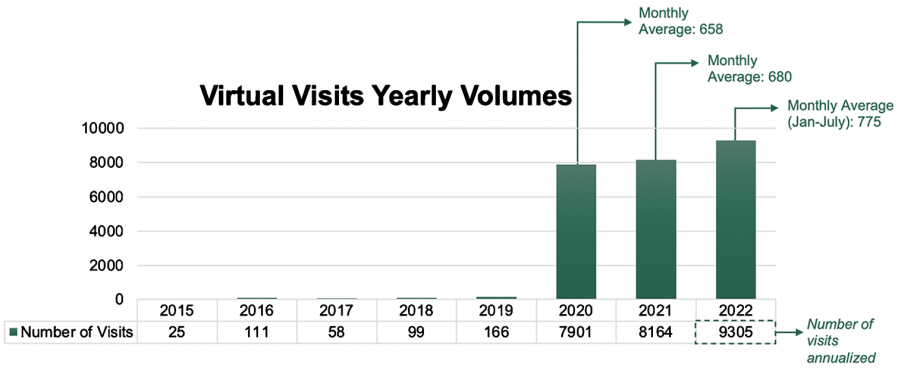

Fig. 1 Annual volume of virtual visits at DHMC GI.

proportion of the telemedicine visits. The 65 + age group had 32% of the telemedicine visits conducted via telephone call as compared to 9% of the 18–34 year olds. This is different from failure rate, which is defined by visits that were intended to be video that were subsequently conducted via phone (versus these visits that were intended to be phone from the start) (Figs. 2 and 3).

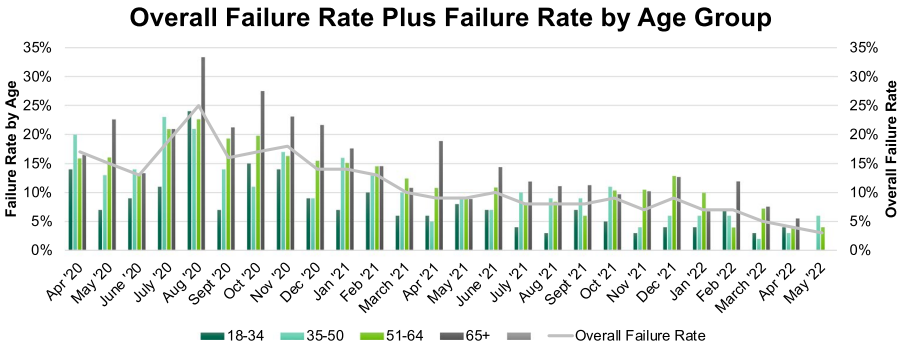

Fig. 2 Telemedicine failure rates among all age groups.

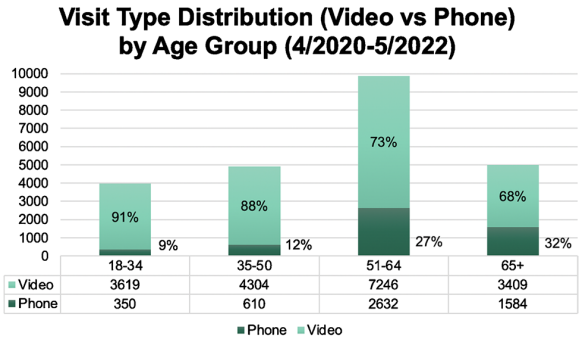

Fig. 3 Phone vs video use during telemedicine visits by age group from April 2020 to May 2022.

Conclusions

There has been a tremendous increase in the use of telemedicine since the beginning of the COVID-19 pandemic, and overall in GI, it has shown to give at least equivalent care by improving patient outcomes and saving costs while providing a high level of patient satisfaction. The older population had been among the most vulnerable during the pandemic, so it has been critical to keep them engaged in the health care system while also avoiding unnecessary exposure at in person visits. Our review of the literature and analysis of data from a rural academic medical center shows that older patient populations can indeed be successful using telemedicine as a care modality.

As found in our systematic review, across sub-specialties in gastroenterology (IBD, hepatology, motility), telemedicine had comparable quality of care and equal or better outcomes to in-person visits when comparing remissions rates in IBD [6•], autoimmune hepatitis [9], and HCV [10]. Additionally, it saved patients money ranging from $36.61 per visit [4•] to $612 per year [2] and distance travelled, ranging from 310 [4•] to 634 km. [10]

At DHMC, the use of telemedicine has been successful since the start of the COVID-19 pandemic and continues to be highly effective. The 65 + age group has successfully navigated the use of video telemedicine after a little bit longer learning curve as compared to younger populations. While this age group is still the largest users of telephone calls overall, it is not clear if this higher use of telephone calls in older patients is due to patient request, scheduler assumption that they may not be able to complete the visit using video, or a failure of the two-way connection for a variety of reasons. This is an important avenue of future research.

While telemedicine has made many advancements in a short period of time, there are still steps to be taken to optimize care for every patient's specific needs. In our literature review, some of the most common requests from patients were enhanced education before and after the appointment (either through written information, summaries of their appointment, or additional educations from advanced practice providers), the ability of caregivers such as family members to be present at their telemedicine appointments, and additional support in learning how to use telemedicine platforms [18].

Potential barriers to telemedicine may contribute to the diminished uptake among various patient groups, including infrastructural factors and patient-related considerations, access to electronic devices, and availability of reliable internet connection. Additional barriers for telemedicine adoption in older patients include small font size, confusing internet navigation and lack of internet experience, poor contrast in text and color, poor coordination, and culture change in adopting technology. [4•]

While there is a wealth of evidence that telemedicine is safe and effective across a broad spectrum of GI disorders including IBD, chronic liver disease, esophageal disorders, and IBS, there are still many steps to be taken before equitable access to video-based telemedicine can be reached. It will be imperative to help educate our older patient population so that they can continue to take advantage of these technologic advances in healthcare delivery, and also be prepared to assist those who do not have access to appropriate

devices or internet access. Providers' offices can take on the responsibility of education and communicating with their patients, but it will also be necessary to establish community partnerships to help broaden the radius of access to all patients.

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Author contribution

MDD (study design, analysis & interpretation, manuscript development and writing).
SS (analysis and interpretation, manuscript review).
LAB (analysis and interpretation, manuscript review).
CAS (study design, analysis & interpretation, manuscript development and writing).

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Declarations

Conflict of interest
Michelle D. Dong declares that she has no conflict of interest. Shelley Steuwe declares that she has no conflict of interest. Lauren A. Barry declares that she has no conflict of interest. Corey A. Siegel declares that he has no conflict of interest.

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