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# Public Health in Emergency Medicine

## PRELIMINARY ASSESSMENT OF A TELEHEALTH APPROACH TO EVALUATING, TREATING, AND DISCHARGING LOW-ACUITY PATIENTS WITH SUSPECTED COVID-19

David J. Carlberg, MD,\*† Rahul Bhat, MD,\*† William O. Patterson, MD,† Saad Zaatari, MD,†  
Vinodh Chandra, MD,† Alexander Kolkin, MD,† Raj M. Ratwani, PHD,‡§ Matthew D. Wilson, MD,\*||¶  
Diana Ladkany, MD,\*\*†† Katharine T. Adams, BA,‡‡ Mary Jackson, PA-C,§§ Kristi Lysen-Hendershot, BS,|||  
and Ethan A. Booker, MD¶¶

\*Department of Emergency Medicine, Georgetown University School of Medicine, Washington, DC, †Georgetown Emergency Medicine Residency, MedStar Georgetown University Hospital / MedStar Washington Hospital Center, Washington, DC, ‡Department of Emergency Medicine, Georgetown University School of Medicine, Washington, DC, §Scientific Affairs, MedStar Health Research Institute, MedStar Health National Center for Human Factors in Healthcare, Washington, DC, ||Department of Emergency Medicine, MedStar Washington Hospital Center, Washington, DC, ¶MedStar Georgetown University Hospital / MedStar Washington Hospital Center, Washington, DC, \*\*MedStar Washington Hospital Center, Washington, DC, ††Department of Emergency Medicine, MedStar Harbor Hospital, Baltimore, MD, ‡‡MedStar Health National Center for Human Factors in Healthcare, Washington, DC, §§MedStar Franklin Square Medical Center, MedStar Franklin Square Hospital, Baltimore, MD, ||||Project Management Office, MedStar Telehealth Innovation Center, MedStar Health, Washington, DC, and ¶¶MedStar Telehealth Innovation Center, MedStar Washington Hospital Center, Washington, DC

Reprint Address: David J. Carlberg, MD, Department of Emergency Medicine, Georgetown University School of Medicine, NA-1177, 110 Irving St., Washington, DC 20010

**Abstract—Background:** Telemedicine is uniquely positioned to address challenges posed to emergency departments (EDs) by the Coronavirus Disease 2019 (COVID-19) pandemic. By reducing in-person contact, it should decrease provider risk of infection and preserve personal protective equipment (PPE). **Objectives:** To describe and assess the early results of a novel telehealth workflow in which remote providers collaborate with in-person nursing to evaluate and discharge well-appearing, low-risk ED patients with suspected COVID-19 infection. **Methods:** Retrospective chart review was completed 3 weeks after implementation. Metrics include the number of patients evaluated, number of patients discharged without in-person contact, telehealth wait time and duration, collection of testing, ED length of stay (ED-LOS), 72-h return, number of in-person health care provider contacts, and associated PPE use. **Results:** Among 302 patients evaluated by telehealth, 153 patients were evaluated and discharged by a telehealth provider with reductions in ED-LOS, PPE use, and close contact with health care personnel. These patients had a 62.5% shorter ED-LOS compared with other

Emergency Severity Index level 4 patients seen over the same time period. Telehealth use for these 153 patients saved 413 sets of PPE. We observed a 3.9% 72-h revisit rate. One patient discharged after telehealth evaluation was hospitalized on a return visit 9 days later. **Conclusion:** Telehealth can be safely and efficiently used to evaluate, treat, test, and discharge ED patients suspected to have COVID-19. This workflow reduces infection risks to health care providers, PPE use, and ED-LOS. Additionally, it allows quarantined but otherwise well clinicians to continue working. © 2020 Elsevier Inc. All rights reserved.

**Keywords—COVID-19; telemedicine; personal protective equipment; length of stay; safety**

### INTRODUCTION

#### Background

The severe acute respiratory syndrome coronavirus 2 (COVID-19) pandemic poses unique challenges to

emergency departments (EDs) throughout the world. Although the overall volume of ED patients has declined, acuity has risen, and EDs in COVID-19 hot spots require strategies to manage high-acuity patients, protect staff, and prepare for surge (1–4). Telehealth has seen an explosion in utilization to respond to the crisis (5).

The use of telehealth to provide an initial assessment, order diagnostic testing, and begin care in EDs is an established process (6). Within a large health system in the Mid-Atlantic region of the United States, the COVID-19 crisis, combined with ED-based telehealth experience, allowed an innovation in care delivery in seven integrated EDs. Clarifying guidance from the federal government pertaining to the use of telehealth in meeting the Medical Screening Examination requirements of the Emergency Medical Treatment and Labor Act permitted implementation in March 2020 (7).

