EHR portal use and telehealth readiness among patients in a national network of community-based health centers: An observational study

Rachel Gold, Ana G Rosales, Suparna Navale, Shelby L. Watkins, Rose Gunn, Dave Boston, Stephanie L. Fitzpatrick, Dickerson John, Middendorf Mary, Carmit McMullen

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Abstract

Background: Lack of telehealth engagement could exacerbate inequities among low-income persons with chronic conditions. As patient portal accounts are the primary access point for telehealth services, understanding portal use patterns and other elements of telehealth readiness in socioeconomically vulnerable populations is necessary.

Objective: To add knowledge on community health center patients' 'telehealth readiness' defined as access to and ability to use relevant technologies, and their portal use patterns.

Methods: Using EHR data from a national network of over 2,000 community-based health centers, we compared patients who ever vs. never used the EHR's portal, and patterns of portal use. We also conducted a survey on telehealth readiness among portal-using patients in four health centers. We compared survey respondents vs. non-respondents, and associations between the respondent characteristics and their survey answers. All data are from 2023.

Results: The 41% of patients who ever used the portal differed from those who did not. Users were younger, more likely female, white, English speaking, and with higher income; they were less likely Hispanic or to have diabetes / hypertension. They did not differ by rural-urban location. Patients who used the portal >10 times / year were more likely female, white, or with diabetes / hypertension, and less likely Black, Hispanic, or primarily Spanish speaking. The survey response rate was 5.6% (567/10,158). Most respondents had access to a smartphone (98%), computer (85%), and the internet (96%); >20% always or often limited their internet use due to cost or poor connectivity. Respondents were less likely to limit internet use because of cost if they were white and more likely if they were Hispanic. Respondents used technological devices to track a health-related goal (71%), find information about a condition (88%), communicate with their provider (95%), make appointments or look up test results (94%), and share biometric data with their care team (60%). Respondents whose primary language was Spanish were less likely to report that their device helped them locate health information or share data with their care team. White respondents and those with diabetes were more likely to use technology to track health information. Hispanic respondents were less likely to access the portal six or more times annually. Respondents with chronic diseases who were portal users used it more frequently than others, suggesting that once initial barriers are bridged, such individuals will engage with the portal.

Conclusions: Health center patients with portal accounts have high telehealth readiness. They face few technology-related barriers to engaging in telehealth, but some barriers exist, including cost, connection quality, and language. It is necessary to ensure that portals can be accessed in multiple languages, and to identify interventions that support portal adoption in diverse patient groups as a means to improve health equity.

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Keywords: Health Equity; Patient Portals; Chronic Disease; Telemedicine; Vulnerable Populations; Community Health Services; Surveys and Questionnaires; Internet Use; Smartphone

Introduction

The provision of healthcare via telehealth rose dramatically during the COVID-19 pandemic, and telehealth remains a common care modality. Telehealth has the potential to address inequities in healthcare access by reducing barriers to care receipt among people with transportation insecurity, mobility challenges, in rural areas, and other socioeconomically vulnerable populations. [1, 2] However, disparities in telehealth uptake could also exacerbate inequities in healthcare access and outcomes. [1, 3-15] Individuals must have telehealth readiness (access to the technology needed to engage in telehealth, and the skills to use it) to benefit from telehealth services. [15] People with chronic conditions who require ongoing healthcare services and experience barriers to in-person care may have much to gain by using telehealth, yet there is limited knowledge about their experiences accessing remotely delivered care.

Patient portal accounts are a critical access point for some telehealth services and can be particularly useful for supporting chronic disease management, [16] and disparities in use of portals represent a missed opportunity to equitably provide easily accessible care. [17] National survey data demonstrate that Black and Hispanic (compared to White) patients are significantly less likely to be encouraged to use a patient portal. [18] Other studies demonstrated that use of patient portals pre-pandemic varied by demographic characteristics, [19] though only a few of these studies were conducted among safety net clinic patients overall or specifically those with chronic diseases, [9, 20-22] or in a general adult patient population. Understanding portal use patterns and other elements of telehealth readiness among socioeconomically vulnerable individuals with chronic illness – particularly in the safety net community-based health centers (hereafter ‘health centers’) context – would provide useful evidence on telehealth access disparities. To provide this knowledge, this research was conducted at OCHIN, a nonprofit health information technology consultancy serving a national network of independent health centers, which share a centralized electronic health record (EHR) system.

