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Short Title: Redirecting Digestive Care via Telehealth

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Abbreviations:

APP (advanced practice provider)
ED (emergency department)
GERD (gastroesophageal reflux disease)
GI (gastrointestinal)
IBD (inflammatory bowel disease)
NPS (net promoter score)
PCP (primary care provider)

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The data and analytic methods used in this study are not publicly available due to proprietary platform design and institutional privacy policies.

Abstract

Background and aims: The aim of this study was to assess the feasibility and effectiveness of an integrated on-demand platform in reducing emergency department (ED) and urgent care visits for patients with gastrointestinal (GI) symptoms.

Methods: A retrospective analysis was conducted using a third-party on-demand telehealth platform staffed by GI-trained advanced practice providers (APPs), who were supervised by board certified gastroenterologists. The study included new and established patients from a community GI practice in Washington State, evaluated between January 24 and September 13, 2024. Patient demographics, visit details and clinical outcomes were analyzed, including

responses from a post-visit survey launched on March 28, 2024.

Results: The study analyzed 1,956 unique patients with 2,186 encounters. Common indications included abdominal pain, gastroesophageal reflux disease (GERD)/dyspepsia, diarrhea, dysphagia/odynophagia, and inflammatory bowel disease (IBD). 70.2% of visits resulted in diagnostic orders, including endoscopic procedures (38.1%), laboratory tests (36.4%), and/or imaging (16.9%). 90.1% of new patients received diagnostic orders, with 64.9% for endoscopic procedures. A post-visit survey launched on March 28, 2024, was sent for 1,807 encounters within the study period, and received 352 responses (19.5% response rate). 41.2% of respondents indicated they would have considered visiting the ED (25.6%) and/or urgent care (29.5%) without the service. 0.7% of all on-demand visits were referred to the ED, and none to urgent care. The Net Promoter Score® (NPS) was 91/100 overall and 93/100 for established patients.

Conclusion: The on-demand GI telehealth platform may have reduced unnecessary ED and urgent care visits, thus suggesting cost savings. The platform also yielded high patient satisfaction, suggesting it may prevent leakage of patients from the GI practice.

Keywords: Gastrointestinal Disorders, Emergency Department Utilization, Telehealth, On-Demand Services, Cost-Effective Care

Introduction

Gastrointestinal (GI)-related healthcare costs at least $119.6 billion dollars annually. GI disorders are the leading cause of treat-and-release visits to emergency departments (EDs) across the United States. Between 2016 and 2019, 62.2 million patients presented to the ED with GI complaints, of which 51.8 million (83.4%) were discharged.[1] In 2021, the average cost of an ED visit with all services included was $2,909.[2] The estimated annual expenditure for treat-and-release ED visits related to GI problems is approximately $37.7 billion.

While the prevalence of GI disorders contributing to ED congestion remains high, the increasing strain on the healthcare system from a shortage of gastroenterologists further complicates timely access to care. There is a projected shortage of 1,630 gastroenterologists by 2025, driven primarily by the aging patient population and physician workforce.[3] In 2021, half of gastroenterologists were over age 55 and there were 20,830 individuals per active gastroenterologist.[4] In the United States, average wait times for GI consultations can range from weeks to months.[5] Due to this, patients may become dissatisfied and seek alternative treatment options, such as the ED or urgent care, resulting in care fragmentation and increased healthcare expenditure. Other patients may not pursue alternative treatment options, which can lead to adverse outcomes due to delays in care. This challenge underscores the need for innovative solutions to improve access to GI specialty care and reduce unnecessary ED utilization.

Telehealth has been utilized across various specialties, including emergency medicine, neurology, and intensive care, demonstrating its ability to provide rapid access to specialty care.[6] Telehealth has also been a long-standing practice in gastroenterology. Mirroring other areas of medicine, its adoption sharply increased in mid-2020 due to the COVID-19 pandemic. This surge was driven by safety concerns and the removal of reimbursement barriers by third-party payers. Although its use has gradually decreased since the height of the pandemic, telehealth continues to be an important part of outpatient care and is expected to continue.[7] With the increasing demand for accessible GI care and the limitations of traditional services, telehealth presents a potential alternative. The success of an on-demand telehealth platform, however, relies on patient adoption and their satisfaction with the experience, both of which are crucial for fostering continued engagement with

the platform. Technical difficulties, lack of digital literacy, the nature of the patient's chief complaint, lack of trust, wait times and perceived poorer quality of care can all influence the patient's view of an on-demand telehealth platform.

