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Authors

Toohey, Shannon

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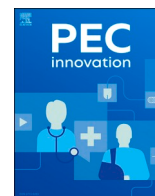
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Access to the internet and mobile applications in a mixed population emergency department: A repeated cross-sectional survey

Shannon Toohey^{a,b,*}, Michelle T. Nguyen^b, Soheil Saadat^a, Carrie E. Chandwani^{a,b}, Stephen F. Gassner^{a,b}, Alisa Wray^{a,b}, Ronald Rivera^{a,b}, Warren Wiechmann^{a,b}

^a University of California, Irvine, Department of Emergency Medicine, 101 The City Dr S, Orange, CA 92868, USA

^b School of Medicine, University of California, Irvine, 1001 Health Sciences Rd, Irvine, CA 92617, USA

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ABSTRACT

Objective: This study aimed to assess patients' interest in education content delivered through electronic modalities and identify trends in internet access and use among emergency department patients of various socioeconomic statuses.

Methods: A prospective, cross-sectional survey with 50 questions was completed by 241 English and Spanish-speaking patients in 2014 and repeated with 253 participants in 2019 at the University of California, Irvine Medical Center's Emergency Department (UCIMCED).

Results: Internet access increased from 83.8 % in 2014 to 88.1 % in 2019. Most internet-using patients owned smartphones (80.1 % in 2014, 89.7 % in 2019). Patients used electronic devices, such as fit bits and activity trackers, to obtain health information. Email was the preferred method for receiving discharge instructions.

Conclusions: As of 2019, 88.1 % of UCIMCED patients have access to the internet or email, making electronic media a reasonable venue for patient education. Given that we have a predominantly low-income patient population—61 % and 32 % of respondents in 2014 and 2019, respectively, reporting an income of less than \$25,000—these results provide new avenues to reach patients of all socioeconomic statuses.

Innovation: The implications of this study can be used to develop electronic resources tailored to educate emergency department patients about their healthcare beyond the confines of a hospital.

1. Introduction

It can be difficult for physicians to effectively educate patients during visits to the emergency room [1-3]. In the face of a complex delivery environment, high patient volumes and medical documentation requirements, physician-patient interactions can be rushed and brief [4]. Limited communication time can have a significant effect on those that we serve as well as our health care system as a whole. At the time of discharge, many patients have a poor understanding of their diagnosis, prescribed medications, and requirements for follow-up care [1]. These knowledge gaps create an abundance of short and long-term consequences. Patient health outcomes are negatively impacted, return visits to the emergency department increase, and the frequency of hospital readmissions rise [1].

Electronic media is a poorly utilized but powerful tool that can be used to help address these communication and knowledge gaps. The

recent proliferation of internet blogs, social networking sites, mobile health apps, and podcasts represents an important educational opportunity for physicians and other medical professionals. Emergency room doctors are uniquely positioned to take advantage of electronic media. As a first-line provider and a proverbial "jack-of-all trades," the emergency physician is trained to advise a wide spectrum of patients on health care issues that arise within every major organ system. Although previous studies have measured internet availability to emergency department patients [5-10], most data was collected prior to 2009—it is highly likely that accessibility has increased in the subsequent years.

Within our emergency department, we collected survey responses from patients regarding current accessibility to the internet, email, and mobile devices. We aimed to quantify the percentage of patients at our emergency department that have access to these resources, as well as the percentage of patients that would be interested in educational content delivered through these means. The study was replicated 5 years later to

Abbreviation: UCIMCED, University of California, Irvine Medical Center's Emergency Department.

* Corresponding author at: 101 The City Dr S, Orange, CA 92868, USA.

E-mail address: stoohey@uci.edu (S. Toohey).

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examine differences in the patterns of internet use and health information searches in 2014 and 2019.

2. Methods

Using a convenience sampling approach, an anonymous survey was conducted at the University of California, Irvine Medical Center's Emergency Department, a Level 1 trauma center located in Orange, California between March 2014 and June 2014, and then repeated five years later between May 2019 and August 2019. The 5–10 min survey consisted of a total of 50 multiple choice, yes-or-no, and free-response questions. This survey was developed by UCI Emergency physician-scientists modeled after the Pew Survey, which is a standard survey which measures the change in internet use over time in the general population. The survey was translated into Spanish by a UCI Emergency physician certified in medical Spanish. Medical translators were available to explain the study to Spanish-speaking patients, but the patients completed the surveys independently on an iPad. All English and Spanish speaking emergency department patients over the age of 18 were eligible for the study, except for those that were too ill to give consent, incarcerated, or pregnant. Eligible patients were screened, approached, and asked for verbal consent by undergraduate students in the Emergency Research Associates Program (EMRAP) from 8 AM until midnight 7 days a week. No personal information was collected and no monetary compensation was provided to the participants. The study fulfilled all criteria necessary to be deemed exempt from the UC Irvine Institutional Review Board (IRB) review.