To add knowledge on health center patients’ ‘telehealth readiness’ – their access to and ability to use relevant technologies – we surveyed patients in this national network who used online patient portal accounts in the post-pandemic landscape. We also examined the use of patient portals more broadly using EHR data to describe characteristics of health center patients with different patterns of portal engagement. These analyses were conducted as part of a larger study on digital health technology adoption in health centers.

Methods

Setting

Data was sourced from the OCHIN Epic EHR system. As a national nonprofit health IT consultancy, OCHIN provides a fully hosted and shared EHR platform with tailored tools and expertise that are currently used by more than 34,500 providers to support care for people in rural and medically underserved communities nationwide. The shared OCHIN Epic EHR includes a patient portal. The Institutional Review Board at Kaiser Permanente Northwest approved this study (#00000405).

Portal use

Almost all (>99%) patients in the OCHIN network of clinics are given the ability to access a portal account; a simple process of ‘activating’ the account at first use is required. Portal use is often encouraged by clinic staff but is optional for the patient. Using data from December 2022-March 2024, analyses compared the characteristics of OCHIN patients who were ‘active’ portal users (those who ever used their portal account after December 1, 2022) to those who were not active portal users, and patterns of active users’ engagement with the portal. These analyses both

describe patterns of portal adoption in health center patients, and support assessing the generalizability of our survey findings to all health center patients.

Telehealth readiness survey

The survey described here was conducted among organizations participating in a larger study on the use of remote monitoring and telehealth technologies (R01NR020305). All six of the health centers participating in that study were approached for survey distribution; two chose not to launch the survey and four organizations in two states agreed to do so. In these four health centers the survey launch dates ranged from November 2022 to November 2023.

Survey invitations were sent to patients through the online patient portal, as both recruitment and survey administration methods aimed to minimize impact on clinics. All ≥18-year-old patients at the four health centers who had a clinic visit in the prior year and a portal account to which they had ever logged in received a survey invitation through a portal message. Patients provided consent by responding to the survey. Patients had the option to decline the survey by not participating in the survey. One month after the initial survey invitation, health centers could choose to send one additional reminder to complete the survey via the portal. Patients who did not return a survey were considered non-responders. Survey responses were collected through the patient portal. De-identified quantitative data on patient characteristics were extracted from the health centers' EHR and linked to individual patients' survey responses. The analyses presented here compared characteristics of survey respondents vs. non-respondents, as well as associations between the characteristics of respondents and their survey responses.

Survey content

The full text of the survey is in Appendix 1. The survey asked respondents about the types of computers to which they have access; whether and how they access the internet, or barriers to doing so; whether they use these technologies in health-related activities; and how they use their portal. Most questions involved a discrete set of response options.

Most of the survey questions came from the American Community Survey. [23] A few were written by the study team because we were unable to find validated instruments that covered those topics: why respondents limit their internet use, how they use their portal account, and whether and how they use devices to track and share health information.

Results

Table 1: **Characteristics of survey respondents and non-respondents, and all patients in the OCHIN network in portal use categories**