In our previous study assessing the utilization of telehealth in gastroenterology, we analyzed data from 5,134 patients from eight practices across the United States. We established that most respondents felt the care they received through telehealth was of similar quality to in-person visits. They expressed a willingness to continue using telehealth, citing easy scheduling, flexibility, and reduced wait and/or travel times. The overall NPS was 21. The majority of telehealth patients (83%) did not need an in-person follow-up visit, suggesting that the lack of a physical exam may not substantially impact the effectiveness of telehealth in managing most GI conditions.[8]

Expanding on previous research, the aim of this study was to assess the feasibility and effectiveness of an on-demand GI telehealth platform to reduce ED and urgent care utilization across a larger patient population and for patients with GI symptoms.

Methods

Study Period and Population: A retrospective study was conducted in which new and established patients of a community-based single-specialty GI practice in Washington State were given access to a third-party on-demand telehealth platform staffed by GI-trained APPs (under the supervision of board certified gastroenterologists) located across the United States from January 24 through September 13, 2024. For study entry, patients were at least 18 years old, presented with a GI complaint, and had verified health insurance. Sex and location of home residence were also recorded. Patients were excluded from the study if they did not complete their encounter with the APP.

Integration: The third-party on-demand telehealth platform (including the APPs) functioned as a virtual extension of the brick-and-mortar GI practice, with clinical notes and orders routed through the physical practice. The data was derived directly from the on-demand telehealth platform.

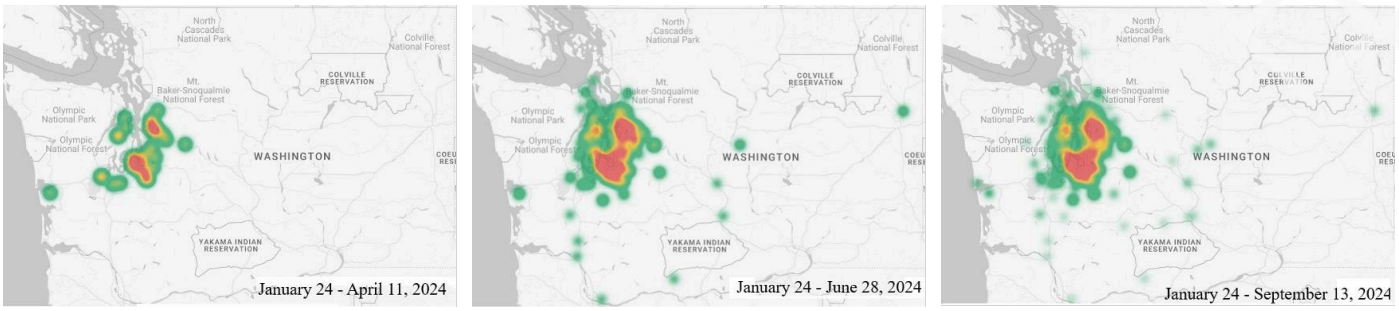
Encounter and Clinical Outcomes: Using the platform data, median visit length and wait time were recorded. Recorded clinical outcomes from the visits include patient diagnosis (selected by the clinician), and any procedure, lab and/or imaging ordered at the conclusion of the visit. A board-certified gastroenterologist reviewed a subset of the cases to assess if they were appropriate for an initial telehealth encounter.

