



Proxy use of patient portals on behalf of children: Federally Qualified Health Centers as a case study

DIGITAL HEALTH
Volume 10: 1–11
© The Author(s) 2024
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/20552076231224073
journals.sagepub.com/home/dhj



Patrick Dang¹, Arlette Chavez¹, Cecilia Pham² , Mary Tipton¹,
LeChauncy D Woodard² and Omolola E Adepoju^{1,2} 

Abstract

Objective: This study examined the proxy use of patient portals for children in a large Federally Qualified Health Centers (FQHC) network in Texas.

Methods: We used de-identified individual-level data of patients, 0–18 years, who had 1+ visits between December 2018 and November 2020. Logistic regression was used to examine patient-, clinic-, and geographic-level factors associated with portal usage by an assumed proxy (i.e. parent or guardian).

Results: The proxy portal usage rate increased from 28% in the pre-pandemic months (November 2018–February 2020) to 34% in the pandemic months (March–Nov 2020). Compared to patients 0–5 years, patients aged 6 to 18 years had lower odds of portal usage (6–10 OR: 0.77, $p < 0.001$; 11–14 OR: 0.62, $p < 0.001$; 15–18 OR: 0.51, $p < 0.001$). Minoritized groups had significantly lower odds of portal usage when compared to their non-Hispanic White counterparts (non-Hispanic Black OR: 0.78, $p < 0.001$; Hispanic OR 0.63, $p < 0.001$; Asian OR: 0.69, $p < 0.001$). Having one chronic condition was associated with portal usage (OR: 1.57, $p < 0.001$); however, there were no significant differences in portal usage between those with none or multiple chronic conditions. Portal usage also varied by service lines, with obstetrics and gynecology (OR: 1.84, $p < 0.001$) and behavioral health (OR 1.82, $p < 0.001$) having the highest odds of usage when compared to pediatrics. Having a telemedicine visit was the strongest predictor of portal usage (OR: 2.30, $p < 0.001$), while residence in zip codes with poor broadband internet access was associated with lower odds of portal usage (OR: 0.97, $p < 0.001$).

Conclusion: While others have reported portal usage rates as high as 64% in pediatric settings, our analysis suggests proxy portal usage rates of 30% in pediatric FQHC settings, with race/ethnicity, age group, and chronic disease status being significant drivers of portal non-usage. These findings highlight the need for appropriate and responsive health information technology approaches for vulnerable populations receiving care in low-resource settings.

Keywords

Proxy, patient portal, safety-net, Federally Qualified Health Centers, health information technology

Submission date: 21 July 2023; Acceptance date: 14 December 2023

Introduction

In recent years, patient portals, secure websites offering patients online access to their personal health information, services, and clinical care,¹ have become increasingly popular to gain access to medical information, improve patient–physician communication,² and empower patients.³ Patient portals positively contribute to general quality of

¹Humana Integrated Health Systems Sciences Institute, University of Houston, Houston, USA

²Tilman J Fertitta Family College of Medicine, University of Houston, Houston, USA

Corresponding author:

Omolola E Adepoju, Humana Integrated Health Systems Sciences Institute, University of Houston, USA; Tilman J Fertitta Family College of Medicine, University of Houston, USA.

Email: oadepoju@central.uh.edu



care as evidence suggests that patient's use of portals improve patient-provider communication,⁴ active medical decision-making,⁵ and satisfaction.⁶ Although limited studies focus on pediatric proxy care through portal usage, Kelly *et al.* found parent participants were highly satisfied with quality of care offered by patient portals as it improved health record accessibility, promoted inclusive treatment plans, and enhanced positive child's care.⁷ For vulnerable populations, portal usage increases patient satisfaction, improves health services utilization, and promotes treatment adherence.^{8,9} However, vulnerable populations must overcome portal utilization barriers such as limited health literacy,¹⁰ privacy concerns,¹¹ and poor broadband access¹² as it limits patient's ability to effectively use patient portals. But the use of technology is not without challenges, which is especially true for Medicaid enrollees, often residing in medically underserved rural and urban areas.¹³ These populations typically experience various challenges, including lower socioeconomic status,¹⁴ lower levels of health literacy,¹⁵ and higher rates of health-related social needs,¹⁶ among others that can adversely impact their ability to obtain and use technology.¹⁷ In this era of digital technology, sub-optimal portal usage may exacerbate disparities in access to healthcare and outcomes of care. These exacerbated disparities are particularly concerning for children enrolled in Medicaid, considering their double vulnerability both as dependents and Medicaid recipients, and need to rely on a proxy for healthcare access and use.

Experts suggest that nearly half of health information seeking is done on behalf of other people.^{18,19} This pattern, coined as proxy online health information seeking,²⁰ is frequently exhibited in parent-child relationships allowing parents and legal guardians to seek out information regarding their child's health and to determine if further medical aid is needed.^{21,22} A 2020 analysis from a large health system suggests that pediatric portal usage by parents and legal guardians increased from 16%²³ to 64% across specialties,²⁴ representing a fourfold improvement from 10 years prior. Earlier work evaluating pediatric portal usage among parents identified access to their child's personalized health information²⁵ and increased communication with providers²⁶ as drivers of portal usage. The most utilized tools in patient portals include messaging, appointment scheduling, medication list review, and viewing lab results.²⁷ There are also significant differences in engagement levels among users, with few parents directly interacting with the portal. For example, while 75% of portal users read messages from their physicians, another 2020 study by Bryan *et al.* found only 28% of portal users to have sent at least one message after a year of account activation.²⁸

