

Data Report

Characterizing Telehealth Visits Across Clinical Research Networks Participating in PCORnet[®]

Rationale for Network Query of PCORnet Data Resources:

This network query of PCORnet data resources was requested by the Patient-Centered Outcomes Research Institute[®] (PCORI[®]) in collaboration with the PCORnet[®] Network Partners. Network queries are developed, distributed, and processed through the [PCORnet[®] Front Door](#), which is the point of contact and manages all data network requests.

This query of PCORnet data resources was motivated by the national shift in care delivery and coverage of telehealth during the COVID-19 pandemic. Unprecedented telehealth utilization resulted due to efforts to support continuity of care delivery during the pandemic. The extent to which the PCORnet[®] infrastructure could be used to characterize patient utilization of telehealth services was of primary interest, with the goal of characterizing the capacity of the network to support investigator-initiated patient-centered comparative clinical effectiveness research (CER) on telehealth. In addition, the query will inform the potential development of future, targeted investments in research focused on telehealth.

Background on PCORnet[®]:

PCORnet is a large, distributed “network of networks” (Figure 1) funded by PCORI to improve the nation’s capacity to efficiently conduct definitive health research, particularly patient-centered comparative clinical effectiveness research (CER).

At the time the query was conducted 63 data contributing partners¹ across eight Clinical Research Networks (CRNs) were participating in PCORnet². In addition to these partners, PCORnet also comprises patient partners and a Coordinating Center. Collectively, CRN data-contributing partners consist of more than thirteen thousand clinical sites across the U.S., including large academic health systems, hospitals, federally qualified health centers, and community clinics. A heatmap reflecting the geographic distribution of sites and more than 30 million patient encounters, is available on [PCORnet.org](#).

¹ A data contributing partner may include multiple clinics, hospitals, health networks, and other care settings.

² PCORnet[®] CRNs added sixteen (16) new sites in September 2023. These sites are not included in the analysis.

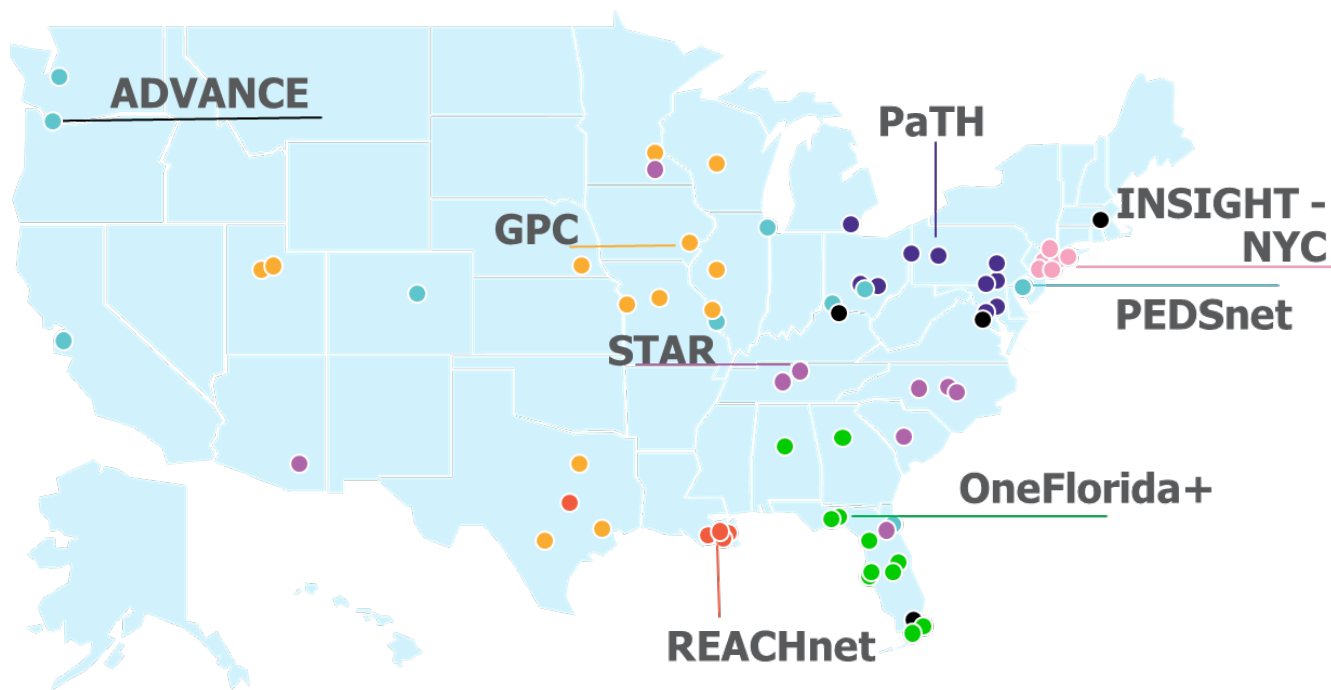


Figure 1. Clinical Research Networks participating in PCORnet, June 2023. Source: Developed by the Duke Clinical Research Institute (DCRI) with funding through a PCORI Award (RI-DCRI-01-PS3).