Post-Visit Patient Survey: Patients were asked to complete a post-visit survey (Appendix), which was launched on March 28, 2024. The survey included four questions and was designed to be completed in approximately two minutes. Patients rated their likelihood of recommending the service to a friend or family member on a scale from 0 (not at all likely) to 10 (extremely likely) and this was recorded as a Net Promoter Score® (NPS). NPS classifies respondents as promoters (scores 9-10), passives (7-8), or detractors (0-6). NPS is calculated by subtracting the percentage of detractors from the percentage of promoters, yielding a score between -100 and +100. A higher score indicates greater satisfaction.[9] They were also asked which care alternatives they would have considered if the on-demand virtual visits were not an option, with choices including the ED, urgent care, their primary care physician (PCP), and others. Patients were able

to select more than one option to reflect real world scenarios, such as their distance from the ED vs. urgent care, or availability of their PCP. Patients also reported their referral source for the telehealth platform, with options such as the practice website, call center, triage nurse and practice emails. An open-ended question allowed patients to provide additional feedback on their experience. Responses were collected electronically following the virtual encounter.

Results

Study Period and Population: During the study period, 1,956 unique patients with 2,186 encounters (1.12 average visits per patient) were evaluated. 7% of patients had multiple visits. 75.4% of the encounters were for established patients. Median age was 50.0 y (range 18-92 y) and 65.1% were female. The geographic distribution of patients in Washington State throughout the study is shown in the following heat map.



Geographic Distribution of Patients in Washington State Throughout the Study

Encounter and Clinical Outcomes: Median wait time for a visit was 16.3 minutes with a median visit length of 21.0 minutes. The most common primary clinical indications were abdominal pain, GERD/ dyspepsia, diarrhea, dysphagia/odynophagia, and inflammatory bowel disease (IBD) (Figure A1). Of these on-demand virtual visits, 70.2% resulted in recommendations for further testing, including endoscopic procedures (38.1%), laboratory tests (36.4%), and/or imaging (16.9%). Of the new patients, 90.1% were recommended at least one of the aforementioned diagnostic tests, with endoscopic procedures being the most frequently recommended (64.9%) (Figure A2). In a review of 498 encounters (22.8% of all encounters), 96.2% were deemed appropriate for an initial telehealth encounter by a supervising board-certified gastroenterologist.

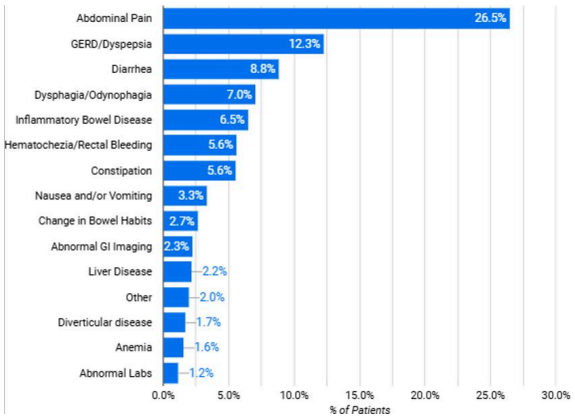


Figure A1. Top Patient Diagnoses in the On-Demand Gastrointestinal (GI) Platform (Selected by Clinician)

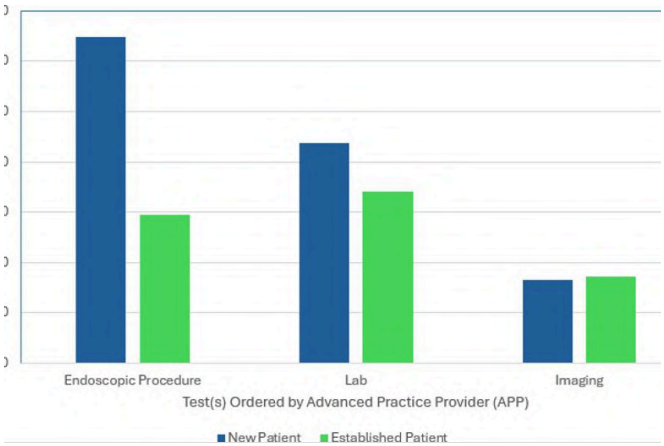


Figure A2. TestingPatterns by PatientType at Visit Conclusion

Post-Visit Patient Survey: A post-visit survey (launched March 28, 2024) was sent for 1,807 encounters, involving 1,643 unique patients (an average of 1.1 visits per patient). Out of the total distributed surveys, 352 were returned, resulting in a response rate of 19.5%. Patients were asked what alternative(s) they would have considered if the virtual on-demand platform had not been an option. They were able to select more than one option to reflect real-world scenarios, considering

