Access to Digital Technology Among Families Coming to Urban Pediatric Primary Care Clinics

WHAT’S KNOWN ON THIS SUBJECT: Internet, smartphones, and online social media offer new platforms for health promotion and disease management. Few studies have evaluated the use of digital technology among families receiving care in an urban pediatric primary care setting.

WHAT THIS STUDY ADDS: Caregivers in an urban pediatric primary care setting have access to and frequently use the Internet, smartphones, and online social media. These technologies may help reach a traditionally hard-to-reach population.

abstract

OBJECTIVE: Digital technologies offer new platforms for health promotion and disease management. Few studies have evaluated the use of digital technology among families receiving care in an urban pediatric primary care setting.

METHODS: A self-administered survey was given to a convenience sample of caregivers bringing their children to 2 urban pediatric primary care centers in spring 2012. The survey assessed access to home Internet, e-mail, smartphone, and social media (Facebook and Twitter). A “digital technology” scale (0–4) quantified the number of available digital technologies and connections. Frequency of daily use and interest in receiving medical information digitally were also assessed.

RESULTS: The survey was completed by 257 caregivers. The sample was drawn from a clinical population that was 73% African American and 92% Medicaid insured with a median patient age of 2.9 years (interquartile range 0.8–7.4). Eighty percent of respondents reported having Internet at home, and 71% had a smartphone. Ninety-one percent reported using e-mail, 78% Facebook, and 27% Twitter. Ninety-seven percent scored ≥1 on the digital technology scale; 49% had a digital technology score of 4. The digital technology score was associated with daily use of digital media in a graded fashion (P < .0001). More than 70% of respondents reported that they would use health care information supplied digitally if approved by their child’s medical provider.

CONCLUSIONS: Caregivers in an urban pediatric primary care setting have access to and frequently use digital technologies. Digital connections may help reach a traditionally hard-to-reach population. Pediatrics 2013;132:e142–e148

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KEY WORDS
social media, digital technology, primary care

ABBREVIATIONS
ED—emergency department
EMR—electronic medical record
PCC—primary care center

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In recent years, computer ownership and Internet use have increased dramatically, and the development of the smartphone has made Internet access more convenient. Online social media has also become increasingly popular with the development of Facebook and Twitter. Although this expansion has increased the number of individuals accessing digital technology, disparities remain with lower usage among individuals with low levels of education and household income, a population commonly seeking care at academic and community primary care centers (PCCs). Although recent data are scant, a study completed in 2003 indicated that 41% of families seeking care in a low-income, underserved PCC had home Internet access. In 2009, 62% of caregivers presenting to an urban, academic pediatric emergency department (ED) reported home Internet access; social media use was also becoming prevalent with 60% using Facebook and 8% Twitter. There has been a dramatic increase in Internet and social media usage to search for health-related information. Caregivers are searching the Internet for answers to questions about their child's health, often before seeking medical care. Social media platforms provide another portal for asking questions and rapidly sharing information about health. Still, given the ubiquity of online information, the variety of health resources has a range of accuracy and reliability. Although credible and reliable sources exist, it can be difficult for a caregiver to determine the quality of available content. Given uncertainties surrounding content, caregivers have been more trusting of health information obtained from their child's medical provider than Internet sources alone, and they value guidance to accessible and trustworthy sites. As an example, caregivers seeking care for their children in an inner-city ED were interested in receiving discharge information electronically. An adult patient study demonstrated interest in having links to credible Web sites provided as part of their discharge paperwork. Thus, medical providers could play an important role in connecting patients and families to credible resources.

To develop and inform such connections, greater knowledge is needed about Internet, smartphone, and social media access and how caregivers would be interested in receiving online health information. Although Internet access and social media usage have increased overall, the urban poor, in particular, those receiving care in a pediatric PCC, have not been recently studied, and to our knowledge, no studies have examined smartphone access. A reassessment of digital access and interest in obtaining online health information in such a low-income urban population is, therefore, warranted. Thus, we sought to assess digital access and usage patterns among caregivers at a low-income, urban pediatric PCC while also assessing how caregivers would want to receive online health information from their child's medical provider.

**METHODS**

**Study Design and Data Collection**

A cross-sectional study was performed with the sample drawn from 2 academic urban pediatric PCCs in Cincinnati, Ohio. Both centers have similar demographic profiles and serve disproportionately low-income populations. Clinic A is a hospital-based, academic, urban pediatric PCC that serves ~15 000 patients (35 000 visits annually). Clinic B is a community-based urban pediatric PCC that serves ~7000 patients (10 000 visits annually). A convenience sample of caregivers of children present for well-child or ill-care was approached and asked to complete a self-administered survey. Surveys were collected over a 2-month period in Spring 2012. Participation was voluntary and anonymous, and all English-speaking caregivers were eligible. The study was reviewed by the Institutional Review Board at Cincinnati Children's Hospital Medical Center and considered to be exempt.