A unique feature of PCORnet is that all data contributing partners store a version of their clinical data in the same standardized data model, the [PCORnet® Common Data Model](#) (CDM). In this distributed network, data holders (e.g., health systems, clinics) maintain physical control, use, and manage the transfer of their data to the CRNs, the Coordinating Center for PCORnet® and data requestors.

Query Description:

This query of PCORnet data resources describes the patients who utilized telehealth services that are served by PCORnet partner sites. The query does not include descriptives of the magnitude of telehealth utilization or the telehealth modalities used. The query also included a comparison to the patient population with ambulatory encounters. The query results will inform how PCORnet can be used for patient-centered CER studies and trials related to telehealth and opportunities to enhance PCORnet data resources for research on telehealth. In addition, the query aims to demonstrate the utility of PCORnet to:

- Describe coding of telehealth visits in the EHR.
- Identify general trends in telehealth utilization before and during the COVID-19 pandemic.
- Illustrate the utilization of telehealth to manage one or more chronic conditions
- Identify populations via PCORnet that may offer opportunities to conduct patient-centered CER on telehealth.

Query Methodology, Criteria and Engagement:

This query of PCORnet data resources describes the characteristics of patients with telehealth encounters at a partner site participating in PCORnet during a 3-year period beginning prior to the onset of the COVID-19 pandemic (January 1, 2019, to September 30, 2022). The query examined the demographic characteristics of the population utilizing telehealth services during the query period, including the presence of chronic conditions and the characteristics of the telehealth visit and characterized patient Socioeconomic Status (SES) through the Area Deprivation Index (ADI) by 5-digit zip code.

The Coordinating Center for PCORnet programmed and distributed this descriptive query to 60 of the 63 data contributing partners, as three were claims partners not typically included in PCORnet feasibility queries.

As with all PCORI topics, the development process includes a review of the relevant literature and engagement with stakeholders such as subject matter experts and patient partners. Additionally, to demonstrate reuse of network resources, the Coordinating Center used previously established code sets for International Classification of Diseases (ICD-10) and Current Procedural Terminology (CPT) codes for conditions and procedures included in this query. Patient and clinician stakeholders reviewed the query results and public query report prior to public dissemination.

Patient encounters were included in this query if they met the following criteria:

- An encounter at a partner site in the period between January 1, 2019, and September 30, 2022, to capture time horizon of the COVID-19 pandemic; and
- A record for any diagnosis or procedure in the telehealth care setting from January 1, 2019, to September 30, 2022; or
- A minimum of one encounter and a record for any diagnosis or procedure in the ambulatory care setting from January 1, 2019, to September 30, 2022.

Age was calculated at the time of the most recent health care encounter and included three categories: 0-17, 18-64, 65+ years. Chronic conditions and comorbidities were included if they were recorded within 3 years prior to the telehealth encounter. The Combined Comorbidity Score was included to characterize the overall burden of chronic diseases and conditions for patients receiving telehealth services.³ The Coordinating Center and partner sites conducted geographic assessment to characterize state of address and SES through the ADI by zip code.

Results:

Forty-nine data contributing partners (82%) participating in PCORnet contributed data to the query request on patients with a recorded diagnosis or procedure in a telehealth care

³ Gagne JJ, Glynn RJ, Avorn J, Levin R, Schneeweiss S. A combined comorbidity score predicted mortality in elderly patients better than existing scores. *J Clin Epidemiol.* 2011 Jul;64(7):749-59. doi: 10.1016/j.jclinepi.2010.10.004. Epub 2011 Jan 5. PMID: 21208778; PMCID: PMC3100405.

setting. For the aggregated baseline characteristics of monthly visits and geographic characterization of SES, all 49 partners were able to run the query, but only 31 (63%) partners returned results that included monthly counts of people with telehealth encounters due to potential missingness of those data in the local PCORnet CDM. Results for SES and monthly/annual visits are presented for only these 31 partner sites.