Despite the purported benefits of portal usage,²⁹ prior studies of pediatric patient portal use by parents have

shown disparities in portal enrollment and activation.^{30,31} Work by LeLaurin *et al.* found that active portal accounts were more likely to be for children 0 and 11 years old, White, non-Hispanic, and privately insured.³² The analysis by Szilagyi and colleagues was consistent, with even greater disparities by insurance type and race, with White patients being 12 times as likely to use patient portals compared to their Black counterparts and three times as likely as their Latino counterparts.²⁴ Some have also noted that racial minorities and lower income pediatric patients were less likely to be offered portal enrollment,^{33,34} and those who were offered faced logistical challenges with the activation process or saw little benefit.^{35,36}

Parents also reported barriers to portal usage, with health literacy and language barriers as the most prominent. Health literacy, which is defined as individual's ability to acquire, understand, and evaluate health information,³⁷ has been shown to be lower in racial and ethnic minorities, older adults, adolescents, and individuals with lower income and educational levels.^{38,39} These existing inequalities are magnified when linking portal usage to digital health literacy, the intersection of digital literacy and health literacy,⁴⁰ as these vulnerable populations may lack both the educational and technological resources to fully utilize patient portals. Moreover, limited English proficiency (LEP) may also exacerbate the consequences of low-health literacy,^{41,42} with work by Sentell and Braun finding 44.9% of those with LEP reporting low-health literacy compared to 13.8% of English speakers.⁴³ Given that LEP individuals may struggle with obtaining and understanding health information,⁴⁴ limited patient portal translations in an individual's preferred language may negatively influence access to digital health technology.³⁵

Specifically regarding pediatrics, portal non-users who identified as high-income cited no time, medium-income parents cited not needing the portal, while portal users from low-income households cited not knowing how to set up the portal.²⁷ Black, non-Hispanic parents, and low-income households were also more likely to have concerns about patient portals, such as being very concerned about hacking,²⁷ feeling like their children were not sick,²⁶ or visiting the clinic frequently enough to use.⁴⁵ While these earlier studies have examined pediatric portal usage, few have uniquely focused on portal usage in low-resourced populations and settings, such as Federally Qualified Health Centers (FQHCs).

Because FQHCs are a major safety net, providing care to 1 in 11 US residents,⁴⁶ elucidating patterns of pediatric portal usage in this population is important as it can shed light on the drivers of portal use in vulnerable populations receiving care in low-resource settings. This study assessed the proxy use of patient portals on behalf of children in a large FQHC network in Texas and stratified findings to explore unique differences in African American and Hispanic children. Studies of this nature are helpful to identify and guide the development of more appropriate and

responsive health information technology (HIT) approaches in vulnerable populations receiving care in low-resource clinics.

Methods

Data

De-identified electronic medical records of patients aged 0–18 years, spanning Family Practice, Dental, Behavioral Health, Obstetrics and Gynecology, and Pediatrics service lines, were obtained from a large FQHC network in Texas, with which the researchers have a prior working relationship. The FQHC, which served 96,000 unique patients, has clinics located in South and Central Texas, with 23 locations across six counties. Data included individual-level records for all patients with one or more visits between 1 December 2018 and 30 November 2020. The data encompassed demographic and clinical characteristics, with a flag denoting portal use during the study period. All patients were offered access to the patient portal at least once.

Measures

The dependent variable was a binary flag indicating patient portal usage. Portal usage was defined as individuals that have a portal account and performed one or more of the following actions: (a) scheduling an appointment through the patient portal, (b) requesting a medication refill through the portal, or (c) reviewing test results. Those defined as non-users include patients that never created a portal account, and those who created one but did not perform any of the previously defined actions.

The independent variables of interest included patient sociodemographic variables (e.g. age, race/ethnicity, biological sex), patient geographic classifications (e.g. metropolitan/non-metropolitan status, residence in a medically underserved area as defined by the Health Resources & Services Administration (HRSA)), patient clinical characteristics (count of chronic diseases, which were provided by the FQHC as binary variables of the most common chronic diseases), visit month (pre-pandemic [December 2018–February 2020] vs. pandemic [March 2020–November 2020]), type of visit (in person or telemedicine), and the primary clinic service line (Family Practice, Dental, Behavioral Health, Obstetrics and Gynecology, and Pediatrics). To account for broadband internet access, a necessary element for portal usage, we merged patient zip codes with zip code-level data on the percentage of households with no internet access (2020 ZCTA level-zip code tabulation areas) available from the Agency of Healthcare Research and Quality's (AHRQ) database on Social Determinants of Health (SDOH).⁴⁷ These variables have been previously found to be associated with HIT use and healthcare utilization.^{48–50} In line with previous studies,

missing data were managed using list wise deletion. Only observations with data on all the variables of interest were included in the analyses.

Analysis

Descriptive analyses employing frequencies and proportions were used to describe patient and clinic characteristics. In particular, we computed frequency distributions for the categorical and continuous variables, and means and standard deviations were reported. Chi-square tests and independent t-tests were used to assess independent bivariate associations between independent variables and portal usage, while multivariable logistic regression models focused on adjusted associations between independent variables and portal usage. The multivariable model produced adjusted odds ratios and 95% confidence intervals of patient portal usage. All data management and analyses were performed using Stata 16.1. All statistical tests were two-sided, and findings were considered statistically significant at $p < 0.05$. This study was approved by an independent institutional review board in July 2022 (ID: STUDY00003775).