	All survey recipients (n= 10,158)	Survey respondents		All OCHIN patients minus study clinics (n=2,466,453)	No portal account, or inactive (n= 1,460,972)	Active portal account (n= 1,005,481)
		No (n=9,591)	Yes (n=567)			
	Col %	Col %	Col %	Col %	Col %	Col %
Age						
Mean±SD	43.9±16.7	43.4±16.6	52.0±17.3	44.9±17.0	46.9±17.4	42.0±16.1
Gender						
Female	72.2	72.1	73.0	59.0	55.5	64.1
Race						
Am. Indian/AK Native	0.6	0.5	1.4	1.2	1.1	1.2
Asian	0.8	0.8	0.5	5.7	6.0	5.3
Black or African Am.	3.9	3.9	3.7	16.4	17.1	15.6
Multiple race	1.4	1.3	2.6	1.0	0.7	1.5
Native Hawaiian/PI	0.1	0.1	0.2	0.2	0.3	0.2
Other/unknown	11.4	11.5	9.5	16.9	18.2	15.1
White	81.9	81.9	82.0	58.5	56.7	61.2
Ethnicity						
Hispanic/Latino	38.7	39.8	21.5	33.8	37.9	28.0
Not Hispanic/Latino	52.0	51.0	68.8	56.0	51.7	62.2
Unknown	9.3	9.2	9.7	10.1	10.4	9.8
Language						
English	72.0	71.3	84.3	69.5	61.0	82.0
Other	0.7	0.8	0.5	7.0	8.7	4.6
Spanish	27.2	28.0	15.2	23.4	30.3	13.4
Federal poverty level						
Missing	7.1	7.2	6.2	10.8	11.0	10.5
>138 of FPL	25.0	24.7	29.1	17.2	13.9	22.0
≤138 of FPL	67.9	68.1	64.7	72.0	75.1	67.5
Patient's rural urban designation						
Missing	0.9	0.8	2.1	1.2	1.2	1.2
Metropolitan	71.0	71.6	59.6	93.4	93.1	93.7
Small town	0.6	0.5	1.6	3.2	3.4	3.0
Rural	27.5	27.0	36.7	2.2	2.3	2.0
Diabetes						
Yes	9.4	9.2	12.3	13.4	14.7	11.4
Hypertension						
Yes	19.5	18.8	31.6	24.8	26.2	22.7
Ever documented social risk screening results						
Never documented	76.3	77.0	64.4	79.4	82.0	75.6
Reported no risk	14.0	13.6	22.0	14.3	12.3	17.2
Reported risk	9.7	9.4	13.6	6.3	5.7	7.2
Portal use in prior year						
Users	**n=10,158**	**n=9,591**	**n=567**	**n=1,005,481**	**n=0**	**n=1,005,481**
Mean±SD	17.2±28.4	15.5±25.9	46.8±46.4	19.2±25.9	na	19.2±25.9
Median (25th, 75th)	5.0 (0, 23)	5.0 (0, 20)	35.0 (17, 63)	10.0 (3, 25)	na	10.0 (3, 25)

Patterns of portal adoption in a national health center network

While almost all (99%) patients in the OCHIN network had a portal account, only 41% had used their account at least once in the year prior to data collection; Table 1. Persons who had ever used their portal (hereafter called ‘active’ users’) differed significantly ($p < .0001$) from those who had not in several ways, as follows. Active users were younger (mean 42 years vs. 47 years); more likely to be female (64% vs. 56%), white (61% vs. 57%), primarily English speaking (82% vs. 61%), from households above 138% of the federal poverty level (25% vs. 16%), and less likely to be Hispanic or Latino (28% vs. 38%), to have diabetes (11% vs. 15%) or hypertension (23% vs. 26%). Among

those who had been screened for social risks, active portal users were more likely to have reported no risk (17% vs. 12%). There were no observed differences in terms of rural-urban location of patient address.

Among active portal users, 77% (n=778,560) used the portal >10 times in the last year (results not shown in tables). In adjusted analyses, the odds of using the portal at that level were higher among patients who were female (OR 1.22, 1.21-1.23), white (OR 1.06, 1.05-1.08), had diabetes (OR 1.19, 1.17-1.21) or hypertension (OR 1.30, 1.28-1.31). They were lower among persons who were Black or African American (OR 0.69, 0.68-0.70), Hispanic or Latino (OR 0.85, 0.84-0.86), or primarily Spanish speaking (OR 0.58, 0.57-0.59). These odds did not differ by age. Results not shown in tables.