Table 1 provides details of the demographic characteristics of the patients receiving telehealth services from January 1, 2019, through September 30, 2022. Over 9 million unique patients received telehealth services during the 3-year query period, compared to over 40 million patients with ambulatory encounters. Results demonstrate that over 3 million patients (36%) had at least one telehealth visit over the first three quarters of 2022.

Patients receiving telehealth services most frequently had diagnoses of hypertension (29%), hyperlipidemia (27%), depression (17%) and arthritis (17%). Nearly 60% of patients with telehealth encounters had one or more of the specified chronic conditions. The mean Combined Comorbidity score for patients receiving telehealth services was 1.2 (standard deviation +/- 2.2). For the over 40 million patients with ambulatory visits during the 3-year query period, the mean Combined Comorbidity score was 0.7 (standard deviation +/- 1.8). For the Combined Comorbidity score, the higher the score, the higher overall burden of chronic disease patients may have.

Table 2 describes the visits by year and month during the query period and is stratified by patients receiving ambulatory and telehealth services. The proportion of all telehealth users who had a telehealth encounter in each month increased from <1% to 14% after the onset of the COVID-19 pandemic in April 2020 and remained between 5-7% during 2022. A visual of the counts of patients with ambulatory or telehealth encounters by month during the query period (2019-2022) is provided in **Figure 2**.

Table 2 also includes SES status for patients receiving ambulatory or telehealth services, as defined by zip code and the ADI. Approximately 30% of patients receiving telehealth services were in the lowest level of socioeconomic deprivation, while 16% were in the highest level of deprivation. The results reported in Table 2 are from 31 data contributing partners that includes representation from all 8 CRNs participating in PCORnet.

Limitations:

Data and analyses presented are descriptive and derived from diagnosis codes collected during healthcare encounters in the EHR. Rows and percentages may not round due to missing values and or if counts are less than 10 they are reported as <10 to protect patient privacy and risk of identification from aggregate values as outlined in the [Data Privacy Statement for PCORnet®](#).

No inferential testing was conducted to compare populations or test hypotheses, as these are descriptive data only. Limitations with any EHR data analysis are applicable to this data, such as the possibility for misclassification due to imperfect algorithms and lack of

consistent definition of enrollment to define cohorts. Results should be interpreted with these limitations in mind.

To ensure PCORnet data resources are of high quality for research, activities in preparation for research (e.g., network query requests), and to mitigate the limitations above, all PCORnet-accessible data resources undergo rigorous quality curation and screening as part of quarterly coordinated data quality assessment.

Conclusion:

This query of PCORnet data resources is the largest known, national-scale descriptive analysis of telehealth utilization using EHR encounter data and may be compared to recent survey-based reports⁴. The results presented in this report provide researchers and patient/caregiver partners with information about the capacity of the PCORnet infrastructure to contribute to future patient-centered CER related to telehealth use and outcomes, including as compared to ambulatory care use. Results presented in this Public Query Report are informative to the public in a variety of ways, such as the extent of telehealth use overall, and across chronic health conditions.

Disclaimer:

PCORnet[®] is intended to improve the nation's capacity to efficiently conduct patient-centered health research, particularly CER, by providing a large, highly representative network of health data, research expertise, and patient insights. PCORnet has been developed with funding from the Patient-Centered Outcomes Research Institute[®] (PCORI[®]).

Network queries that return only aggregate or limited data sets are covered by the PCORnet[®] Master Data Sharing Agreement (version 4.0), and site-level blanket Institutional Review Board approvals.

The statements presented in this report do not necessarily represent the views of PCORI or other organizations participating in, collaborating with, or funding PCORnet.

For questions, comments or suggestions related to this PCORnet[®] Front Door query or other PCORnet queries, please contact the PCORnet[®] Front Door at frontdoor@pcornet.org.

⁴ [Updated National Survey Trends in Telehealth Utilization and Modality \(2021-2022\) | ASPE \(hhs.gov\)](#)

Tables

Table 1. Demographic characteristics for patients receiving a telehealth visit at partner sites participating in PCORnet (January 1, 2019, to September 30, 2022).