Results

Table 1 shows the summary characteristics of the analytic sample. This sample consisted of 36,982 total patients, with 11,176 of them using the portal and 25,806 not using the portal. Approximately 39% ($n = 14,301$) of the sample were 0–5 years of age, 25% ($n = 9358$) were 6–10 years, 20% (7501) were 11–14 years, and 16% ($n = 5822$) were 15–18 years. The sample comprised approximately 50% ($n = 18,329$) females. Racial and ethnic subgroups included Hispanic (59%, $n = 21,672$), non-Hispanic White (20%, $n = 7464$), non-Hispanic Black (15%, $n = 5694$), Asian (2%, $n = 823$), Other (3%, $n = 1139$), and Mixed Race (1%, $n = 190$). Over 93% ($n = 34,475$) of the sample had no chronic diseases, 6.6% ($n = 2439$) had one chronic disease, and 0.2% ($n = 68$) had two or more chronic diseases. About 87% ($n = 31,993$) of the sample were patients in the Pediatrics service line, 4% Dental ($n = 1322$), 6% Behavioral Health ($n = 2229$), 0.8% Obstetrics and Gynecology ($n = 298$), and 3% Family Practice ($n = 1140$). Based on aggregate zip code reports, about 5% had no broadband internet access.

Bivariate association

Bivariate associations of independent variables by portal usage are also shown in Table 1. The proportion of individuals using portals was significantly lower as age increased ($p < 0.001$). [It is important to mention that for individuals 0–18 years, portal usage is most likely by their parents or other legal guardian; however, proxy versus use by the actual patient is not specifically measured in this analysis]. Gender was not associated with patient portal usage. Race

Table 1. Bivariate associations between independent variables and patient portal usage (n = 36,982).

Variables	Portal usage						p-value
	Total n = 36,982		No (0) n = 25,806		Yes (1) n = 11,176		
	N	(%)	n	(%)	n	(%)	
Age							<0.001
0-5	14,301	(38.7)	9361	(36.3)	4940	(44.2)	
6-10	9358	(25.3)	6570	(25.5)	2788	(25.0)	
11-14	7501	(20.3)	5481	(21.2)	2020	(18.0)	
15-18	5822	(15.7)	4394	(17.0)	1428	(12.8)	
Gender							0.47
Female	18,329	(49.6)	12,822	(49.7)	5507	(49.3)	
Male	18,653	(50.4)	12,984	(50.3)	5669	(50.7)	
Race/ethnicity							<0.001
Non-Hispanic White	7464	(20.2)	4693	(18.2)	2771	(24.7)	
Non-Hispanic Black	5694	(15.4)	3911	(15.1)	1783	(16.0)	
Hispanic	21,672	(58.6)	15,846	(61.4)	5826	(52.1)	
Asian	823	(2.2)	583	(2.3)	240	(2.2)	
Other	1139	(3.1)	641	(2.5)	498	(4.5)	
Mixed race	190	(0.5)	132	(0.5)	58	(0.5)	
Total chronic Diseases							<0.001
0	34,475	(93.2)	24,264	(94.0)	10,211	(91.4)	
1	2439	(6.6)	1496	(5.8)	943	(8.5)	
2+	68	(0.2)	46	(0.2)	22	(0.1)	
Primary Service line							<0.001
Pediatrics	31,993	(86.5)	22,432	(86.9)	9561	(85.6)	
Dental	1322	(3.6)	1015	(3.9)	307	(2.8)	
Behavioral health	2229	(6.0)	1246	(4.8)	983	(8.8)	
Obstetrics and gynecology	298	(0.8)	190	(0.8)	108	(0.9)	
Family practice	1140	(3.1)	923	(3.6)	217	(1.9)	

(continued)

Table 1. Continued.

Variables	Total n = 36,982		Portal usage				p-value
			No (0) n = 25,806		Yes (1) n = 11,176		
	N	(%)	n	(%)	n	(%)	
Telemedicine							<0.001
0	35,846	(96.9)	25,270	(97.9)	10,576	(94.6)	
1	1136	(3.1)	536	(2.1)	600	(5.4)	
Broadband Internet usage (Mean, SD)	Mean	SD	Mean	SD	Mean	SD	<0.001
Percent with no broadband internet	5.49	0.02	5.60	0.02	5.23	0.03	

and ethnicity status were also significantly related to portal usage. For example, 25% of those who used the portal identified as non-Hispanic White vs. 18% among those who did not use the portal, while 52% of those who used the portal identified as Hispanic vs. 61% among those who did not use the portal ($p < 0.001$). Not having a chronic disease was significantly associated with portal usage; about 91% of those who did not have a chronic disease used the patient portal, compared to 9% of those who had one or more chronic diseases ($p < 0.001$).

Patient visits under specific lines of service were significantly associated with portal usage. For example, 86% of portal usage was in Pediatrics vs. 87% of the Pediatric service line who did not use the patient portal, while 9% of portal usage was in Behavioral Health compared 5% of the Behavioral Health service line who did not use the patient portal ($p < 0.001$). Among those who used the portal, 5% also reported having 1 or more consultations via telemedicine vs. 2% among those who did not use the patient portal ($p < 0.001$). Broadband internet usage was also significantly associated with portal usage; among those who used the portal, the mean rate of no broadband internet access was 5.2% vs. 5.6% among those who did not use the portal ($p < 0.001$).

Figure 1 depicts monthly patient portal usage during the study period. Overall, the mean portal usage rate was 30%. In the pre-pandemic months (December 2018–February 2020), portal usage ranged between 26% and 35% (mean portal usage in pre-pandemic months: 28%). Between March and November 2020, portal usage increased modestly, ranging between 30% and 37%, with a mean of 34%.