Population completing survey

The survey response rate was 5.6% (567/10,158). As shown in Table 1, survey respondents were significantly older than non-respondents (mean age 52 vs. 43, p<0.0001), from households above 138% of the federal poverty level (p=0.027), more often English speakers (84% vs. 71%, p<0.0001), less often Hispanic (22% vs. 40%, p<0.0001), less often lived in urban areas (60% vs. 72%, p<0.0001), and more likely to have hypertension (32% vs. 19%, p<0.0001) or diabetes (12% vs. 9%, p=0.0295). These groups differed significantly in racial distribution (p=0.0164) but not by gender.

Survey results

Appendix 2 shows the survey results. Nearly all (98%) respondents had access to a smartphone, 85% to a desktop or laptop computer, and 69% to a tablet or similar device (totals sum to >100% as respondents could select multiple options). Almost all (96%) had internet access, and most had that access through a cell phone (95%) or broadband device (78%); 28% had satellite service.

About 22% always or often limited their internet use due to cost, and 20% due to poor connectivity. Most respondents used their devices to track progress on a health-related goal (71%) or find information about how to treat a condition (88%) and nearly all had used their devices to communicate with their provider (95%) or make appointments and / or look up test results (94%). Respondents used devices to track heart rate (43%), steps taken (49%), heart rhythm (27%), blood pressure (35%), diet (27%), blood glucose (19%), and body temperature (18%); 60% reported using devices to share such information with their provider in the last year.

Respondents reported having accessed their portal account in the last year at varying levels, with 10% doing so 1-2 times, 22% 3-5 times, 20% 6-9 times, and 48% 10 or more times. Less than 1% reported never accessing it. Almost all (95%) found the patient portal very to somewhat useful.

Several associations between the characteristics of survey responses and their response patterns were seen (Tables 2a-c) in adjusted analyses. Respondents were significantly less likely to report limiting their internet use because of cost if they were white (OR 0.26, 0.10-0.66) and more likely to report doing so if they were Hispanic / Latino (OR 3.94, 1.50-10.32). Females were more likely than males to limit internet use due to slow or poor connection (OR 2.42, 1.17-5.02), Table 2a.

Older respondents were significantly less likely than younger ones to report that their device helped them track a health-related goal (OR 0.76, 0.65-0.88), as were females compared to males (OR 0.57, 0.34-0.97), Table 2b; respondents with diabetes were more likely to report using it in this way (OR 2.30, 1.05-5.01). Respondents whose primary language was Spanish were significantly less likely to report that their device helped them to locate health-related information (OR 0.19, 0.06-0.59) and less likely to report having used the device to share health information with their care team (OR 0.27, 0.09-0.85). White respondents were more likely to report using a device to track

health information in the last year (OR 2.87, 1.03-8.01) as were respondents with diabetes (OR 3.31, 1.14-9.64). Respondents who were Hispanic / Latino were less likely to access their portal account six or more times in the last year (OR 0.44, 0.22-0.87), Table 2c. No factors were associated with reporting finding the portal very useful versus somewhat or less useful. Reasons given for not using the portal included preferring to speak with a health care provider, lacking internet access, and concerns about privacy; each of these were cited by only 1-2 people (results not in tables).

Table 2a. Limiting internet use.

	Always or often limit internet use because cost n=459*			Always or often limit internet use because slow/poor connection n=447*		
		95% CI			95% CI	
	OR	LL	UL	OR	LL	UL
Age by 10-year increments	0.84	0.72	1.00	0.85	0.71	1.02
Female vs Male	0.86	0.48	1.53	**2.42**	**1.17**	**5.02**
White vs others	**0.26**	**0.10**	**0.66**	0.52	0.18	1.47
Black/African American vs others	0.39	0.10	1.56	0.39	0.08	1.96
Hispanic/Latino vs Not	0.78	0.32	1.85	1.32	0.59	2.94
Spanish vs English	**3.94**	**1.50**	**10.32**	1.79	0.74	4.36
Diabetes – Yes vs No	1.05	0.47	2.38	1.19	0.51	2.78
Hypertension – Yes vs No	0.73	0.39	1.36	1.14	0.60	2.15

*In all cases, 567 persons surveyed; N shown here are the number responding to a given question.