The primary outcome was to compare the internet access and communication technology use between 2014 and 2019. All data was collected on Qualtrics, and was reviewed by a team of emergency physicians and medical students. Based on prior studies [5,9], we expected that 90 % of respondents would have access to the Internet. Using a simple asymptotic formula for sample size calculation, we estimated that 217 subjects would be needed to produce a confidence interval with a width of no more than ± 4 %. The secondary goal was to compare the pattern of internet use and health information searches between 2014 and 2019 among patients presented to the UC Irvine Emergency Department. Data was analyzed by using STATA 14.2 SE (STATA 14.2 SE, StataCorp, College Station, TX). Distribution of categorical variables are presented as N, percentage and 95 % Confidence Interval and was examined between 2014 and 2019 by using chi-square test. Type I error level was set to 5 % and a *p*-value smaller than that was considered as statistically significant.

3. Results

During the 2014 study period, a total of 241 patients were surveyed at the UC Irvine Emergency Department; 253 patients were surveyed in 2019. Demographics of the study populations are in Table 1 below. The main demographic differences between 2014 and 2019 were as follows: the proportion of Spanish-speaking patients changed from 20.3 % (*N* = 49) to 10.3 % (*N* = 26). Similarly, the proportion of patients in the lowest income bracket decreased from 61.0 % (*N* = 147) in 2014 to 32.0 % (*N* = 81) in 2019. In 2014, 83.8 % (*N* = 201, 95 % CI: 78.5 %–88.2 %) reported using the internet or accessing email at least occasionally. This proportion was 88.1 % (*N* = 223, 95 % CI: 83.5 %–91.9 %) in 2019 (*P* = .160). In 2014, 55.2 % (*N* = 111, 95 % CI: 48.1 %–62.2 %) of internet users indicated that they access the internet or email multiple times per day. This proportion rose to 64.7 % (*N* = 141, 95 % CI: 57.9 %–71.0 %) in 2019 (*P* = .048).

Patients most frequently accessed the internet or email using their home internet connection in both 2014 and 2019, (*N* = 107, 53.2 % and *N* = 106, 48.6 %, respectively) or the data plan on their cell phone (*N* = 83, 41.3 % and *N* = 98, 45 %). Most internet-using patients owned a smartphone in 2014 (*N* = 161; 80.1 %), and 2019 (*N* = 200; 89.7 %).

Table 2 also describes patients' use of various devices to connect to

Table 1
Demographic data.

	2014 N (%)	2019 N (%)
<i>Questionnaire language</i>		
English	192 (79.7)	227 (89.7)
Spanish	49 (20.3)	26 (10.3)
<i>Gender</i>		
Female	128 (53.1)	114 (45.1)
Male	113 (46.9)	118 (46.6)
No response	0	21(8.3)
<i>Age</i>		
18–25	36 (14.9)	36 (14.2)
26–35	48 (19.9)	43 (17.0)
36–50	71 (29.5)	60 (23.7)
51–69	70 (29.1)	59 (23.3)
70+	16 (6.6)	34 (13.4)
No response	0	21(8.3)
<i>Approximate annual income</i>		
\$0–\$24,999	147 (61.0)	81 (32.0)
\$25,000–\$49,000	36 (14.9)	46 (18.2)
\$50,000–\$74,999	23 (9.5)	20 (7.9)
\$75,000–\$99,000	17 (7.1)	17 (6.7)
\$100,000–\$199,000	12 (5.0)	15 (5.9)
\$200,000+	6 (2.5)	4 (1.6)
Decline to answer	N/A	48 (19.0)
No response	N/A	22(8.7)

the internet and email, including smartphones, computers, and tablet devices. We also broke down how internet-using patients used their devices in 2014 and 2019. Patients more often tended to be more successful in finding the health information that they were looking for online in 2019 compared to 2014 (*p* = .004).

Survey participants indicated that they accessed information on a variety of health-related issues using the internet (Fig. 1). There was not a statistically significant difference in distribution of information searched on internet between 2014 and 2019 (*P* = .212).