Additional regulatory and system changes permitted implementation, including emergency provider credentialing at hospitals within the health system, state licensure waivers and modifications, and Centers for Medicare and Medicaid Services guidance regarding billing for telehealth services within an ED (8,9). The intervention took place within a single, employed emergency provider group spanning seven EDs with a single electronic health record (EHR).

### *Importance*

The use of telehealth to complete the assessment and discharge of a patient from the ED without an in-person examination has not been described in literature prior to the COVID-19 crisis.

### *Goals of This Investigation*

A telehealth-enabled, Evaluate-Treat-Discharge (ETD) workflow was implemented with the goals of safely decreasing ED length of stay (ED-LOS), minimizing health care workers in physical contact with potentially infectious patients, preserving personal protective equipment (PPE), and increasing the available workforce by creating a safe workflow for quarantined or exempt clinicians.

## **MATERIALS AND METHODS**

### *Design and Implementation*

The ETD workflow was piloted at one clinical site, which had an established telehealth program for initial patient assessment, commonly called teletriage. This site was an academic, tertiary care, Level I trauma center with an annual ED census of approximately 100,000. In the

teletriage process, a triage nurse connects by synchronous video to a staff emergency physician located outside of the department to evaluate the patient and initiate testing and interventions.

For the ETD workflow, patients identified by the ED triage nurse were presented to the remote provider for evaluation, consideration of testing, and possible discharge. Patients presenting with possible COVID-19 exposure or infectious respiratory illness and meeting these criteria were deemed eligible for assessment:

- Age > 2 years and < 65 years.
- Age-appropriate vital signs, with heart rate in adults < 110 beats/min.
- Ambulating oxygen saturation > 95%.
- Tolerating oral intake.
- Immune competent.
- First ED visit for this complaint.
- Not sent by another health care provider for ED evaluation.

The triage nurse completed a triage assessment with vital signs as usual, requested the telehealth provider through the platform, and gave a brief presentation via two-way video. The provider's telehealth examination noted the patient's general appearance, mental status, movement, ability to communicate, respiratory rate and work of breathing, heart rate, blood pressure, and appearance of perfusion. In these well-appearing patients with suspected COVID-19 infection, pharyngeal, abdominal, and extremity examination generally did not add to the clinical picture. If the telehealth provider requested demonstration of a particular examination finding, the nurse was able to assist with obtaining it.

After history and examination, the remote provider's management options included discharge without COVID-19 testing, discharge after specimen collection for COVID-19 testing, or deferring to in-person evaluation in the ED. To expedite in-person care in the ED, the telehealth provider could place diagnostic and treatment orders.

To confirm the safety of this ETD workflow during the piloting phase, an in-person provider assessed the patient after the telehealth evaluation to determine if additional testing or intervention was required. After this brief pilot, the ETD process was expanded to six additional EDs in the system, and the in-person assessment was used only if the ETD provider felt it was necessary. The six EDs included a mix of community and academic departments with annual patient censuses ranging from 32,000 to 89,000, staffed by employed physicians and physician assistants (PAs) from the same group. Emergency medicine attending physicians and experienced PAs were available 8 AM–8 PM at all sites and were staffed in 4-h shifts with double coverage to manage volume. Most work was

completed from the provider's home. Telehealth was provided via an existing Web-based, enterprise-wide platform that used a Windows-based tablet as an end-point device (Microsoft, Redmond, WA). Brief on-line education and training materials were developed and distributed for triage nurses and for remote providers. Additional education was provided via brief presentations at faculty meetings and weekly updates circulated by electronic mail regarding work flow.

For patients discharged directly from ETD, the triage nurse evaluated the patient, facilitated the consultation via the telehealth platform, performed COVID-19 testing when ordered, and discharged the patient home without any additional staff members coming into contact with the patient. Patients deemed appropriate for discharge received preprinted discharge instructions regarding self-quarantine, return precautions, and follow-up. Full registration was completed upon patient arrival if it did not delay care, in compliance with the Emergency Medical Treatment and Labor Act.