Table 2b. How devices were used.

	Device(s) helped with tracking progress on a health-related goal n=457*			Device(s) helped with finding health-related information n=458*			Used device(s) in last year to track any health information n=446*			Used device(s) in last year to share health information with care team n=319*		
		95% CI			95% CI			95% CI			95% CI	
	OR	LL	UL	OR	LL	UL	OR	LL	UL	OR	LL	UL
Age by 10-year increments	**0.76**	**0.65**	**0.88**	0.89	0.70	1.14	0.94	0.80	1.11	0.99	0.83	1.17
Female vs Male	**0.57**	**0.34**	**0.97**	0.61	0.26	1.43	0.97	0.55	1.72	1.20	0.67	2.13
White vs others	2.04	0.75	5.54	0.52	0.06	4.22	**2.87**	**1.03**	**8.01**	0.49	0.10	2.49
Black/African Am. vs others	3.94	0.80	19.3	1.00	0.05	18.67	1.74	0.41	7.32	0.42	0.05	3.27
Hispanic/Latino vs Not	1.20	0.52	2.78	0.53	0.17	1.63	1.32	0.53	3.33	1.35	0.50	3.68
Spanish vs English	0.62	0.23	1.68	**0.19**	**0.06**	**0.59**	0.52	0.19	1.46	**0.27**	**0.09**	**0.85**
Diabetes - Yes vs No	**2.30**	**1.05**	**5.01**	1.00	0.35	2.83	**3.31**	**1.14**	**9.64**	1.75	0.83	3.70
Hypertension - Yes vs No	0.99	0.60	1.63	0.97	0.44	2.11	1.64	0.91	2.95	1.14	0.64	2.03

*In all cases, 567 persons surveyed; N shown here are the number responding to a given question.

Table 2c. Portal access.

	Access portal 6 or more times vs 0-5 times n=479*			Portal very useful vs somewhat or less useful n=483*		
		95% CI			95% CI	
	OR	LL	UL	OR	LL	UL
Age by 10-year increments	0.99	0.86	1.14	0.95	0.83	1.09
Female vs Male	1.25	0.77	2.01	1.31	0.83	2.10
White vs others	0.84	0.31	2.28	0.62	0.22	1.76
Black/African American vs others	0.31	0.08	1.16	1.02	0.22	4.63
Hispanic/Latino vs Not	**0.44**	**0.22**	**0.87**	1.42	0.66	3.07
Spanish vs English	0.98	0.44	2.16	2.51	0.91	6.98
Diabetes - Yes vs No	0.97	0.51	1.84	0.97	0.51	1.85
Hypertension - Yes vs No	1.12	0.69	1.82	1.50	0.92	2.43

*In all cases, 567 persons surveyed; N shown here are the number responding to a given question.

Discussion

Portal users

Despite being available to all patients in the OCHIN collaborative, fewer than half of patients ever engaged with their portal accounts. The portal use patterns we found align with prior research showing that older persons, members of racial / ethnic minoritized groups, and lower-income persons have lower portal use than other populations. [20] The lower use among Hispanic / Latino or Spanish-speaking persons seen here also aligns with prior research showing that persons whose primary language is not English engage with portals less often. [24, 25]

Some prior research found that persons with chronic diseases had higher portal use rates in general; some found that these patients were less likely to *ever* use the portal. [26] A similar pattern was seen here: persons with chronic diseases were less likely to ever use the portal, but those who *were* portal users used it more frequently than others. This suggests that once initial barriers are bridged, persons with ongoing health needs do engage with their portal.

In this population there were no differences in portal use rates by rural-urban location. Others reported lower portal use rates in rural populations prior to the COVID pandemic, [27] but little has been reported on whether this pattern persisted post-pandemic. These results suggest that some rural-urban differences in portal use may be smaller than they were pre-pandemic.