48.0 % (*N* = 96) of the responders in 2014 and 50.5 % (*N* = 105) in 2019 stated that online health information has convinced them to seek advice from a medical professional (*P* = .616)

Additionally, 42.8 % (*N* = 86) of responders in 2014, and 39.1 % (*N* = 81) in 2019 reported that they have discussed health information they accessed they online with a care provider (*P* = .453). Of this subset, 77.9 % (*N* = 67) in 2014, and 75.3 % (*N* = 61) in 2019 stated that this medical professional had a “positive” or “somewhat positive” reaction to the information that was shared (*P* = .692).

Every patient surveyed was asked about the use of non-application products to help manage their health and activity levels including a blood pressure cuff, glucose meter, heart rate monitor, and other activity trackers (Fig. 2). A given patient may have been using more than one device. In that case, the responder has appeared in several categories. In 2014, a blood pressure cuff and blood glucose meter were most frequently used by patients. The use of Fitbits and other activity trackers rose in 2019.

This same group of patients was asked whether they would feel comfortable interacting with physicians in a variety of scenarios using different electronic tools (Fig. 3). These tools included social media resources, internet resources, text messages, and emails. In 2014 and 2019, 49.8 % (*N* = 120) and 54.5 % (*N* = 138) of patients respectively felt most comfortable receiving discharge instructions via email.

4. Discussion and conclusion

4.1. Discussion

The outcomes of this study suggest that emergency department

Table 2
Internet access and use.

Most frequent service to access the internet	2014 N (%)	2019 N (%)	P value
Home internet connection	107 (53.2)	106 (48.6)	0.631
Data plan on cell phone	83 (41.3)	98(45.0)	
Free services at public locations	11 (5.5)	14 (6.4)	
No response	40	35	
<i>Own a smartphone</i>			
Yes	161 (80.1)	200 (89.7)	0.953
No	40 (19.9)	23 (10.3)	
No response	40	30	
<i>Smartphone plans</i>			
Have a monthly contract plan	162 (85.3)	184 (90.6)	0.256
Pay as you go prepaid plan	28 (14.7)	19 (9.4)	
No response	51	50	
<i>Access the internet via a smartphone</i>			
Yes	164 (82.4)	195 (90.3)	0.015
No	35 (18.6)	21(9.7)	
No response	42	37	
<i>Access the internet via a computer</i>			
Yes	157 (78.9)	161 (74.9)	0.348
No	42 (21.1)	54 (25.1)	
No response	42	38	
<i>Access the internet via a tablet</i>			
Yes	105 (52.5)	106 (49.8)	0.582
No	95 (47.5)	107 (50.2)	
No response	41	40	
<i>Send/receive text messages on any device</i>			
Yes	184 (92.0)	204 (96.7)	0.039
No	16 (8.0)	7 (3.3)	
No response	41	42	
<i>Watch films on any device</i>			
Yes	139 (69.8)	170 (80.6)	0.009
No	60 (30.2)	41 (19.4)	
No response	42	42	
<i>Download software application on any device</i>			
Yes	153 (78.1)	181 (86.2)	0.016
No	43 (21.9)	29 (13.8)	
No response	45	43	
<i>Manage health or activity on any device</i>			
Yes	54 (28.4)	98 (48.8)	<0.001
No	136 (71.6)	103 (51.2)	
No response	51	52	
<i>Search for health information via computer/netbook</i>			
Yes	141 (71.9)	143 (69.1)	0.705
No	55 (28.1)	64 (30.9)	
No response	45	46	
<i>Search for health information via phone or tablet</i>			
Yes	130 (66.3)	176 (84.6)	<0.001
No	66 (33.7)	32 (15.4)	
No response	45	45	
<i>Success in finding health information</i>			
Always	51 (27.9)	68 (37.2)	0.002
Most times	95 (51.9)	83 (45.4)	
About half the time	15 (8.2)	19 (10.4)	
Few Times	4 (2.2)	10 (5.5)	
Never	18 (9.8)	3 (1.6)	
No response	58	70	

Table 2 (continued)

Most frequent service to access the internet	2014 N (%)	2019 N (%)	P value
<i>Reliability of health information</i>			
Always	29 (15.8)	43 (20.7)	0.004
Most times	84 (45.9)	90 (43.3)	
About half the time	24 (13.1)	48 (23.1)	
Few Times	13 (7.1)	13 (6.3)	
Never	5 (2.7)	3 (1.4)	
I am unsure	28 (15.3)	11 (5.3)	
No response	58	45	

Sample size may vary because some participants did not answer all the questions.

patients have reliable access to the internet and mobile devices. Several studies have found a similar reliance on internet access and smartphones to complement their healthcare in a variety of healthcare settings, supporting that internet access is widely available across diverse socioeconomic patient populations [9,11,12]. This opens a wide avenue of opportunities to use online resources and electronic communication for patient education and follow-up [13].