factors like the availability of their PCP or the distance to the ED vs. urgent care. Of the respondents, 41.2% of respondents indicated they would have considered visiting the ED (25.6%) and/or urgent care (29.5%) without the service. 0.7% of all encounters in the study timeframe ended with a referral to the ED. 40.1% of respondents reported they would have considered seeking an appointment with their PCP, and 26.5% of respondents (42.3% of new patient respondents) stated they would have considered seeking an appointment with another GI practice if the on-demand service had not been an option. The most common referral sources were the practice call center (58.8%), practice website (16.4%), and practice triage nurse (12.1%). The Net Promoter Score® from respondents was 91/100 (93/100 for established patients).

Discussion

The integration of an on-demand telehealth platform into a community GI practice offers an innovative approach to reducing unnecessary ED and urgent care utilization. The platform provided access to 1,956 patients with 2,186 encounters in a near seven month period, offering rapid specialty assessment for GI symptoms. The most common referral sources being the practice call center (58.8%), practice website (16.4%), and practice triage nurse (12.1%) highlight the platform's ability to engage patients from different access points. The range of chief complaints (abdominal pain, GERD/dyspepsia, diarrhea, dysphagia/odynophagia, IBD, etc.)

mirror what GI providers typically see in clinical practice. A total of 70.2% of visits resulted in orders for diagnostic testing, including endoscopic procedures, laboratory tests, and/or imaging, which demonstrates that telehealth consultations are not only useful for basic medical advice, but can be an essential part of a complete diagnostic assessment. While it can take weeks to months to secure an appointment with a GI provider, the median wait time for an on-demand telehealth visit was 16.3 minutes with a median visit length of 21.0 minutes, demonstrating that an on-demand telehealth platform can provide prompt access to care with sufficient time for patient-provider interaction. This is especially important for new patients, 90.1% of whom were recommended at least one diagnostic test. The high percentage of endoscopic procedures among these tests (64.9% for new patients and 38.1% for all patients) highlights the platform's role in facilitating timely access to specialty care that might have been delayed in traditional in-person settings. A review of 498

encounters (22.8% of all encounters) found that 96.2% were deemed appropriate for an initial telehealth encounter by a supervising board-certified gastroenterologist, underscoring the clinical validity and appropriateness of the telehealth model.

Among respondents to the post-visit survey, 41.2% of respondents indicated they would have considered visiting the ED (25.6%) and/or urgent care (29.5%) without the service. However, only 0.7% of all patients were recommended for ED evaluation, and none were directed to urgent care. By potentially reducing unnecessary ED and urgent care utilization, the on-demand telehealth platform may ease pressure on emergency and urgent care services and improve healthcare resource allocation. With the average cost of an ED visit with all services included being $2,909 (as of 2021)[2] and the average cost of an outpatient GI visit being $365 (as of 2016),[10] cost savings can have the potential to be substantial. Forty percent of respondents reported they would have considered seeking an appointment in primary care, an area of medicine that is experiencing considerable strain. The hybrid subspecialty platform helps alleviate the burden on primary care while ensuring that GI issues are managed without care fragmentation. Additionally, 26.5% of respondents, including 42.3% of new patients, stated they would have considered exploring another GI practice if the on-demand service had not been an option. This further highlights the platform's role in retaining patients within the practice while enhancing access to timely care that might otherwise have been delayed or sought outside the system. Only 7% of patients had multiple visits within the near seven month study period, indicating minimal overuse. These results suggest that an on-demand telehealth platform integrated into a community-based GI practice can potentially reduce unnecessary ED and urgent care utilization while maintaining high patient satisfaction, patient retention, potential cost savings and minimal overuse by patients.