Survey response generalizability

Only 5.6% of portal users at four health centers responded to the portal-based survey. This response rate is comparable to those seen in other web-based surveys, [28, 29] which generally have lower response rates than surveys in other modes. [28] Differences between respondents and non-respondents limit the generalizability of survey findings. Compared to non-respondents, survey respondents were more likely to be older, from higher-income households, English speakers, non-Hispanic, to have hypertension or diabetes, and to live in non-urban areas. Nevertheless, within the surveyed population, results reflect a substantial number of health center patients (n=567); furthermore, these respondents were not incentivized to participate in the survey, reducing the potential for related biases.

There are also limitations to how generalizable the survey responses are to all health center patients who are active portal users. OCHIN member patients generally reflect the characteristics of all health center patients. As shown in Table 1, compared to all OCHIN member health center portal users, survey respondents were significantly more likely to be older, female, white, higher income, rural, hypertensive, and to have reported social risks; they also used the portal at a much higher rate. Survey respondents were less likely than other OCHIN portal users to be Asian, Black / African American, or Hispanic / Latino. To some extent, this reflects differences in the patient composition of health centers participating in this study compared to those in OCHIN, rather than simply differences in portal use. It may also reflect the fact that the survey targeted patients with chronic diseases; as noted above, once persons with chronic diseases become active portal users, they tend to use it more frequently than other patients. Despite these limitations, our results provide a useful and needed contribution to our understanding of telehealth readiness and portal use among health center patients post-pandemic.

Survey results and associated patient characteristics

Survey results made clear that most respondents had internet access, as was expected given that they were contacted through their patient portal; this aligns with prior research showing low rates of

perceived barriers to telehealth use. [26] Most reported using the portal to track their health (e.g., heart rate, blood pressure), find information, communicate with their provider, manage appointments, and look up test results, and the majority accessed it at least six times annually. Yet among these patients with internet access, about one in five reported limited their internet use due to cost or quality of connection; this aligns with some prior pre- and post-pandemic research showing that broadband limitations hampered ability to engage in video visits. [7, 11, 30] These results underscore that variability in access to affordable, high-quality internet could hamper some patients' ability to engage in some forms of telehealth, with the potential to exacerbate health disparities. They also suggest that simply having some internet access may be necessary but not adequate to ensure readiness to engage in all telehealth modalities among safety net clinic patients with chronic diseases. It seems unlikely from these results that lack of a cellphone poses a substantial barrier, as cellphone ownership is ubiquitous here and shown to be so previously, even among low-income, less educated, and older persons. [31, 32] Future research should strive to identify additional barriers to such readiness and strategies for addressing them.

Other potential drivers of disparities are implied in the associations between some respondent characteristics and some survey responses. Most notably, persons whose primary language was Spanish were less likely to use their device for a range of functions. This aligns with prior research showing lower portal use among persons with a primary language other than English. It points to the need for EHR providers to ensure that portals can be accessed in multiple languages and suggests the need to identify interventions that support portal adoption in diverse patient groups. Prior research on strategies for improving equitable portal adoption indicates that interventions involving personal contact, reminders, and education / support in initial adoption can be effective. [20] Indeed, a provider's encouragement to use a portal can significantly increase a patient's likelihood of doing so. Studies have shown disparities in portal use (racial/ethnic, income, education, and/or gender) may be related more to whether a patient is *encouraged* to use a portal than to their willingness to do so. [18, 33] While more research is needed, assessing telehealth readiness as we did may reveal patients who are overlooked in telehealth outreach. Last, Grossman et al.'s recent systematic review reported that interventions focused on individuals (patients) are likely of limited impact. Instead, future efforts should develop and test interventions that encompass technological improvements, and workflow- and organization-based approches to reducing disparities in portal use. [20]