The observed differences in internet access between 2014 and 2019 may be partially explained by changes in the socioeconomic composition of the patient population. The proportion of people in the lowest income bracket in 2019 was half of that in 2014. It also raises concerns about health care-seeking patterns among the low-income population. UCIMC, as a safety net hospital, serves patients regardless of their income or insurance status. The reduction in the proportion of low-income patients in 2019 raises questions about how and where these patients fulfill their emergency care needs, or whether they might be neglecting their needs due to marginalization.

Despite a varied proportion of people in low income brackets, our findings are consistent with trends from the Pew Research Center, which has collected data on American internet and mobile device usage since the early 2000s. This database shows that 84 % and 90 % of Americans used the internet in 2014 and 2019, respectively [14]. Similarly, we found that 83.8 % of patients in 2014 and 88.1 % of patients in 2019 had internet access. More recent data from Pew Research indicates that in 2023, 95 % of Americans used the internet, reflecting not only widespread internet but also the profound shift in how patients engage with healthcare [14].

Our study found that a higher percentage of patients owned smartphones (80.1 % in 2014, 89.7 % in 2019) compared to the average American (59 % in 2014, 81 % in 2019) during this period [15]. One potential reason for this difference is that our study took place in a largely suburban emergency department, while the Pew Research data includes individuals from both urban and rural communities. Overall, these results indicate internet and smartphone usage has become increasingly common among American adults and our patient population.

Our data indicates that patients are more comfortable searching for and accessing health information on mobile devices, prompting a greater need for technology proficiency and implementation in patient care. Patients are engaging more with tools to access and gauge their health, showing trends towards tracking their activity, exercise, and food intake. These devices include activity trackers and Fitbits, which enable patients receive biofeedback and modulate their lifestyle [16]. Thus, patients are searching for opportunities to measure health outcomes regularly and are amenable to adopting new health-based technology.

Previous literature has reported that with the innovation of technology and growth of the internet, patients are challenged with filtering through the information found online [17–19]. Our study is consistent with these findings as only 32.5 % of patients could always find pertinent health information and less than 21 % of these individuals found that information always reliable. A potential solution to this uncertainty

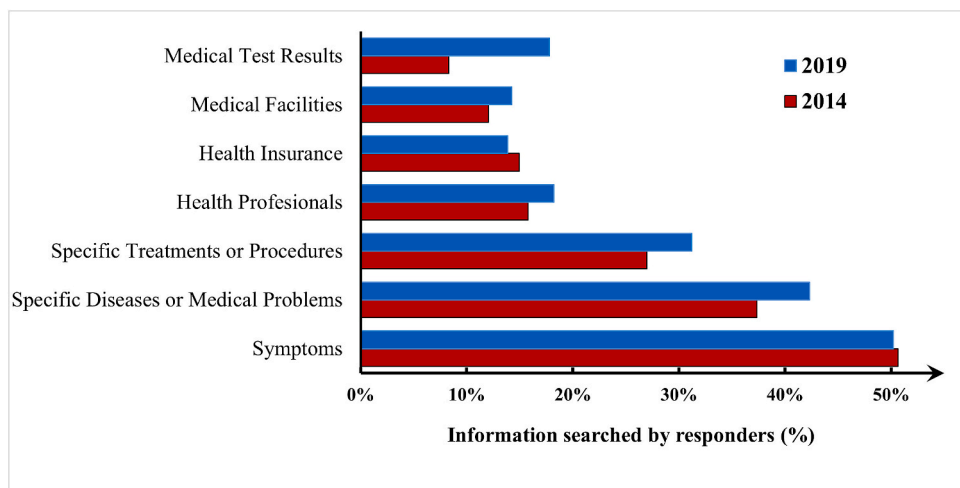


Fig. 1. Patient access to internet-based health information by topic.