The findings of this study expand on previous research and demonstrate potential for a telehealth platform to reduce unnecessary ED (and urgent care) utilization while improving patient satisfaction. A prior study analyzed over a million triage calls in the VA healthcare system and found that connecting patients directly to emergency care providers in real time resulted in a 5.5% reduction in subsequent ED visits.[11] Another VA healthcare system study analyzed 7,845 calls to the triage and found that the tele-emergency platform was associated with a 16.8% lower rate of ED visits than the nurse triage system.[12] Although the reduction in ED visits is notable, the larger

reduction observed in our study suggests that utilization of GI specialists for managing GI complaints may amplify the reduction in ED visits. In fact, previous research found that IBD patients with higher utilization of outpatient GI telehealth care (vs. in-person care) were less likely to be hospitalized during the study period.[13] Another study of 12,848 patients with 16,987 ED visits found that patients with a telehealth follow up post ED visit were more likely to return to the ED and require hospitalization than patients with in-person follow up. However, the study specifically focused on patients with a recent ED visit, whereas ours included a broader patient population.[14]

Additionally, previous research has shown that telehealth can yield high patient satisfaction,with nearly 50% of patients in an Australian study preferring telehealth over in-person visits.[15] This echoes findings from our prior study where telehealth patients reported similar or improved satisfaction compared to in-person visits.[8] This study built upon previous research by specifically examining an on-demand telehealth platform for GI care, highlighting its effectiveness in delivering timely diagnostic care for a range of GI complaints, significantly reducing unnecessary ED utilization, and maintaining high levels of patient satisfaction.

This study is not without limitations. Out of all the surveys distributed, 352 were returned, with a response rate of 19.5%. Assuming a 95% confidence interval and a maximum variability ($p = 0.5$), the margin of error was ± 5.23%, which falls within the commonly accepted threshold for survey research. Because the survey was self-reported, the results are subject to biases, which may affect the accuracy of the responses. Despite this, efforts were made to minimize these biases by ensuring confidentiality and designing the survey to include clear, specific questions that minimized the potential for misinterpretation. While these biases cannot be fully eliminated, they were mitigated to ensure the most accurate responses possible. Finally, the study only measured short-term outcomes, such as patient satisfaction and visit completion rates. While future research is needed to assess long-term outcomes, the short-term findings provide meaningful insights into the feasibility and immediate effectiveness of an on-demand telehealth platform for reducing ED and urgent care utilization for patients with GI symptoms.

Future studies should build upon these findings while addressing the study's limitations. Larger sample sizes may help reduce the response bias and enhance the generalizability of the results.

Long-term studies would also be valuable in evaluating the clinical outcomes and cost-effectiveness of using on-demand telehealth platforms for managing GI conditions, including their impact on ED and urgent care utilization. Additionally, real-world outcomes should be examined using claims data to provide a more comprehensive assessment.

In conclusion, this study shows potential for the effectiveness of an on-demand telehealth platform in reducing unnecessary ED and urgent care utilization, while increasing patient satisfaction. By offering rapid access to care, these platforms have the potential to not only enhance the patient experience, but also ensure the appropriate site of service. Integration of the on-demand telehealth platform with a traditional brick-and-mortar GI practice reduces care fragmentation, promoting continuity of care. As telehealth continues to evolve, further research will be essential to understand its full impact on long-term health outcomes and its broader applications across other specialties.

References:

1. Suchman K, Kohn N, Trindade AJ. Emergency department utilization for gastrointestinal care and patient characteristics associated with hospital admission in a national cohort. Gastroenterol Rep. 2023;11:goad045. doi:10.1093/gastro/goad045.