Multivariate analysis

Table 2 shows the logistic regression results of the multivariate analysis conducted. Compared to individuals 0–5 years, patients aged 6 to 18 had lower odds of portal

usage (6–10 OR: 0.77, $p < 0.001$; 11–14 OR: 0.62, $p < 0.001$; 15–18 OR: 0.51, $p < 0.001$). All races, except Mixed Race and Other, showed statistically significantly lower odds of portal usage compared to non-Hispanic Whites (non-Hispanic Black OR: 0.78, $p < 0.001$; Hispanic OR: 0.63, $p < 0.001$; and Asian OR: 0.69, $p < 0.001$). Patients with one chronic disease had significantly higher portal usage (OR: 1.57, $p < 0.001$). Compared to the Pediatrics service line, the Obstetrics and Gynecology service line had the greatest odds of portal usage (OR: 1.84, $p < 0.001$), while the Family Practice (OR: 0.75, $p < 0.001$) and Dental Service lines had lower odds (OR: 0.80 $p < 0.001$). Individuals who had one or more telemedicine consults had a two-time greater odds of portal usage (OR: 2.30, $p < 0.001$), and as the proportion of those with no broadband internet access at the zip code-level increased, the likelihood of portal usage decreased (OR: 0.97 $p < 0.001$). Compared to individuals who had clinic visits in December 2018, portal usage was significantly higher in the pandemic months (March 2020–November 2020, all are $p < 0.05$).

Discussion

This study examined proxy use of patient portals on behalf of children in a large FQHC network in Texas and found differential utilization rates across this low-income population. While others have reported portal usage rates as high as 64% in pediatric settings,²⁴ our analysis suggests proxy portal usage rates of 30% in pediatric FQHC settings. This work is important because, to date, proxy portal usage in safety-net clinics has received limited attention in the existing literature, with even fewer studies specifically addressing adolescents or Medicaid enrollees. To the best of our knowledge, this is one of the first studies to focus on portal usage for individuals 0–18 years receiving

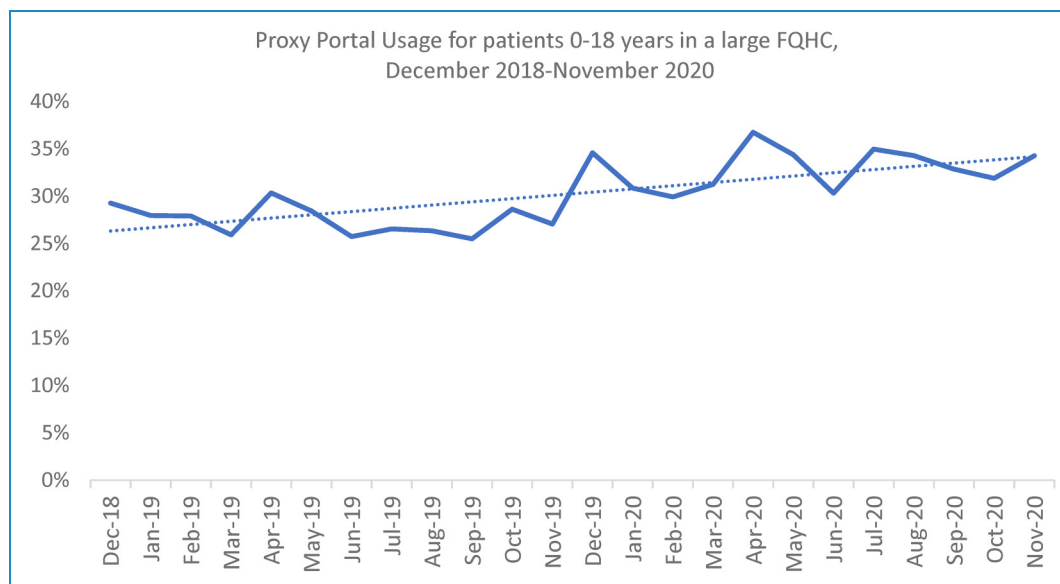


Figure 1. Proxy portal usage for patients 0–18 years in a large FQHC, December 2018–November 2020. FQHC: Federally Qualified Health Center.

care in safety-net settings, filling a crucial gap in the literature and contributing to our understanding of drivers of portal usage in this unique population. Our findings are consistent with other studies across pediatric²³ and adult^{51,52} primary care settings, suggesting that factors contributing to portal use in both populations are similar.

For safety-net populations, concerns about the digital divide contribute to the ability to use patient portals effectively. In this study, residing in a zip code with lower broadband internet rates was negatively associated with portal usage. This finding is consistent with existing literature on internet access and portal usage.^{53,54} Work by Bush *et al.* expounded on this linking computer internet and smartphone access to past and anticipated future portal use.⁵⁴ This linkage has significant implications for many safety-net populations, who often reside in lower broadband internet access areas. While some of these populations may have access to internet services, access is often shared with other low-income families in the same apartment building. Hence, access depends on how close a family is to the router, and during peak periods when most internet users are online, access might be slow and unreliable. While the effective use of portals may optimize healthcare delivery⁵⁵ and promote patient engagement,⁵⁶ reliable internet access is a must for safety-net populations to use portal technology.

