

# Association of Telemedicine with Primary Care Appointment Access After Hospital Discharge



J Gen Intern Med

DOI: 10.1007/s11606-021-07321-3

© This is a U.S. government work and not under copyright protection in the U.S.; foreign copyright protection may apply 2021

## INTRODUCTION

The COVID-19 pandemic led to a large increase in the use of telemedicine. There is ongoing debate around whether expansions in telemedicine coverage during the pandemic should become permanent, much of which has centered around the value of telemedicine.<sup>1</sup> Telemedicine may be particularly valuable for post-discharge primary care appointments, which are an essential component of the transition from the inpatient setting, as timely follow-up visits are associated with lower rates of readmission.<sup>2</sup> When compared with White patients, Black patients have lower rates of completed post-discharge follow-up appointments.<sup>3, 4</sup> We examined whether telemedicine affected post-discharge access to primary care follow-up among patients discharged from the medicine service and trends in visit completion rates by race.

## METHODS

We extracted data from the University of Pennsylvania Health System's (UPHS) electronic medical record. We included all adult discharges from the inpatient medicine services of five UPHS hospitals between January 1, 2019, and April 30, 2021, who had outpatient follow-up scheduled with a primary care provider in the same health system within 30 days of discharge. Demographic information on each patient and data on each scheduled encounter were obtained, including whether the appointment was completed, the modality of the visit (telemedicine or in-person), and the timing of the appointment relative to discharge.

We looked at monthly visit completion rates of post-discharge primary care appointments across the study period for the whole study population and by race.

Because telemedicine availability was limited before the pandemic and in-person visit availability was limited in the early months of the pandemic, we limited our comparison of visit modalities to the period after June 1, 2020, when telemedicine and in-person visit utilization approached a new steady state.<sup>5</sup> We looked at average time from discharge to first scheduled visit; the rate of scheduled visits within 7 days of discharge; the rate of visits scheduled with the patient's listed PCP; and visit completion rates. Continuous outcomes and proportions were compared using *t* tests. This study was reviewed and classified as exempt by the University of Pennsylvania Institutional Review Board.

## RESULTS

Post-discharge primary care visit completion rates increased from 62% in January 2020 to 72% in June 2020, remaining elevated for most of the remainder of 2020 (Fig. 1). Appointment completion rates for Black patients increased from 52 to 70% over this same time frame. The change for White patients was much smaller, decreasing slightly from 68 to 67%.

Among patients discharged after June 1, 2020, those who had telemedicine visits scheduled were more likely to be Black, female, and slightly younger compared to patients who had in-person follow-up scheduled (Table 1). The average time from discharge to first scheduled appointment was 1.4 days shorter for telemedicine than in-person visits ( $p < 0.0001$ ), the rate of scheduled follow-up within 7 days was 8.2% higher ( $p < 0.001$ ), visit completion rates were 22.5% higher ( $p < 0.001$ ), and the rate of seeing one's assigned PCP was 2.6% higher ( $p = 0.04$ ).

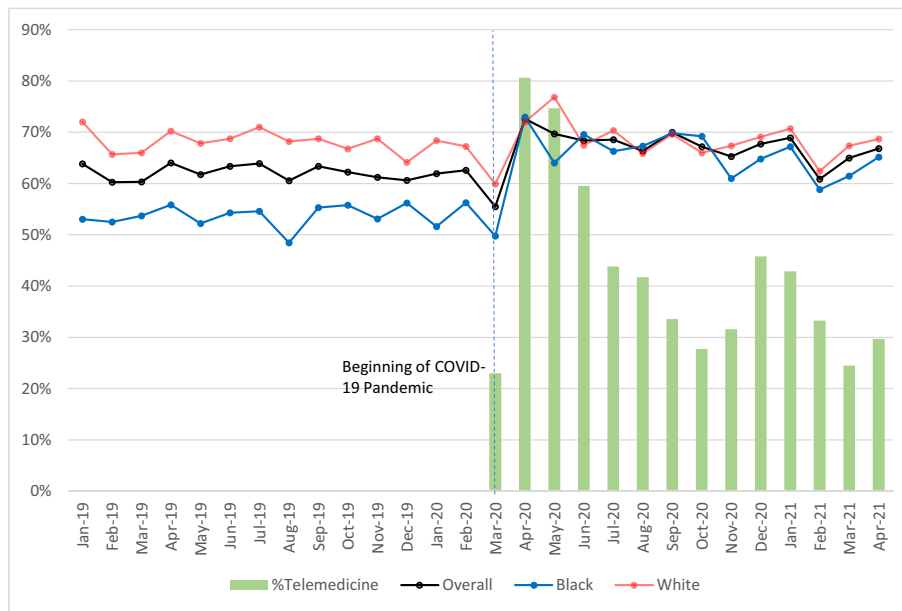
## DISCUSSION

In this study of primary care follow-up appointments among medicine service discharges of a large academic health system, telemedicine visits were associated with improved markers of access, including decreased time to follow-up and increased visit completion rates. No-show

---

Received July 23, 2021

Accepted December 8, 2021



**Figure 1 Post-discharge primary care visit completion rates by month. The trend lines represent visit completion rates displayed overall and broken down by race. The columns display the monthly percent of all scheduled post-discharge primary care visits that were telemedicine.**

rates for in-person follow-up visits have historically been high, which is costly for health systems and leads to lower-quality transitions of care.<sup>2, 4</sup>

Given concerns about the potential for telemedicine to increase disparities in access, it is especially striking that disparities in visit completion rates narrowed between Black and White patients with telemedicine. Many Black patients face barriers to accessing primary care, including disparities in distance from clinics, which are only compounded while recovering from an inpatient stay.<sup>6</sup> These findings provide encouraging signals that telemedicine can improve access to

care, perhaps by lowering the geographic barriers and opportunity costs to accessing care, as long as there is equitable access to the necessary technology.