#### *Data Collection and Analysis*

Call data placed between March 21 and April 12 were retrieved from the telehealth platform's secure data portal, resulting in an initial dataset of 55,341 unique calls. The data were filtered to identify calls placed as part of the ETD workflow, resulting in 612 unique calls. Incomplete and test calls were excluded from the dataset, resulting in 312 unique, completed ETD calls. The following metrics were collected: the number of patients seen, discharged via ETD, directed to in-person evaluation, tested for COVID-19 (as well as results), and returning for health care within 72 h. Additionally, ED-LOS (defined as registration to disposition order), number of in-person health care workers contacted, wait times for telehealth providers, and telehealth encounter durations were assessed. Chart review collected data from the telehealth platform, EHR, and the Chesapeake Regional Information System for our Patients, the regional Health Information Exchange (HIE). Data collection was performed by four unblinded physician members of the investigative team who were not involved with patient care for either ETD or in-person evaluations. Data collection among abstractors was primarily conducted independently, with periodic review of selected charts to optimize interrater quality. The local institutional review board determined that the retrospective study of this administrative process change was exempt from review.

Microsoft Excel 365 and Stata ver. 12.1 (StataCorp LLC, College Station, TX) were used for statistical analysis. Descriptive statistics are presented with Mann-Whitney testing used for comparison of median values between groups.

## RESULTS

From 312 unique telehealth sessions between March 21 and April 12, 2020, there were 302 patient encounters with complete chart data. [Figure 1](#) depicts primary outcomes. Of 302 unique encounters, 153 patients followed the ETD workflow, managed entirely by the telehealth provider and discharged. The average age for the ETD group was 34.4 ( $\pm 13.2$ ) years; average ESI was 4 ( $\pm 0.5$ ); and average ED-LOS (registration time to discharge order) was 57 ( $\pm 28$ ) min, compared with 151 min for an average discharged ESI level 4 patient without a telehealth encounter across our EDs during the study timeframe ( $p < 0.01$ ) ([Table 1](#)). Patients managed with the ETD workflow had physical contact with an average of 1.4 nurses and zero physicians or PAs. Of 153 patients in the ETD group, 4 (2.6%) had a COVID-19-related health care encounter identified in the EHR or HIE within 72 h. An additional 4 patients in this group had a COVID-19-related health care encounter beyond 72 h. One patient, 9 days after the initial visit, was briefly hospitalized and discharged from a non-intensive care unit setting. [Table 2](#) presents return to health care outcomes for both observational groups.

Of the 302 unique telehealth encounters, 149 patients had an in-person evaluation completed by a PA or physician, with 81 of these patients receiving no additional diagnostic or therapeutic interventions and subsequently discharged. No patients assessed in the pilot phase, in which the telehealth provider intended discharge, had a change in management related to in-person evaluation. Sixty-eight patients were seen by the telehealth provider, determined to need in-person evaluation, and subsequently had additional testing or treatment. Of the 149 patients assessed by telehealth and directed to in-person care, 17 patients were hospitalized. Six (4.5%) patients seen by both telehealth and an in-person provider had a COVID-19-related 72-h return visit, resulting in one hospitalization. Between 72 h and the end of the follow-up period, an additional 8 patients in the in-person assessment group had a health care encounter for a COVID-19-related concern, and 2 were hospitalized. Overall, of the 149 patients receiving an in-person evaluation, 14 (10.6%) returned for additional COVID-19-related concerns during the follow-up period. The average age for those seen by telehealth followed by an in-person provider was 39.3 ( $\pm 14.6$ ) years; the average ESI was 3.6 ( $\pm 0.6$ ); and the average ED-LOS was 202 ( $\pm 143$ ) min. Patients seen by a telehealth provider and having a subsequent in-person evaluation had physical contact requiring PPE with an average of 2.1 nurses, 0.8 physicians, and 0.5 PAs.