	Ambulatory Encounter	Telehealth Encounter
Number of unique patient records	40,358,394	9,276,939
Mean Age (SD)	40.7 (±22.7)	43.2 (±21.3)
Sex		
Female	56%	59%
Male	44%	41%
Race		
White	63%	68%
Black or African American	13%	12%
American Indian or Alaska Native	<1%	0%
Asian	3%	3%
Native Hawaiian or Other Pacific Islander	<1%	0%
Multiple Races ¹	NA	NA
Other ¹	8%	7%
Missing	12%	10%
Hispanic		
Yes	12%	11%
Year of most recent healthcare encounter (% contribution to cohort)		
2019	15%	1%
2020	14%	31%
2021	23%	33%
2022	48%	36%
Chronic Conditions²		
Hypertension	21%	29%
Hyperlipidemia	18%	27%
Arthritis (Osteoarthritis and Rheumatoid)	11%	17%
Depression	8%	17%
Diabetes	9%	13%
Asthma	6%	10%
Ischemic Heart Disease	6%	8%
Chronic Kidney Disease	5%	7%
Chronic Obstructive Pulmonary Disease	3%	5%
Heart Failure	3%	5%
Atrial Fibrillation	3%	4%
Osteoporosis	2%	4%
Autism Spectrum Disorders	1%	2%
Breast Cancer	1%	2%
Prostate Cancer	1%	2%
Stroke	1%	2%
Alzheimer's Disease and Related Dementia	1%	1%
Colorectal Cancer	1%	1%
Hepatitis (Chronic Viral B & C)	1%	1%
HIV / AIDS	<1%	1%
Lung Cancer	<1%	1%
Schizophrenia and Other Psychotic Disorders	1%	1%
Number of Chronic Conditions		
None	58%	41%
1 or more chronic conditions	42%	59%
Combined Comorbidity Score	0.7 (±1.8)	1.2 (±2.2)

¹For this particular query "Multiple Race" is included in

"Other".

²Patients may have multiple conditions and be represented more than once across conditions; 42% of the ambulatory cohort had 1 or more conditions and 59% of the telehealth cohort had one or more chronic conditions.

Table 2. Descriptive statistics of socioeconomic status and count of patient encounters by year and month.¹

	Ambulatory Encounter	Telehealth Encounter
Number of Unique Patients in Cohort	15,195,092	3,269,640
Area Deprivation Index (ADI)² at recent encounter		
SES Q1	29%	32%
SES Q2	16%	16%
SES Q3	16%	16%
SES Q4	17%	16%
Missing	23%	20%
Total % of unique patients with telehealth encounter over the full year		
2022	43%	34%
2021	52%	49%
2020	44%	58%
2019	50%	1%
Total % of unique patients with telehealth encounter each month		
2022		
January	10%	9%
February	10%	6%
March	11%	7%
April	10%	6%
May	11%	6%
June	11%	6%
July	10%	5%
August	12%	6%
September	11%	5%
2021		
January	9%	10%
February	10%	10%
March	12%	10%
April	12%	9%
May	11%	8%
June	11%	8%
July	10%	7%
August	11%	7%
September	11%	7%
October	12%	7%
November	12%	6%
December	11%	7%
2020		
January	12%	<1%
February	11%	<1%
March	8%	4%
April	4%	14%
May	5%	14%
June	8%	12%
July	9%	11%
August	9%	10%
September	9%	10%
October	10%	10%
November	9%	10%
December	9%	11%
2019		
January	11%	<1%
February	11%	<1%
March	11%	<1%
April	12%	<1%
May	11%	<1%
June	10%	<1%
July	11%	<1%
August	11%	<1%
September	11%	<1%
October	12%	<1%
November	11%	<1%
December	11%	<1%

¹All 49 data contributing partners were able to run the query to answer these questions, but only 31 (63%) partners returned results that included the monthly counts of people with telehealth encounters, so results for SES and monthly/annual visits are presented for only these 31 partner sites.

²Area Deprivation Index (ADI): Patient 5-Digit Zip Codes are mapped to socioeconomic status by normalized Area Deprivation Index (ADI) value (0-100). Lower values are associated with lower deprivation and higher values are associated with higher deprivation. A ranking of 1 indicates the highest level of socioeconomic status within the nation and an ADI with a ranking of 100 indicates the lowest level of socioeconomic status. In this table, values are grouped into quartiles using the count of zip codes. Quartile 1 (SES Q1) represents the lowest range of ADI values and Quartile 4 (SES Q4) represents the highest range of ADI values (Q1=0-38, Q2=39-43, Q3=44-49, and Q4=50-100). For additional information regarding the ADI index, see the Neighborhood Atlas here: <https://www.neighborhoodatlas.medicine.wisc.edu/>. Note that the Area Deprivation Index (ADI) is designed for validity at the 9-digit zip or census block group level rather than the 5-digit zip level.

Figure 2. Counts of Patients with Ambulatory or Telehealth Encounters by Month (2019-2022).