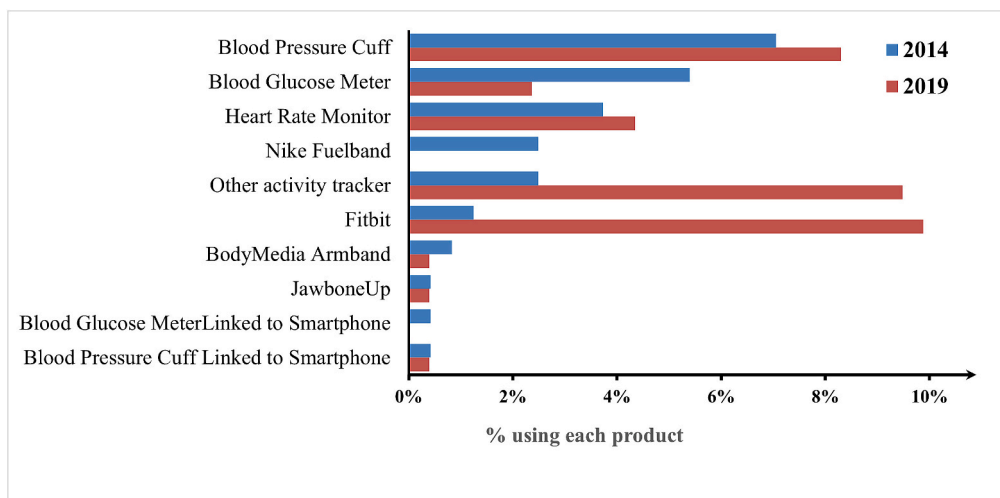


Fig. 2. Percentage of patients that use various products to manage health and activity.

is integration of web-based programs that are sent directly from providers to their patients, which can be used to compliment discharge instructions. This could provide patients with medically verified information simplified into digestible facts to optimize patient understanding. This eliminates distrust and confusion around medical information found online. Delivering this information directly to patients can equip them with the knowledge and skills to address their healthcare concerns before leaving the hospital.

Our results demonstrate that patients are comfortable with interacting with physicians using a variety of electronic media. Similar studies also indicate that patients request electronic or video discharge instructions because these resources promote patient and caregiver knowledge of their diagnoses and treatments [20–22]. In addition to discharge instructions, patients express a growing interest in sending and receiving text message or emails to their providers, allowing for rapid response times and reassuring answers. This communication via patient portals has improved medicine adherence and quality of life without incurring an additional cost [23]. While most usage is in the outpatient setting and there is no significant literature on their usage in the ED setting, we believe these portals can be tailored to provide more detailed clarification on discharge instructions, helping to bridge knowledge gaps, enhance patient understanding, and provide easier access to results for continuity of care.

After discharge, follow-up interventions through telephone calls or

telehealth visits have shown mixed results. While there is no clear significant evidence to support that these ED interventions improve compliance or decrease mortality in the elderly [24–28], one of the largest call program published study to date found that patients who were not included in telephone interventions are 1.3 times more likely to be readmitted [29]. Additionally, a meta-analysis found patients who received ≥ 2 follow-up phone calls have the lowest likelihood of readmission [29]. High internet access and usage among ED patients make digital follow-up methods more relevant, potentially enhancing patient engagement and care continuity in this population. Further research is needed to identify the impact of electronic follow-up systems on other factors of patient care including patient satisfaction, patient education, support for caregivers, psychological support, and other social determinants of health.

Many emergency department patients were too ill or otherwise unable to complete the survey. Additionally, there was a gap in data collection, as the research associates do not work between midnight and 8 am. Thus, any patients that presented overnight were not included in the survey. This could cause unknown skews in the data results and many not fully represent experiences of all emergency department patients. These results may not be generalizable to very rural communities with limited access to the internet or other electronic devices. Considering these factors, we feel the result still provides an interesting view into the ways our patients use technology and the internet with respect