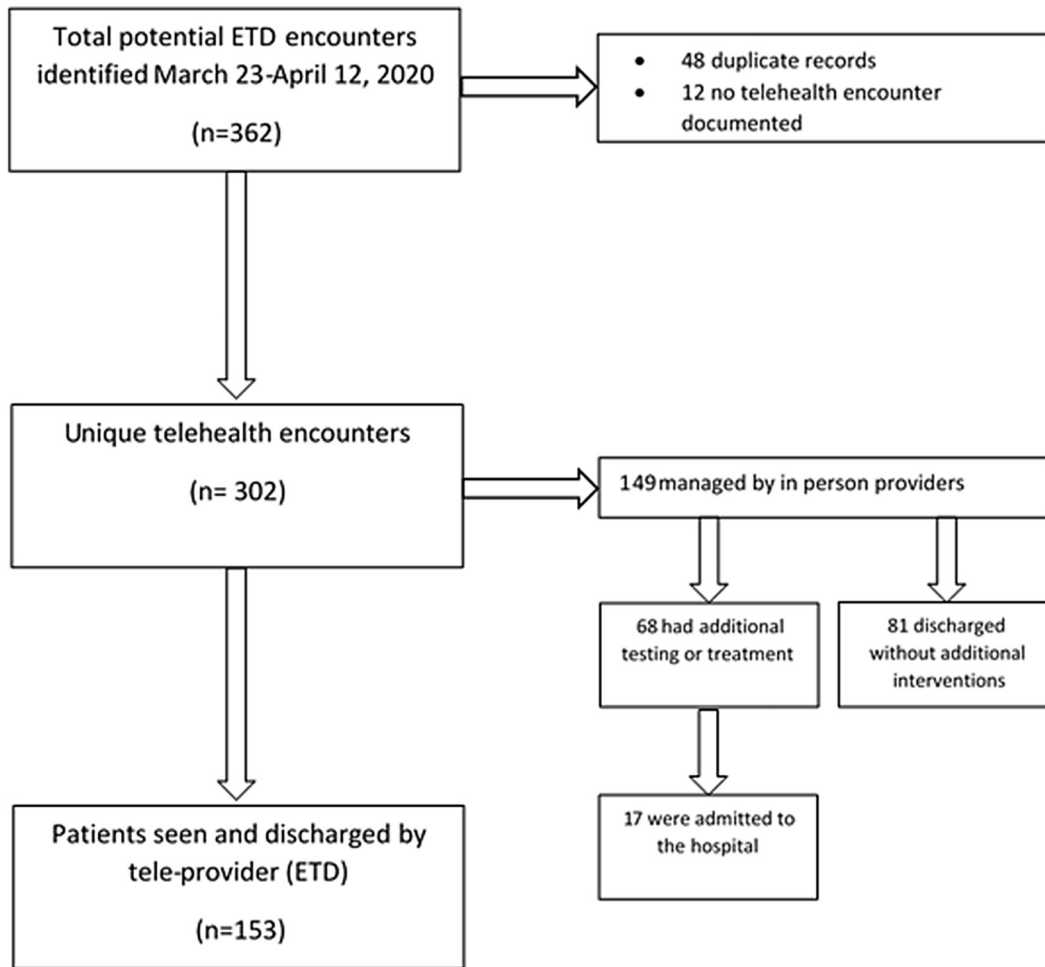


Figure 1. Primary outcomes of patients evaluated by the ETD workflow. ETD = Evaluate-Treat-Discharge workflow.

Across all 302 telehealth sessions, the average time from triage nurse request for remote evaluation to the beginning of the video encounter was 35 (± 80) s with an average encounter length of 6.4 (± 3.8) min.

**DISCUSSION**

Robust previous telehealth experience, considerable change in the regulatory environment, and a host of system incentives permitted rapid adoption of a novel

approach to ED management during the early phases of the COVID-19 pandemic.

In these preliminary results, the use of telehealth to discharge low-risk, well-appearing ED patients suspected to have the COVID-19 virus seems safe. In this group of 153 patients, 3.9% had a repeat health care encounter within 72 h and none were hospitalized. A recent study of more than 12 million ED visits evaluating 72-h return within a regional HIE demonstrated a 7.5% rate among all discharged patients (10).

Table 1. Demographics, Testing, and ED-LOS

	Patients	Age (SD)	ESI (SD)	COVID Test Ordered (%)	COVID Test Positive (%)	ED-LOS in Minutes (SD)
ETD (telehealth only)	153	34.4 (13.2)	4.0 (0.5)	41 (27%)	3 (7%)	57 (28)
Telehealth and in-person evaluation	149	39.3 (14.6)	3.6 (0.6)	61 (41%)	6 (10%)	202 (143)
Overall	302	36.8 (14.1)	3.8 (0.6)	102 (33.8%)	9 (8.8%)	

ED-LOS = emergency department length of stay; ESI = Emergency Severity Index; COVID = Coronavirus Disease; ETD = Evaluate-Treat-Discharge workflow.