Limitations

As discussed above, the survey response rate and differences between survey respondents, non-respondents, and other health center portal users limit the ability to generalize results to all health center patients. While the response rate is typical of web-based surveys, resource limitations and the need to be minimally impactful on clinic operations necessitated this approach. Additional research must be conducted using methods that attain higher response rates. Furthermore, only persons with portal accounts were invited to participate in the survey. While almost all patients had a portal account, it is likely that only persons who are comfortable using the portal responded. Thus, respondents can be assumed to be more likely to use technologies in general, so these results likely overestimate telehealth readiness in health center patients. Nevertheless, these results contribute novel evidence about telehealth readiness in these patients in the post-pandemic period. As such, they can support hypothesis generation about how to improve telehealth readiness and equitable access to telehealth in these populations. Last, the analyses of differences in survey responses by patient characteristics were limited by the relatively small number in some patient groups, which yielded wide confidence intervals. This may have introduced errors towards the null; in populations with more patients in all groups, significant differences may emerge.

Conclusion

There are substantial differences between community-based health center patients who engage with the patient portal and those who do not, pointing to the need for effective interventions to increase portal use as a means to improving health equity. Despite limitations, our results indicate

that health center patients who have portal accounts face relatively few technology-related barriers to engaging in telehealth. Some barriers exist, including cost, connection quality, and language. Far more research is needed to address these barriers and to promote telehealth services that are best suited to the needs of health center patients.

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APPENDICES

Appendix 1: Telehealth Readiness Survey

This survey asks about your use of the internet and technology for health. If you are not sure how to answer a question, pick the response that fits best.

1. Do you or other people you live with have any of these types of computers? [23]

	Yes	No
Desktop or laptop	☐	☐
Smartphone	☐	☐
Tablet or other portable computer	☐	☐
Some other type of computer	☐	☐

Specify: _____

2. Where you are living now, do you or any member of the household have access to the Internet? [23]
   - Yes, by paying a cell phone company or Internet service provider *(skip to #4)*
   - Yes, without paying a cell phone company or Internet service provider *(skip to #5)*
   - No access to the internet where I live (*ask #3)*

3. If you do not have access to the internet where you live, how do you access the internet? *(skip to #5) (modified 2015 American Community Survey [ACS] question) [34]*

4.

	Yes	No
I use the internet at a library, community center, park or other public place	☐	☐
I use the internet at a coffee shop or other business that offers access	☐	☐
I use the internet at someone else's home	☐	☐
I do not have access to the internet	☐	☐
I access the internet another way	☐	☐

Specify: _____

5. Where you live, do you have access to the Internet using a - (*ACS) [23]*

	Yes	No
Cellular data plan for a smartphone or other mobile device?	☐	☐
Broadband (high speed) Internet service such as cable, fiber optic, or DSL service installed in the household?	☐	☐
Satellite internet service installed in the household?	☐	☐
Dial-up internet service installed in the household?	☐	☐
Some other service?	☐	☐

Specify: _____

	Always	**Often**	**Rarely**	**Never**
5. I limit my internet use because of the cost of data plans, internet packages, or other costs*	☐	☐	☐	☐
6. I limit my internet use because my connection is too slow or	☐	☐	☐	☐

disconnects often*

7. Has your computer, tablet or smartphone helped you do any of the following? *(branching logic: if Yes to owning or using computer, tablet or smartphone in Question #1)***

	Yes	No
Track progress on a health-related goal, such as losing weight, increasing physical activity, or changing behaviors	☐	☐
Find information or make a decision about how to treat an illness or condition	☐	☐
Communicate with your health care provider	☐	☐
Make appointments with your health care provider or look up medical test results using the online medical record (MyChart)	☐	☐
Other health-related activity	☐	☐

Specify: _____

8. Have you used any devices within the last 12 months to track any of the following health information?*

9.

Step counter/Distance
Heart rhythm
Diet or food intake
Body temperature
Blood glucose
Blood pressure
Other
Specify: _____

10. *[If yes to any in #8]* In the last 12 months, have you used a computer, tablet or smartphone to share health information from one of these devices with a health professional?
    - Yes
    - No
    - I don't know

11. How many times did you access your online medical record (MyChart) in the last 12 months?*
    - 0 (I did not access MyChart)
    - 1-2 times
    - 3-5 times
    - 6-9 times
    - 10 or more times

12. *(if 0 above)* Why have you not accessed your online medical record (MyChart)?