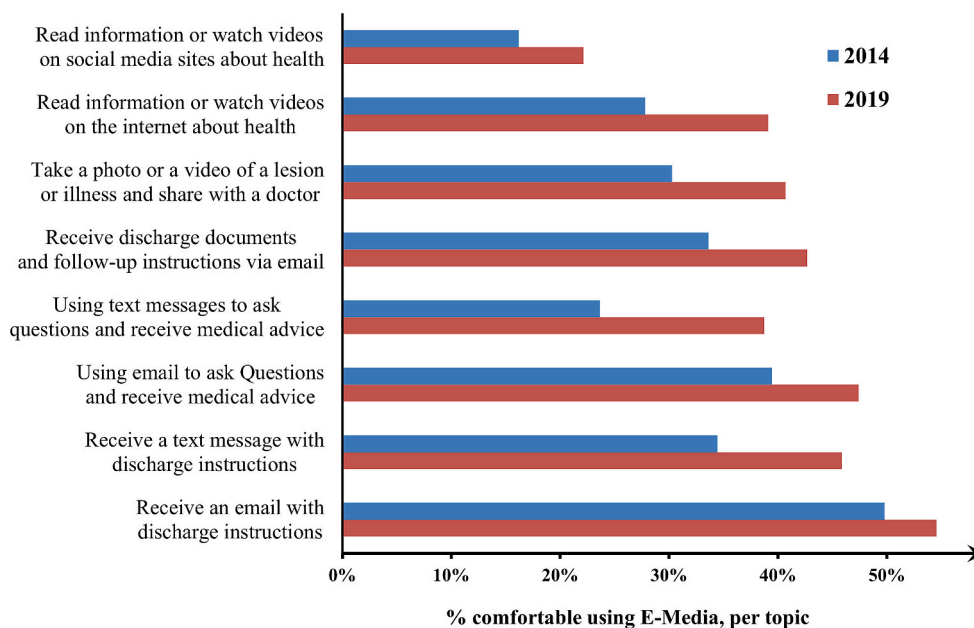


Fig. 3. Percentage of patients that felt comfortable communicating with a health care provider on electronic media in 2014 and 2019.

to their healthcare.

It is also important to note that the survey contained only yes/no, multiple-choice, and free response questions. Furthermore, patients were not required answer all the questions. Several factors contributed to participant non-completion, such as discharge from the emergency room, waning interest in survey completion, interruptions by staff or family members, exacerbation of existing conditions, or other undisclosed reasons. A better understanding of patients' interest in electronic multimedia could potentially be gained through open-ended interviews on all patients.

In summary, further development of internet-based communication in the hospital and after discharge is both desired and warranted.

4.2. Innovations

A similar population has not been recently studied regarding their access to electronic modalities, type of health health-related information they seek, or their level of comfort with these modalities. While internet use was high among our sample, suggesting that electronic portals and resources could be utilized in an ED population. However, approximately 10 % of respondents did not access or use the internet. Therefore, electronic patient education interventions need to be thoughtfully designed to ensure they are accessible to patients with limited or no internet access to prevent exacerbating disparities for marginalized groups facing digital barriers. These results underscore the need for developing inclusive, multi-lingual internet-based patient education resources, which can significantly enhance patient satisfaction, education, and health outcomes. Directly integrating web-based programs from providers to patients can enhance information dissemination, promoting better patient understanding and addressing uncertainty around online health information. Patients are amenable to receiving electronic or video discharge instructions to enhance patient and caregiver knowledge, while adopting electronic communication methods like text messages or emails can facilitate rapid responses and improved medicine adherence at no additional cost.

4.3. Conclusions

There is a trend towards increasing prevalence in internet and smartphone usage in emergency department patients of diverse

socioeconomic statuses. Patients are increasingly comfortable with electronic media and activity trackers, creating opportunities for enhanced patient education through the utilization of medically verified online resources and the transmission of robust health data to providers. The data from this study will help us guide future plans to take advantage of electronic resources for various patient education means including implementation of electronic discharge instructions and patient education. This digital evolution signifies a transformative leap towards more personalized and accessible healthcare solutions. Future research should evaluate if access to physician prescribed electronic resources and/or utilization of electronic follow-up improves patient satisfaction, understanding, compliance and healthcare outcomes.

CRediT authorship contribution statement

Shannon Toohey: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Michelle T. Nguyen:** Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation. **Soheil Saadat:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology, Investigation, Formal analysis. **Carrie E. Chandwani:** Writing – review & editing. **Stephen F. Gassner:** Writing – review & editing. **Alisa Wray:** Writing – review & editing. **Ronald Rivera:** Writing – review & editing. **Warren Wiechmann:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Multimedia Appendix. Appendix: Access to Technology Survey

Access to Technology Survey.

1. Do you use the internet or access email, at least occasionally?
 - a. Yes (*user proceeds to complete questions 8-50*)
 - b. No (*user proceeds to complete questions 2-7, then 42-50*)
 - c. I don't know (*user proceeds to complete questions 2-7, then 42-50*)
2. Does ANYONE in your household use the internet or access email, at least occasionally?
 - a. Yes
 - b. No
 - c. I don't know
3. Did you EVER at some point regularly use the internet or email, but have since stopped for some reason?
 - a. Yes
 - b. No
 - c. I don't know
4. Would you like to start using the internet or email (again), or is that not something you're interested in?
 - a. Yes
 - b. No
 - c. I don't know
5. What is the MAIN reason you don't use the internet or email?
 - a. Free response
6. If you wanted to start using the internet or email (again), do you feel that you know enough about computers and technology to be able to do that on your own, or would you need someone to help you?
 - a. Yes, I could do this on my own
 - b. No, I would need someone to help me
 - c. I don't know
7. Have you ever asked a friend or family member to look something up or complete a task on the internet for you?
 - a. Yes
 - b. No
 - c. I don't know