2. Health Cost Institute. Emergency room spending, price and use trends: 2012–2021. Accessed November 21, 2024. https://healthcostinstitute.org/hcci-originals-dropdown/all-hcci-reports/emergency-room-spending-price-and-use-trends-2012-2021

3. RosmanSearch. 2024 RosmanSearch physician recruiting trends report. Accessed November 21, 2024. https://www.rosmansearch.com/files/17361/file/2024-rosmansearch-physician-recruiting-trends-report.pdf

4. Association of American Medical Colleges. Active physicians by age and specialty, 2021. Accessed November 21, 2024. https://www.aamc.org/data-reports/workforce/data/active-physicians-age-specialty-2021

5. ECG Management Consultants. The waiting game: new patient appointment access for US physicians. Accessed April 10, 2025. https://www.ecgmc.com/insights/whitepaper/the-waiting-game-new-patient-appointment-access-for-us-physicians

6. Siegel CA. Transforming gastroenterology care with telemedicine. Gastroenterology. 2017;152(5):958-963. doi:10.1053/j.gastro.2017.01.048.

7. Gellad ZF, Diamond S, Crockett SD, et al. AGA clinical practice update on telemedicine in gastroenterology: commentary. Gastroenterology. 2023;164(4):690-695. doi:10.1053/j.gastro.2022.12.043.

8. Dobrusin A, Hawa F, Montagano J, et al. Patients with gastrointestinal conditions consider telehealth equivalent to in-person care. Gastroenterology. 2023;164(1):156-158.e2. doi:10.1053/j.gastro.2022.09.035.

9. Net Promoter. The Net Promoter System. Accessed November 21, 2024. https://www.netpromoter.com/know/

10. Machlin SR, Mitchell EM. Expenses for office-based physician visits by specialty and insurance type, 2016. Stat Brief #517. October 2018. Accessed November 21, 2024. https://meps.ahrq.gov/data_files/publications/st517/stat517.shtml

11. Tran LD, Rose L, Suzuki K, et al. Medical advice lines offering on-demand access to providers reduced emergency department visits. Health Aff Sch. 2023;1(6):qxad079. doi:10.1093/haschl/qxad079.

12. Li KY, Kim PS, Thariath J, et al. Standard nurse phone triage versus tele–emergency carepilot on veteran use of in-person acute care: an instrumental variable analysis. Acad Emerg Med. 2023;30(4):310-320. doi: 10.1111/acem.14681.

13. Cohen-Mekelburg S, Valicevic A, Lin L, et al. Inflammatory bowel disease hospitalizations are similar for patients receiving televisit-delivered outpatient care and those receiving traditional in-person care. Am J Gastroenterol. 2024;119(8):1555-1562. doi: 10.14309/ajg.0000000000002703.

14. Shah VV, Villaflores CW, Chuong LH, et al. Association between in-person vs telehealth follow-up and rates of repeated hospital visits among patients seen in the emergency department. JAMA Netw Open. 2022;3;5(10):e2237783. doi: 10.1001 jamanetworkopen.2022.37783.

15. Bensted K, Kim C, Freiman J, et al. Gastroenterology hospital outpatients report high rates of satisfaction with a telehealth model of care. J Gastroenterol Hepatol. 2022; 37(1):63-68. doi: 10.1111/jgh.15663.

Appendix:

On-Demand Satisfaction Survey

On a scale of 0 to 10, how likely are you to recommend on-demand virtual visits to a friend or family member? *

	0	1	2	3	4	5	6	7	8	9	10	
Not at all likely	○	○	○	○	○	○	○	○	○	○	○	Extremely likely

If on-demand virtual visits weren't an option, what alternative(s) would you have considered? Choose as many options as may be applicable.

- ☐ Emergency Room
- ☐ Urgent Care
- ☐ Your Regular Doctor (Primary Care Physician)
- ☐ Wait for my already scheduled appointment at this practice
- ☐ Call to schedule an appointment at this practice
- ☐ Explored another GI practice
- ☐ Waited and monitored my symptoms/do nothing

How did you hear about on-demand virtual visits?

- ○ Found a link on the website
- ○ Referred by the call center
- ○ Referred by a triage nurse
- ○ Email from the practice
- ○ Heard about it on the hold message
- ○ Other...

Is there anything else you'd like to share about your on-demand visit experience today? We value your feedback and would love to hear more about your thoughts, concerns, or suggestions.

Long answer text