This study was limited to patients who had follow-up within our health system. Our study population was predominantly non-Hispanic Black or White, limiting our ability to look at trends in other racial or ethnic subgroups. While questions remain about the relative quality of post-discharge telemedicine visits, our findings demonstrate the potential for telemedicine to increase access to primary care during the critical post-discharge recovery period.

**Table 1 Patient Demographics and Visit Characteristics by Visit Modality from June 2020 Through April 2021**

| First primary care visit modality             | In-person    | Telemedicine | <i>p</i> value    |
|---|--------------|--------------|-------------------|
| # of observations                             | 4045         | 2108         |                   |
| Female (%)                                    | 2148 (53.1%) | 1277 (60.6%) |                   |
| Age (mean, SD)                                | 64.0 (17.3)  | 62.5 (17.7)  |                   |
| Race (%)                                      |              |              |                   |
| Black   | 1488 (36.8%) | 1060 (50.3%) |                   |
| White   | 2330 (57.6%) | 938 (44.5%)  |                   |
| Other/unknown                                 | 227 (5.6%)   | 110 (5.2%)   |                   |
| Ethnicity (%)                                 |              |              |                   |
| Hispanic Latino                               | 239 (5.9%)   | 76 (3.6%)    |                   |
| Non-Hispanic Latino                           | 3766 (93.1%) | 2012 (95.5%) |                   |
| Unknown                                       | 40 (1.0%)    | 20 (1.0%)    |                   |
| Payor (%)                                     |              |              |                   |
| Commercial                                    | 1023 (25.3%) | 573 (27.2%)  |                   |
| Medicaid                                      | 619 (15.3%)  | 319 (15.2%)  |                   |
| Medicare                                      | 2160 (53.4%) | 1166 (55.3%) |                   |
| VA/uninsured/unknown                          | 243 (6.0%)   | 50 (2.4%)    |                   |
| Days from discharge to appointment (mean, SD) | 10.3 (7.2)   | 8.9 (6.4)    | <i>p</i> < 0.0001 |
| Scheduled within 7 days of discharge (%)      | 1857 (45.9%) | 1140 (54.1%) | <i>p</i> < 0.0001 |
| Visit scheduled with assigned PCP (%)         | 2734 (67.6%) | 1480 (70.2%) | <i>p</i> = 0.04   |
| Visit completed (%)                           | 2488 (61.5%) | 1771 (84.0%) | <i>p</i> < 0.0001 |

---

---

Eric Bressman, MD<sup>1,2,3</sup>  
Rachel M. Werner, MD, PhD<sup>1,2,3</sup>  
Claiborne Childs, MD, MS<sup>1</sup>  
Amanda Albrecht, MD<sup>1</sup>  
Jennifer S. Myers, MD<sup>1,2</sup>  
Srinath Adusumalli, MD, MSHP, MBMI<sup>1,2,4</sup>

<sup>1</sup>Department of Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

<sup>2</sup>Leonard Davis Institute of Health Economics, University of Pennsylvania, Philadelphia, PA, USA

<sup>3</sup>Corporal Michael J. Crescenz VA Medical Center, Philadelphia, PA, USA

<sup>4</sup>Center for Applied Health Informatics, Penn Medicine, Philadelphia, PA, USA

**Corresponding Author:** Eric Bressman, MD; Department of Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA (e-mail: eric.bressman@pennmedicine.upenn.edu).

**Declarations:**

**Conflict of Interest:** Dr. Adusumalli reports serving on the virtual care advisory board for Verizon as well as an advisory committee for Epic

Systems Inc.. Dr. Werner reports having previously served on the academic advisory board for FAIR Health. All other authors have no potential conflicts of interest to report.

## REFERENCES

1. Mehrotra A, Wang B, Snyder G. Telemedicine: What Should the Post-Pandemic Regulatory and Payment Landscape Look Like? *Commonwealth Fund*. 2020.
2. Shen E, Koyama SY, Huynh DN, et al. Association of a dedicated post-hospital discharge follow-up visit and 30-day readmission risk in a medicare advantage population. *JAMA Internal Medicine*. 2017;177(1):132-135.
3. DeLia D, Tong J, Gaboda D, Casalino LP. Post-discharge follow-up visits and hospital utilization by Medicare patients, 2007–2010. *Medicare Medicaid Research Review*. 2014;4(2):mmrr:004.02.a01.
4. Banerjee R, Suarez A, Kier M, et al. If You Book It, Will They Come? Attendance at Postdischarge Follow-Up Visits Scheduled by Inpatient Providers. *J Hosp Med*. 2017;12(8):618-625.
5. Mehrotra A, Chernew M, Linetsky D, Hatch H, Cutler D, Schneider EC. The Impact of COVID-19 on Outpatient Visits in 2020: Visits Remained Stable, Despite a Late Surge in Cases. *The Commonwealth Fund Improving Health Care Quality Web Site*. 2021.
6. Brown EJ, Polsky D, Barbu CM, Seymour JW, Grande D. Racial disparities in geographic access to primary care in Philadelphia. *Health Aff (Millwood)*. 2016;35(8):1374-1381.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.