Another major finding of this study was that overall portal usage reduces with increasing patient age. Other pediatric studies have reported similar findings,^{23,32,57,58} with work by Thompson *et al.* suggesting a slight decrease in portal use with increasing age.⁵⁷ Steitz and colleagues

noted that the highest portal use was seen in the first 3 years of life,²³ which may be related to the number of well-child visits recommended from ages 0–4^{23,59} in outpatient settings.⁶⁰ Another explanation for this trend could be a potential shift from portal use by a proxy towards self-patient portal use, which has been noted to increase significantly for patients aged 14 and above.²³ Other researchers have highlighted how parent proxy access can spark online health information seeking behavior among adolescent patients,³² with adolescents reporting increased interest in using patient portals⁶¹ as they age and transition into adult care.⁶² Similar to other pediatric studies,^{24,32} gender was not associated with portal usage. However, another prior analysis of pediatric portal activity suggested significant differences, with female and transgender individuals being more likely to use secure messaging tools.⁶³

Consistent with findings from other pediatric studies,^{24,32,58} this study also found exaggerated disparities in portal usage, with African Americans, Asians, and Hispanics receiving significantly lower odds of usage. Work by Szilagyi *et al.* suggested even wider racial disparities, with non-Hispanic Black patients making up only 3.5% of active portal users and Hispanic patients making up only 12.5%.²⁴ Some have posited that these disparities may be driven by lower socioeconomic status, language barriers, and low literacy.⁶⁴ For example, work by Wood *et al.* noted that 86.6% of patients whose preferred language was not English had an inactive patient account, compared to 57.8% of those who preferred English.⁶⁵ Ng and colleagues reported disparities in portal usage based on socioeconomic status and literacy, especially when pertaining to digital literacy.⁶⁶

Table 2. Logistic regression model of patient portal usage (n = 36,982).

Variables	Multivariate Adjusted OR		
	OR	95%CI	p-value
Age			
0-5	Ref.		
6-10	0.77	0.73-0.82	<0.001
11-14	0.62	0.58-0.66	<0.001
15-18	0.51	0.47-0.55	<0.001
Biological sex			
Female	Ref.		
Male	1.02	0.97-1.07	0.40
Race/ethnicity			
Non-Hispanic White	Ref.		
Non-Hispanic Black	0.78	0.72-0.84	<0.001
Hispanic	0.63	0.60-0.67	<0.001
Asian	0.69	0.59-0.81	<0.001
Mixed race	1.28	1.12-1.45	<0.001
Other	0.74	0.54-1.02	0.06
Total chronic diseases			
0	Ref.		
1	1.57	1.42-1.73	<0.001
2+	1.40	0.83-2.37	0.21
Service line			
Pediatrics	Ref.		
Dental	0.80	0.70-0.91	<0.001
Behavioral health	1.82	1.65-2.01	<0.001
Obstetrics and gynecology	1.84	1.44-2.37	<0.001
Family practice	0.75	0.64-0.88	<0.001
Telemedicine			

(continued)

Table 2. Continued.

Variables	Multivariate Adjusted OR		
	OR	95%CI	p-value
0	Ref.		
1	2.30	2.03-2.62	<0.001
Monthly appointments			
Dec-18	Ref.		
Jan-19	0.98	0.86-1.13	0.83
Feb-19	1.01	0.88-1.17	0.88
Mar-19	0.90	0.78-1.05	0.20
Apr-19	1.05	0.91-1.19	0.50
May-19	1.03	0.89-1.19	0.71
Jun-19	0.88	0.74-1.03	0.11
Jul-19	0.97	0.83-1.14	0.71
Aug-19	0.96	0.83-1.10	0.56
Sep-19	0.94	0.79-1.10	0.43
Oct-19	1.00	0.87-1.17	0.91
Nov-19	0.97	0.82-1.14	0.68
Dec-19	1.29	1.12-1.49	<0.001
Jan-20	1.10	0.95-1.27	0.21
Feb-20	1.11	0.96-1.29	0.15
Mar-20	1.15	0.98-1.34	0.09
Apr-20	1.25	1.05-1.48	0.01
May-20	1.19	1.00-1.41	0.05
Jun-20	1.04	0.89-1.22	0.58
Jul-20	1.24	1.07-1.44	0.004
Aug-20	1.25	1.09-1.43	<0.001
Sep-20	1.17	1.01-1.36	<0.001
Oct-20	1.13	0.98-1.31	<0.001

(continued)

Table 2. Continued.

Variables	Multivariate Adjusted OR		
	OR	95%CI	p-value
Nov-20	1.18	1.03-1.36	<0.001
Broadband internet			
Percent with no broadband internet	0.97	0.97-0.98	<0.001

CI: confidence interval; OR: odds ratio.

Compared to patients with no diagnosed chronic disease, our finding that having a chronic disease is significantly associated with portal usage showcases how increased portal engagement may assist with addressing healthcare needs, assessment of new symptoms, medication demands, and managing chronic conditions for parents of children with chronic conditions.⁶⁷⁻⁶⁹ These resources may not be accessible to FQHC patients due to high likelihood of socioeconomic barriers and health literacy.^{70,71} Among parents of children with chronic conditions, studies show a larger emphasis on direct use, such as scheduling appointments, requesting reminders about upcoming appointments, requesting prescription refills, and requesting referrals for their children.²⁴ However, we observed no significant differences in portal usage between patients with two or more chronic conditions and those without chronic conditions. We posit that having multiple chronic conditions receiving care from a FQHC may be reflective of patient barriers, such as low digital⁷² and health literacy,⁷¹ alongside low broadband access⁷⁰ contribute to factors that may hinder a patient and/or their proxies from utilizing patient portals.⁷³ Behavioral Health and Obstetrics/Gynecology service lines were also associated with increased portal usage and possibly reflect the influx of uninsured and unemployed patients seeking FQHC services, such as mental health, substance abuse, and stress-related symptoms, during the early COVID-19 timeframe.⁷⁴

Portal usage also significantly increased for those who had a consultation via telemedicine and during the pandemic months starting from March 2020. This notable surge is consistent with findings from other studies,⁷⁵⁻⁷⁷ with findings by Huang *et al.* observing an even stronger trend with patient portal usage peaking in March 2020 at the start of the pandemic.⁷⁵ Following the rise and lasting impact of virtual health technology during the COVID-19 pandemic,⁷⁸ recent studies have also identified a strong correlation between telemedicine and portal usage, with prior patient portal utilization serving as an indicator for the completion of telemedicine video visits.⁷⁹