**Study Measures**

A 16-question, paper-based survey with an eighth-grade reading level was developed to assess access to and usage patterns for digital technologies and digital connections. Interest in having health and clinic information available in various digital forms was also assessed. Survey questions were chosen after a literature review and discussion with a multidisciplinary research team that included medical educators and physicians with expertise in the care of underserved patients.

The survey first focused on access to and availability of digital technologies, including Internet and smartphone. Participants were asked whether they had Internet access within their home and locations where they had used the Internet in the past month (home, friend's/relative's house, work, library, school, other). Additional questions assessed access to and usage patterns for digital connections, including the Internet, e-mail, and social media. Participants were initially asked whether they had e-mail, Facebook, and/or Twitter accounts. Subsequent questions addressed frequency of e-mail and social media (Facebook and Twitter) use, as well as Internet searches for general and medical information over the past week. Usage frequency was defined as more than once per day, 2 or 3 times per week, once per week, or not at all. Because smartphones have become increasingly popular and available and are widely used for Internet
Analyses were performed by using SAS statistical software (version 9.3, SAS Institute, Inc, Cary, NC). Survey data were captured by using Research Electronic Data Capture (REDCap), a secure, Web-based application.19

**RESULTS**

Two hundred fifty-seven caregivers completed the survey (Clinic A, n = 177; Clinic B, n = 80). Caregivers completing the survey had a median age of 28 years; 48% of respondents had ≥3 children. During the 2-month recruitment period, there were no significant differences in patient demographics between the 2 PCCs. The patient population seen in the PCCs during the study period from which the sample was drawn was 52% male, 73% African American and 19% white, and 92% publicly insured. The median patient age was 2.9 years (interquartile range 0.8–7.4). More than half of the patients lived in a census-defined “poverty area,” defined as >20% of individuals living below the poverty line.20 Census tract median household income was $31,516 (interquartile range 22,649–42,021).21

Eighty percent of respondents reported having Internet access at home; 71% reported owning a smartphone (Table 2). Digital connections were also common with a majority of respondents reporting having both e-mail (91%) and Facebook (78%) accounts; Twitter accounts were less common (27%). Nearly all respondents (97%) scored ≥1 on the digital technology scale, and a score of ≥1 did not vary significantly based on caregiver age (Table 2). Nearly half had a score of 4, with access to all assessed digital technologies.

Seventy-five percent of caregivers reported daily use of ≥1 form of digital technology or connection. Fifty-five percent of caregivers searched the Internet for general information daily. Many also reported using e-mail (52%), Facebook (56%), and, to a lesser extent,

### TABLE 1 Internet and Social Media Use (N = 257)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>203</td>
<td>52</td>
</tr>
<tr>
<td>Has Internet access at home</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>Owns a smartphone</td>
<td>174</td>
<td>71</td>
</tr>
<tr>
<td>Has e-mail account</td>
<td>229</td>
<td>91</td>
</tr>
<tr>
<td>Daily e-mail use</td>
<td>127</td>
<td>52</td>
</tr>
<tr>
<td>Has Facebook account</td>
<td>198</td>
<td>78</td>
</tr>
<tr>
<td>Daily Facebook use</td>
<td>139</td>
<td>56</td>
</tr>
<tr>
<td>Has Twitter account</td>
<td>66</td>
<td>27</td>
</tr>
<tr>
<td>Daily Twitter use</td>
<td>30</td>
<td>13</td>
</tr>
</tbody>
</table>

### TABLE 2 Association Between Number of Digital Technologies Used and Frequency of Use

<table>
<thead>
<tr>
<th>Digital Technology Score</th>
<th>n (%)</th>
<th>Daily Digital Use, %a</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7 (3)</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>20 (8)</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>51 (12)</td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>74 (29)</td>
<td>81</td>
</tr>
<tr>
<td>4</td>
<td>125 (49)</td>
<td>88</td>
</tr>
</tbody>
</table>

a Mantel-Haenszel $\chi^2$ $P < .0001.
Twitter (13%) daily. Daily usage was associated with the digital technology scale in a graded fashion ($P < .0001$). Forty-three percent were “hyperconnected” with both a digital technology score of 4 and reported daily digital use.

Health-specific uses of digital technologies were also common. Caregivers reported using the Internet daily to search for general medical information (15%), and hospital-specific information via the hospital Web site (6%); 58% reported searching for medical information at least once in the week preceding their visit to the PCC. Fifty-three percent of caregivers agreed or strongly agreed that they would use information from the Internet to help make decisions about their child’s health. Furthermore, 71% agreed or strongly agreed that they would use health information supplied digitally if it was approved by their child’s medical provider. Most respondents reported that it would be somewhat or very helpful to receive medical information by Web site, text message, or Facebook, whereas fewer preferred Twitter (Fig 1). Caregivers reported interest in receiving digital information about common infections (77%), immunization schedules (73%), age-appropriate activities (73%), healthy eating tips (71%), taking care of an infant/child (67%), recommended well-child visits and screening tests (65%), and links to community resources (62%).