User proceeds to Question 42

8. In general, how frequently do you access the internet or email?
 - a. Multiple times per day
 - b. Daily
 - c. 3-5 times per week
 - d. 1-2 times per week
 - e. Less than once per week
9. Do you pay for an internet connection at your home (from companies such as Cox, Comcast, Charter, UVerse, Earthlink) in order to go online?
 - a. Yes
 - b. No
 - c. I don't know
10. Have you used "free" internet at a public location, such as the library, McDonald's, or Starbucks, at least occasionally?
 - a. Yes
 - b. No
 - c. I don't know
11. Do you pay for a data plan on your cell phone or smartphone to connect to the internet or access email, at least occasionally?
 - a. Yes
 - b. No
 - c. I don't know
12. How do you most frequently access the internet or email?
 - a. I use the internet connection at my home
 - b. I use "free" internet at public locations
 - c. I use the data plan on my cell phone or smart phone
13. Do you use a mobile device or cell phone to make phone calls, at least occasionally?
 - a. Yes
 - b. No

14. Some cell phones are called “smartphones” because of certain features they have. Is your cell phone a smartphone such as an iPhone, Android, Blackberry or Windows phone, or are you not sure?
 - a. Yes, my phone is a smartphone
 - b. No, my phone is a standard cell phone
 - c. I don't know
15. Does your cell phone or smartphone use a “pay as you go” prepaid plan, or does it have a monthly contract plan?
 - a. I have a “pay as you go” prepaid plan
 - b. I have a monthly contract plan
 - c. I don't know
16. Do you use a smartphone to access the internet or email, at least occasionally?
 - a. Yes
 - b. No
 - c. I don't know
17. Do you use a desktop computer, laptop computer, or “netbook” to access the internet or email, at least occasionally?
 - a. Yes
 - b. No
 - c. I don't know
18. Do you use a mobile tablet device (such as the Apple iPad, Samsung Galaxy, Google Nexus, or Amazon Kindle Fire) to access the internet or email, at least occasionally?
 - a. Yes
 - b. No
 - c. I don't know
19. Do you use any other devices (such as an iPod Touch) to access the internet or email, at least occasionally?
 - a. Yes
 - b. No
 - c. I don't know
20. How many different devices do you own (or regularly use) that allow you to access the internet or email?
 - a. 0
 - b. 1
 - c. 2
 - d. 3
 - e. 4
 - f. 5+
21. On which device do you most frequently access the internet or email?
 - a. Cell Phone or Smartphone
 - b. Desktop or Laptop Computer
 - c. Mobile Tablet Device
 - d. Other Device
22. How often do you access the internet or email using this device?
 - a. Several times each day
 - b. Once per day
 - c. 3-5 times per week
 - d. 1-2 times per week
 - e. Less than once a week
23. Do you ever use your cell phone or smartphone to send or receive text messages?
 - a. Yes
 - b. No
 - c. I don't know
24. Do you every uses your cell phone, smartphone, tablet, or other mobile device to watch videos or films?
 - a. Yes
 - b. No
 - c. I don't know
25. Have you ever downloaded a software application or ‘app’ to your cell phone, smartphone, mobile tablet, or other mobile device?
 - a. Yes
 - b. No
 - c. I don't know

26. Some websites are called “social media” sites because they allow you to connect and interact with other people. How frequently do you use the following social media sites?

	Multiple times per day	Daily	3–5 times per week	1–2 times per week	Less than 1 time per week	Never used it
Facebook						
Google Plus						
Twitter						
LinkedIn						
Pinterest						
Instagram						
Snapchat						

27. On your cell phone, smartphone, mobile tablet, or other mobile device, do you have any software applications or “apps” that help you track or manage your health or activity?

- a. Yes
- b. No
- c. I don't know

28. Do you use any of the following products to help you track or manage your health or activity? (choose all that apply)

- a. Fitbit
- b. Nike Fuelband
- c. Jawbone Up
- d. BodyMedia armband
- e. Other Activity Tracker or Pedometer
- f. Heart Rate Monitor
- g. Blood Pressure Cuff
- h. Blood Pressure Cuff that links to your smartphone
- i. Blood Glucose Meter
- j. Blood Glucose Meter that links to your smartphone
- k. I don't have any of these devices

29. Have you ever used your cell phone, smartphone, mobile tablet, or other mobile device to look up health or medical information?