Several limitations must be considered in interpreting the findings of this study. While we used data from a large FQHC network in Central and South Texas consisting of 56 clinic locations, our findings may not be generalizable to other types of clinics or clinics in other U.S. states. This data also does not capture the frequency or intensity of use of the patient portal, which prevents analysis of differences between patients that used the portal a lot and patients that only used the portal once. Non-users include both patients who never created a portal account and those who created one but did not use the portal. There is a possibility of significant differences between the two types of non-users; however, this study does not capture several challenges and barriers to portal usage. For example, information on patient medical conditions, language spoken, and digital literacy level—that could also inform portal usage—were not included in the data obtained for this study. Despite these limitations, findings from this large study of safety nets fill a gap in the literature. Future work should consider utilizing automated decision support systems, AI, and mobile telemonitoring⁸⁰ in underserved settings.

Conclusion

This paper examined a little studied intersection of portal use in pediatric populations who are Medicaid recipients. The findings are consistent with previously published work that examined trends in other pediatric populations. However, this population faces specific barriers both to care and healthcare technology use. We hope in the future to continue to delve into this area and explore the barriers and facilitators that will increase this population's use of health technology and their participation in care.

Acknowledgement: We acknowledge Ms. Maya Singh for research assistance.


Contributorship: OA conceptualized the study. PD and AC wrote the initial draft. OA, PD, and MT were responsible for protocol development and data analysis. OA was responsible for gaining ethical approval. CP and LW contributed to interpretation of findings and reviewed multiple versions of the manuscript. All authors reviewed and approved the final version of the manuscript.

Declaration of conflicting interests: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval: This study was approved by an independent institutional review board in July 2022 (ID: STUDY00003775). All guidelines on patient consent have been met.

Funding: The author(s) received no financial support for the research, authorship, and/or publication of this article.

Guarantor: OA.

ORCID iDs: Cecilia Pham  <https://orcid.org/0009-0001-5172-1487>
Omolola E Adepoju  <https://orcid.org/0000-0002-5585-7146>

References

- Weingart SN, Rind D, Tofias Z, et al. Who uses the patient internet portal? The PatientSite experience. *J Am Med Inform Assoc* 2006; 13: 91–95.
- Griffin A, Skinner A, Thornhill J, et al. Patient portals: who uses them? What features do they use? And do they reduce hospital readmissions? *Appl Clin Inform* 2016; 7: 489–501.
- Tulu B, Trudel J, Strong DM, et al. Patient portals: an under-used resource for improving patient engagement. *Chest* 2016; 149: 272–277.
- Portz JD, Bayliss EA, Bull S, et al. Using the technology acceptance model to explore user experience, intent to use, and use behavior of a patient portal among older adults with multiple chronic conditions: descriptive qualitative study. *J Med Internet Res* 2019; 21: e11604.
- Kruse CS, Bolton K and Freriks G. The effect of patient portals on quality outcomes and its implications to meaningful use: a systematic review. *J Med Internet Res* 2015; 17: 44.
- Lin SC, Lyles CR, Sarkar U, et al. Are patients electronically accessing their medical records? Evidence from national hospital data. *Health Aff* 2019; 38: 1850–1857.
- Kelly MM, Hoonakker PL and Dean SM. Using an inpatient portal to engage families in pediatric hospital care. *J Am Med Inform Assoc* 2017; 24: 153–161.
- Lyles CR, Sarkar U, Schillinger D, et al. Refilling medications through an online patient portal: consistent improvements in adherence across racial/ethnic groups. *J Am Med Inform Assoc* 2016; 23: e28–e33.
- Arcury TA, Quandt SA, Sandberg JC, et al. Patient portal utilization among ethnically diverse low income older adults: observational study. *JMIR Med Inform* 2017; 5: 47.
- Tieu L, Schillinger D, Sarkar U, et al. Online patient websites for electronic health record access among vulnerable populations: portals to nowhere? *J Am Med Inform Assoc* 2017; 24: e47–e54.
- Abdelhamid M, Gaia J and Sanders GL. Putting the focus back on the patient: how privacy concerns affect personal health information sharing intentions. *J Med Internet Res* 2017; 19: e169.
- Perzynski AT, Roach MJ, Shick S, et al. Patient portals and broadband internet inequality. *J Am Med Inform Assoc* 2017; 24: 927–932.
- Franciosi EB, Tan Alice J, Kassamali B, et al. The impact of telehealth implementation on underserved populations and no-show rates by medical specialty during the COVID-19 pandemic. *Telemed J E Health* 2021; 27: 874–880.
- Federal poverty level (FPL). *HealthCare.gov*. Washington, DC: U.S. Centers for Medicare & Medicaid Services, 2023.
- Kino S and Kawachi I. Can health literacy boost health services utilization in the context of expanded access to health insurance? *Health Educ Behav* 2020; 47: 134–142.
- Thompson T, McQueen A, Croston M, et al. Social needs and health-related outcomes among medicaid beneficiaries. *Health Educ Behav* 2019; 46: 436–444.
- Goldman LE, Chu PW, Tran H, et al. Federally qualified health centers and private practice performance on ambulatory care measures. *Am J Prev Med* 2012; 43: 142–149.
- Fox S and Duggan M. Health online 2013. *Health* 2013; 2013: 1–55.
- Reifegerste D, Bachl M and Baumann E. Surrogate health information seeking in Europe: influence of source type and social network variables. *Int J Med Inform* 2017; 103: 7–14. © 2017 Elsevier B.V.
- Robinson TN, Patrick K and Eng TR. Gustafson D, for the science panel on interactive communication and H. An evidence-based approach to interactive health CommunicationA challenge to medicine in the information age. *JAMA* 1998; 280: 1264–1269.
- Jaks R, Baumann I, Juvalta S, et al. Parental digital health information seeking behavior in Switzerland: a cross-sectional study. *BMC Public Health* 2019; 19: 225.
- Park E, Kim H and Steinhoff A. Health-related internet use by informal caregivers of children and adolescents: an integrative literature review. *J Med Internet Res* 2016; 18: e57.
- Steitz B, Cronin RM, Davis SE, et al. Long-term patterns of patient portal use for pediatric patients at an academic medical center. *Appl Clin Inform* 2017; 8: 779–793.
- Szilagyi PG, Valderrama R, Vangala S, et al. Pediatric patient portal use in one health system. *J Am Med Inform Assoc* 2020; 27: 444–448.
- Kelly MM, Thurber AS, Collier RJ, et al. Parent perceptions of real-time access to their hospitalized child’s medical records using an inpatient portal: a qualitative study. *Hosp Pediatr* 2019; 9: 273–280.
- Byczkowski TL, Munafo JK and Britto MT. Family perceptions of the usability and value of chronic disease web-based patient portals. *Health Informatics J* 2014; 20: 151–162.
- Clark SJ, Costello LE, Gebremariam A, et al. A national survey of parent perspectives on use of patient portals for their children’s health care. *Appl Clin Inform* 2015; 6: 110–119.
- Bryan M, Norton D, Birstler J, et al. Resource utilization among portal users who send messages: a retrospective cohort study. *WMJ* 2020; 119: 26–32.
- Nagykaldi Z, Aspy CB, Chou A, et al. Impact of a wellness portal on the delivery of patient-centered preventive care. *J Am Board Fam Med* 2012; 25: 158–167.
- Britto MT, Hesse EA, Kamdar OJ, et al. Parents’ perceptions of a patient portal for managing their child’s chronic illness. *J Pediatr* 2013; 163: 280–1.e1–2.
- Byczkowski TL, Munafo JK and Britto MT. Variation in use of internet-based patient portals by parents of children with chronic disease. *Arch Pediatr Adolesc Med* 2011; 165: 405–411.
- LeLaurin JH, Nguyen OT, Thompson LA, et al. Disparities in pediatric patient portal activation and feature use. *JAMIA Open* 2021; 4: ooab086.
- Ancker JS, Nosal S, Hauser D, et al. Access policy and the digital divide in patient access to medical records. *Health Policy Technol* 2017; 6: 3–11.
- Ancker JS, Barrón Y, Rockoff ML, et al. Use of an electronic patient portal among disadvantaged populations. *J Gen Intern Med* 2011; 26: 1117–1123.