	Yes	No
I would rather talk to my health care provider	☐	☐
I do not have a way to access the website	☐	☐
I did not need to use my online medical record (MyChart)	☐	☐
I am concerned about the privacy or security of	☐	☐

accessing medical records online		
I don’t have an online medical record (MyChart)	☐	☐
Other reason	☐	☐
Specify: _____		

13. In general, how useful is your online medical record (MyChart) for monitoring your health?
    - Very useful
    - Somewhat useful
    - Not very useful
    - Not at all useful
    - I do not use my online medical record to monitor my health

*=Question created by study team
**=Question created by study team based on HINTS questions

Appendix 2. Survey results

Topic / question	Responses	
	N	%
Internet Access		
Do you or other people you live with have any of these types of computers?		
Desktop or laptop	447	84.8%
Smartphone	540	97.5%
Tablet or other portable computer	333	68.7%
Other	39	11.7%
Where you are living now, do you or any member of the household have access to the Internet?		
Yes, by paying a cell phone company or Internet service provider	537	96.2%
Yes, without paying a cell phone company or Internet service provider	17	3.1%
No access to the internet where I live	4	0.7%
Where you live, do you have access to the Internet using		
Wifi	6	1.1%
A cellular data plan for a smartphone or other mobile device?	482	95.1%
Broadband (high speed) Internet service such as cable, fiber optic, or DSL service installed in the household?	370	78.4%
Satellite internet service installed in the household?	112	27.7%
Dial-up internet service installed in the household?	36	9.7%
Other	16	4.8%
If you do not have access to the internet where you live, how do you access the internet?		
… at a library, community center, park or other public place	0	0.00%
… at a coffee shop or other business that offers access	0	0.00%
… at someone else's home	0	0.00%
I do not have access to the internet	0	0.00%
I access the internet another way	1	0.18%
I limit my internet use because of the cost of data plans, internet packages, or other costs		
Always	52	9.7%
Often	64	12.0%
Rarely	151	28.2%
Never	268	50.1%
I limit my internet use because my connection is too slow or disconnects often		
Always	26	5.0%
Often	78	15.0%
Rarely	236	45.3%
Never	181	34.7%
Use of IT for Health Purposes		
Has your computer, tablet or smartphone helped you do any of the following?		
Track progress on a health-related goal, such as losing weight, increasing physical activity, or changing behaviors	379	70.8%
Find information or make a decision about how to treat an illness or condition	470	88.0%

Communicate with your health care provider	515	95.4%
Make appointments with your health care provider or look up medical test results using the online medical record (MyChart)	512	94.1%
Other health-related activity	189	43.3%
Have you used any devices within the last 12 months to track any of the following health information?		
Heart rate	225	42.7%
Step counter/Distance	256	49.2%
Heart rhythm	138	27.4%
Diet or food intake	134	26.6%
Body temperature	90	18.2%
Blood glucose	93	18.6%
Blood pressure	179	34.8%
Other	55	14.4%
Portal (MyChart) Access		
How many times did you access your online medical record (MyChart) in the last 12 months?		
0 (I did not access it)	4	0.7%
1-2 times	53	9.5%
3-5 times	125	22.4%
6-9 times	110	19.7%
10 or more times	266	47.7%
In general, how useful is your online medical record (MyChart) for monitoring your health?		
Very useful	394	70.2%
Somewhat useful	138	24.6%
Not very useful	17	3.0%
Not at all useful	0	0.0%
I did not use my online medical record to monitor my health	12	2.1%
Sharing Information with a Healthcare Professional		
In the last 12 months, have you used a computer, tablet or smartphone to share health information from one of these devices with a health professional?		
Yes	238	59.5%
No	130	32.5%
I don't know	32	8.0%

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