**Table 2. Repeat Health Care Encounters After ETD Evaluation**

	Discharged After Telehealth Evaluation (ETD) (n = 153)		Discharged after Both Telehealth and In-Person Evaluation (n = 132)	
	72 Hour	Overall	72 Hour	Overall
Reasons for Return				
COVID-19 related	4 (2.6%)	7 (4.6%)	5 (3.8%)	12 (9%)
Non-COVID-19 related	2 (1.3%)	2 (1.3%)	1 (0.8%)	4 (3%)
Total return to care	6 (3.9%)	10 (6.5%)	7 (5.3%)	19 (14.4%)
Admitted upon return				
COVID-19 related	0 (0%)	1 (0.7%)	1 (0.8%)	2 (1.5%)
Non-COVID-19 related	0 (0%)	0 (0%)	0 (0%)	1 (0.8%)

ETD = Evaluate-Treat-Discharge workflow; COVID-19 = Coronavirus Disease 2019.

Patients discharged after a telehealth assessment had a 62.5% shorter time to disposition than other ESI level 4 patients seen in our EDs over the same time period.

We suggest that the ETD program positively impacts provider safety. ETD decreased the average number of providers in close contact with a potentially infectious patient from 3.4 to 1.4. With further process improvement, we suspect that the average number of providers per discharged patient will decrease toward 1, as the optimal encounter involves the triage nurse initiating the telehealth evaluation and discharging the patient when the evaluation is complete.

The ETD process directly preserves PPE. Compared with the typical flow of patients through the ED and standard PPE use for persons under investigation, we determined that each patient discharged from telehealth preserves an average 2.7 sets of PPE. The 153 patients discharged from ETD translates into 413 sets of PPE preserved.

Of the 149 patients seen by ETD and sent for in-person evaluation, 11.4% were hospitalized, suggesting that the remote providers were able to accurately identify sicker patients appropriate for additional evaluation.

Two physicians who were at high personal risk of illness and were exempt from in-person care provided 156 h of direct patient care in the ED through telehealth during this study period, eliminating their risk of ED-acquired illness but maintaining considerable clinical capacity. All other ETD providers participated as overtime, mostly in 4-h shifts from home, which was desirable work for them.

Safely and quickly evaluating and discharging a subset of well-appearing patients via telehealth should help in-person staff focus on higher-acuity patients.

### Limitations

This study represents early and initial findings from a new telehealth workflow to evaluate, treat, and discharge patients in the ED during the COVID-19 crisis. Additional

data will be collected. Details of the operational process are described to encourage replication by others.

A limitation in these early data is the inclusion of patients evaluated by the telehealth provider and clinically deemed appropriate for discharge who subsequently received an in-person evaluation by an ED attending to confirm the safety of the discharge. None of these quality control checks resulted in management changes. In these initial data, there is an appearance of a larger number of patients deferred to in-person evaluation than would be expected in a more mature program. Subsequent study will assess this.

The observational nature of the study limits our ability to compare with a control group. Our 72-h return assessment follows prior study methodology by using a regional HIE (10). With the severe travel limitations of the COVID pandemic, it is likely that a large proportion of patients were captured.

## CONCLUSIONS

By implementing a telehealth-enabled workflow in ED triage areas, a cohort of low-risk patients with suspected COVID-19 can be rapidly assessed, tested if appropriate, and discharged, decreasing risk to health care workers and preserving PPE. Patients with more serious illness can be identified for further in-person care. Quarantined and exempt providers were able to contribute substantial clinical hours to the crisis response. Further operational development and assessment of this novel workflow is warranted to confirm safety and efficacy and to provide data for regulatory guidance in the wake of the COVID-19 crisis.

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## ARTICLE SUMMARY

### **1. Why is this topic important?**

Telemedicine is uniquely positioned to address many of the challenges posed to emergency departments (EDs) by the Coronavirus Disease 2019 (COVID-19) pandemic. Using telehealth to evaluate and potentially discharge low-risk, well-appearing patients with suspected COVID-19 infection should decrease infection risk to providers, preserve personal protective equipment (PPE), and potentially mitigate surge.

### **2. What does this study attempt to show?**

This study describes and assesses the preliminary results of a novel telehealth workflow in which remote providers collaborate with in-person nursing to evaluate and discharge well-appearing, low-risk ED patients with suspected COVID-19 infection.

### **3. What are the key findings?**

One hundred fifty-three patients were evaluated and discharged by a telehealth provider, with reductions in length of stay, PPE use, and close contact with health care personnel. The practice seems safe, with a 3.9% 72-h revisit rate.

### **4. How is patient care impacted?**

Patients discharged by a telehealth provider had a 62.5% shorter length of stay compared with other ESI Level 4 patients seen over the same time period. Using telehealth to discharge these well-appearing patients can help unload a busy ED, mitigating surge. Reducing PPE usage and decreasing provider infection risk supports a sustained ED response to the continuing pandemic.