35. Antonio MG, Petrovskaya O and Lau F. Is research on patient portals attuned to health equity? A scoping review. *J Am Med Inform Assoc* 2019; 26: 871–883.
36. Zhao JY, Song B, Anand E, et al. Barriers, facilitators, and solutions to optimal patient portal and personal health record use: a systematic review of the literature. *AMIA Annu Symp Proc* 2017; 2017: 1913–1922.
37. Rowlands G, Shaw A, Jaswal S, et al. Health literacy and the social determinants of health: a qualitative model from adult learners. *Health Promot Int* 2017; 32: 130–138.
38. Ylitalo KR, Meyer MRU, Lanning BA, et al. Simple screening tools to identify limited health literacy in a low-income patient population. *Medicine (Baltimore)* 2018; 97: e0110.
39. Cutilli CC and Bennett IM. Understanding the health literacy of America: results of the national assessment of adult literacy. *Orthop Nurs* 2009; 28: 27–32; quiz 33–4.
40. Honeyman M, Maguire D, Evans H, et al. *Digital technology and health inequalities: a scoping review*. Cardiff: Public Health Wales NHS Trust, 2020.
41. Leyva M, Sharif I and Ozuah PO. Health literacy among Spanish-speaking Latino parents with limited English proficiency. *Ambul Pediatr* 2005; 5: 56–59.
42. Shaw SJ, Huebner C, Armin J, et al. The role of culture in health literacy and chronic disease screening and management. *J Immigr Minor Health* 2009; 11: 460–467.
43. Sentell T and Braun KL. Low health literacy, limited English proficiency, and health status in Asians, Latinos, and other racial/ethnic groups in California. *J Health Commun* 2012; 17: 82–99.
44. Andrulis DP and Brach C. Integrating literacy, culture, and language to improve health care quality for diverse populations. *Am J Health Behav* 2007; 31: S122–S133.
45. Selvadurai H, Janssen A, Keep M, et al. An online patient portal to enhance clinical communications for patients with chronic asthma. In: *Respirology*, Vol. 24. Hoboken, NJ, USA: Wiley, 2019, p.110.
46. Health Center Program: Impact and Growth. *Health Resources & Services Administration*. U.S. Department of Health & Human Services, 2022.
47. Social Determinants of Health Database. Rockville, MD: Agency for Healthcare Research and Quality, 2022.
48. Waldman J. *COVID-19 Deepens a Digital Divide that has long impacted low-income, Black and Hispanic, Tribal and Rural, and older households, according to recent reports (Digital Divide Blog Series: Part 1)*. Connecting Justice Communities, 2020.
49. Syed ST, Gerber BS and Sharp LK. Traveling towards disease: transportation barriers to health care access. *J Community Health* 2013; 38: 976–993.
50. Brown EJ, Polsky D, Barbu CM, et al. Racial disparities in geographic access to primary care in Philadelphia. *Health Aff* 2016; 35: 1374–1381.
51. Hong YA, Jiang S and Liu PL. Use of patient portals of electronic health records remains low from 2014 to 2018: results from a national survey and policy implications. *Am J Health Promot* 2020; 34: 677–680.
52. Casacchia NJ, Rosenthal GE, O'Connell NS, et al. Characteristics of adult primary care patients who use the patient portal: a cross-sectional analysis. *Appl Clin Inform* 2022; 13: 1053–1062.
53. Woods SS, Forsberg CW, Schwartz EC, et al. The association of patient factors, digital access, and online behavior on sustained patient portal use: a prospective cohort of enrolled users. *J Med Internet Res* 2017; 19: e345.
54. Bush RA, Barlow H, Pérez A, et al. Internet access influences community clinic portal use. *Health Equity* 2018; 2: 161–166.
55. (OCR) tUSDoHaHSH-OfCR. Health Information Technology, 2022.
56. Dendere R, Slade C, Burton-Jones A, et al. Patient portals facilitating engagement with inpatient electronic medical records: a systematic review. *J Med Internet Res* 2019; 21: e12779.
57. Thompson LA, Martinko T, Budd P, et al. Meaningful use of a confidential adolescent patient portal. *J Adolesc Health* 2016; 58: 134–140.
58. Ketterer T, West DW, Sanders VP, et al. Correlates of patient portal enrollment and activation in primary care pediatrics. *Acad Pediatr* 2013; 13: 264–271.
59. Services USDoHaH. Office of Disease Prevention and Health Promotion. Regular Checkups. <https://health.gov/myhealthfinder/doctor-visits/regular-checkups> (2023, Accessed 16 July 2023).
60. Silver RA, Subramaniam C and Stylianou A. Association between Patient Portal use and Office Visits. *J Med Syst* 2021; 45: –8.
61. Miklin DJ, Vangara SS, Delamater AM, et al. Understanding of and barriers to electronic health record patient portal access in a culturally diverse pediatric population. *JMIR Med Inform* 2019; 7: e11570.
62. Hong MK, Wilcox L, Feustel C, et al. Adolescent and caregiver use of a tethered personal health record system. *AMIA Annu Symp Proc* 2016; 2016: 628–637.
63. Hoopes AJ, Cushing-Haugen KL, Coley RY, et al. Characteristics of adolescents who use secure messaging on a health system's patient portal. *Pediatrics* 2023; 152: e2022060271,
64. Chen X, Schofield E, Hay JL, et al. Race/ethnicity, nativity status, and patient portal access and use. *J Health Care Poor Underserved* 2022; 33: 1135–1145.
65. Wood KE, Greene HR and Krasowski MD. Patient portal activation and use in hospitalized children at an academic medical center. *Hosp Pediatr* 2021; 11: 587–594.
66. Ng BP P, Silverman C, Eckhoff CL, et al. Accessibility and utilisation of telehealth services among older adults during COVID–19 pandemic in the United States. *Health Soc Care Community* 2022; 30: e2657–e2669.
67. Saviñon C, Taylor JS, Canty-Mitchell J, et al. Childhood obesity: can electronic medical records customized with clinical practice guidelines improve screening and diagnosis? *J Am Acad Nurse Pract* 2012; 24: 463–471.
68. Parker R, Goldbloom EB, Mitsakakis N, et al. Social determinants of health associated with patient portal use in pediatric diabetes. *Can J Diabetes* 2022; 46: 586–593.
69. Sun R, Korytkowski MT, Sereika SM, et al. Patient portal use in diabetes management: literature review. *JMIR Diabetes* 2018; 3: e11199.
70. Bell N, Hung P, Lòpez-De Fede A, et al. Broadband access within medically underserved areas and its implication for telehealth utilization. *J Rural Health* 2023; 39: 625–635.
71. De Alba A, Britigan DH, Lyden E, et al. Assessing health literacy levels of Spanish-speaking Hispanic patients in Spanish