- a. Yes
- b. No
- c. I don't know

30. Have you ever used your desktop computer, laptop computer, or “netbook” to look up health or medical information?

- a. Yes
- b. No
- c. I don't know

31. When you look up health information online, how did you begin looking?

- a. I started with a search engine such as Google, Bing, or Yahoo
- b. I started with a website that specializes in health information, such as WebMD
- c. I started with a site that contains information on all kinds of topics, such as Wikipedia
- d. I started with a social network site, such as Facebook

32. Do you find the health information that you are looking for?

- a. I always find the information
- b. Most times I find the information
- c. About half of the time I find the information
- d. Only a few times do I find the information
- e. I never find the information

33. In general, do you feel that the information you find online is reliable and valid?

- a. I always find the information reliable
- b. Most times I find the information reliable
- c. About half of the time I find the information reliable
- d. Only a few times do I find the information reliable
- e. I never find the information reliable
- f. I am unsure

34. In the past 12 months (1 year), what kinds of health information were you looking up on the internet? (choose all that apply)

Information about symptoms that you or someone else were experiencing

- a. Information about a specific disease or medical problem
- b. Information about a certain medical treatment or procedure
- c. Information about doctors or other health professionals
- d. Information about hospitals or other medical facilities
- e. Information related to health insurance, including private insurance, Medicare or Medicaid
- f. Information about medical test results
- g. None of the above

35. In the past 12 months (1 year), has health information you found online convinced you to seek advice from a doctor or other medical professional?

- a. Yes
- b. No
- c. I don't know

36. In the past 12 months (1 year), has health information you found online convinced you to not seek advice from a doctor or other medical professional?

- a. Yes
- b. No
- c. I don't know

37. Have you ever shared health information that you have found online with your doctor or other medical professional?

- a. Yes
- b. No
- c. I don't know

38. If you answered "yes" to the previous question, how would you describe the reaction of your medical provider to this information?

- a. Positive
- b. Somewhat positive
- c. Somewhat negative
- d. Negative
- e. I don't know

39. In general, do you feel comfortable interacting with a doctor or health professional in the following situations? Please choose all that apply.

- a. Receive an email with discharge instructions from a physician after a medical appointment
- b. Receive a text message with discharge instructions from a physician after a medical appointment
- c. Using email to ask questions and receive medical advice from a doctor
- d. Using text messages to ask questions and receive medical advice from a doctor
- e. Receive discharge documents and follow-up instructions from a hospital or emergency department visit via email.
- f. Take a photo or a video of a rash, injury, or illness and share the image with a doctor
- g. Read information on the internet or watch videos on the internet about health issues prepared by a doctor in his/her clinic or hospital.
- h. Read information or watch videos on social media sites (Facebook, Twitter, YouTube, etc) about health prepared by a doctor in his clinic or hospital
- i. None of the above

40. Today, prior to coming to the emergency department, did you go online to look up health information regarding the reason for your visit?

- a. Yes
- b. No
- c. I don't know

41. (If yes), did the information you looked up influence your decision to come to the emergency department?

- a. Yes
- b. No
- c. I don't know

42. What is your age

- a. 18–25
- b. 26–35
- c. 36–50
- d. 51–69
- e. 70+

43. What is your gender?

- a. Male
- b. Female

44. Are you of Hispanic, Latino, or Spanish origin?

- No, not of Hispanic, Latino, or Spanish origin
- Yes, Mexican, Mexican Am., Chicano
- Yes, Puerto Rican
- Yes, Cuban
- Yes, Salvadorian
- Yes, Guatemalan
- Yes, another Hispanic, Latino, or Spanish origin.

45. What is your Race? Mark one or more boxes.

- White
- Black, African American
- American Indian or Alaska Native
- Asian Indian
- Japanese
- Native Hawaiian
- Chinese
- Korean
- Guamanian or Chamorro
- Filipino
- Vietnamese
- Samoan
- Other Asian
- Other Pacific Islander
- Some other Race (Specify below)

46. What language do you feel most comfortable SPEAKING?

- a. English
- b. Spanish
- c. Vietnamese
- d. Other

47. What language do you feel most comfortable READING/WRITING?

- a. English
- b. Spanish
- c. Vietnamese
- d. Other

48. Over the past 12 months (1 year), what was your approximate income?

- a. \$0–\$24,999
- b. \$25,000–\$49,000
- c. \$50,000–\$74,999

- d. \$75,000–\$99,000
- e. \$100,000–\$199,000
- f. \$200,000+

49. Including today's visit, how many times were you a patient in **ANY** Emergency Room in the past 12 months (1 year)?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5
- f. 6–12
- g. 13+

50. How many times have you been seen by a doctor outside of the Emergency Department (such as your personal doctor, at your regular clinic, or urgent care) in the past 12 months (1 year)?

- a. 0
- b. 1
- c. 2
- d. 3
- e. 4
- f. 5
- g. 6–12
- h. 13+

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