- at federally qualified health centers (FQHCs) in the Midwest. *J Health Care Poor Underserved* 2016; 27: 1726–1732.
72. Matthews AK, Jung MY, Akufo J, et al. Barriers to using a patient portal among low-income patient populations: a qualitative descriptive study. *J Health Care Poor Underserved* 2023; 34: 863–883.
 73. Shippee ND SN, May CR, Mair FS, et al. Cumulative complexity: a functional, patient-centered model of patient complexity can improve research and practice. *J Clin Epidemiol* 2012; 65: 1041–1051.
 74. Rosenbaum S and Handley M. *Caring for the Uninsured in a Pandemic Era. 2020 Assessing Legal Responses to COVID-19*. Boston: Public Health Law Watch, 2020.
 75. Huang M, Khurana A, Mastorakos G, et al. Patient portal messaging for asynchronous virtual care during the COVID-19 pandemic: retrospective analysis. *JMIR Hum Factors* 2022; 9: e35187.
 76. Stanimirovic D. Ehealth patient portal - becoming an indispensable public health tool in the time of COVID-19. *Stud Health Technol Inform* 2021; 281: 880–884.
 77. Lo B, Charow R, Laberge S, et al. Why are patient portals important in the age of COVID-19? Reflecting on patient and team experiences from a toronto hospital network. *J Patient Exp* 2022; 9: 23743735221112216.
 78. Shaver J. The state of telehealth before and after the COVID-19 pandemic. *Prim Care* 2022; 49: 517–530.
 79. Wood BR, Lan KF, Tao Y, et al. Visit trends and factors associated with telemedicine uptake among persons with HIV during the COVID-19 pandemic. *Open Forum Infect Dis* 2021; 8: ofab480.
 80. Jung SY, Lee K and Hwang H. Recent trends of healthcare information and communication technologies in pediatrics: a systematic review. *Clin Exp Pediatr* 2022; 65: 291–299.
-