**DISCUSSION**

In an urban underserved primary care pediatric population, the vast majority (97%) of caregivers are regularly using or are connected to ≥1 form of digital technology, and nearly half are using all 4 forms assessed (home Internet, smartphone, e-mail, social media). Overall, 75% reported using digital technologies or connections daily. In addition, although the Internet appears to be a common tool used to search for information that informs caregivers’ medical decision-making, even more caregivers reported that they would use such information if approved by their child’s medical provider. Web sites, social media, and text messaging were the preferred modalities for information delivery, reflecting potential mechanisms to reach a traditionally hard-to-reach population.

Digital technology usage has steadily increased in recent years even among underserved populations.1 Although disparities in access remain, our study demonstrates significant increases in digital access and usage among families seeking care in an urban, underserved pediatric PCC. Indeed, Kind et al in 2003 showed that 41% of a similar clinic population had home Internet access, whereas in 2009, Saidinejad et al found an increase in home Internet access to 62% in a pediatric ED setting.3,4 Internet use in our study was reported to be 80%. Furthermore, Saidinejad et al showed that 96% had an e-mail account and 80% had a Facebook account; our findings demonstrate that e-mail access has remained relatively stable, whereas Facebook use increased, with 78% now reporting use. A significant new contributor to this increase in digital technology accessibility is likely the smartphone. More than 70% of caregivers reported smartphone ownership in our study. Previous work has shown that individuals with similar sociodemographic characteristics to our population are more likely to use their mobile device as their primary Internet source.1

As more caregivers become digitally connected and use those connections to search for medical information, the opportunity to develop innovative strategies to deliver pertinent, reliable, and easily accessible information increases. Other studies have shown that the most commonly referenced Internet resources range in accuracy and have reading levels well above that of the general population.15,22 In our population, nearly 60% of caregivers reported searching for medical information at least once in the preceding week. Thus, clinicians could extend their services beyond the in-clinic encounter by facilitating the distribution of appropriate information for each particular family.

Underserved populations can be hard to reach, because families frequently change addresses, and phone numbers are often disconnected or temporarily out of service.23,24 Our population’s relative hyperconnectivity makes using digital technologies another approach to reaching our families. Given the
The increasing prevalence of social media use in urban underserved populations, these platforms may become more suitable for delivering information to this target population. Recognizing, however, that social media platforms are not secure, these sites may best be used to distribute general medical information applicable to the entire population rather than individual patients. Alternatively, text messaging has been used successfully to deliver information, including reminders for immunizations and medication adherence and healthy preventive tips. Given the variety of smartphone functions and the previous success of text messaging, innovation related to expanded text, including links to Web sites, photos, and videos, could enhance the quality of information distributed and create more effective messages for patients. The rapid evolution of digital technology highlights the importance of closely following usage trends.

Aligning digital interventions with the burgeoning use of the EMR could enhance connections established between clinical provider and patient or family. As EMRs become more widely implemented, work should be done to create an effective patient-provider interface to allow secure passage of patient-specific information. Access to a secure patient portal may decrease office visits, improve communication with providers, and increase patient empowerment. Such an interface may be an effective way to become part of our population's day-to-day network, especially if available on increasingly ubiquitous mobile devices. At our PCCs, we have EMRs, but we do not routinely use this system to schedule appointments or interact with patients. With the new knowledge that our patients are using digital technology, we can now begin to develop and use these features.

Despite their apparent high degree of digital connectivity, it is possible that this urban, underserved pediatric population will remain hard to reach. Just as patient mailings have been plagued by the frequency with which families change addresses, digital interventions, too, are subject to periodic interruptions in Internet and smartphone service. Additionally, smartphone data plans vary in cost and total data allotted, leading to some consumers running out of data and losing Internet access for portions of a given month. Although we did not assess this in our study, additional research on reliable access would be relevant.

There are limitations to our study. First, we did not obtain individual demographic information on our sample, but we used demographic data from the entire population seen at both clinics during our study period to characterize the population from which our results arise. The survey respondents answered anonymously to improve reliability, but results could not be linked to patient records. Second, this was a convenience sample. Thus, it is possible that the families surveyed were, in some way, different from the rest of the clinics’ population. Third, only 3% of our clinics’ population are non–English speaking, making any inferences in this population difficult. This limits the generalizability of our sample. Fourth, we did not control for the possibility that a caregiver could have completed multiple surveys or that 2 caregivers from the same household could have completed surveys. However, given the brief 2-month study period, it is unlikely that a patient was approached multiple times, and the lack of financial remuneration leaves little incentive for completing the survey twice. Next, the absence of a previously validated survey tool led us to create certain questions de novo. Lastly, this study demonstrates reported use and interests, and not actual usage data. Future studies that validate questions and link reported use and actual use would be beneficial.

The increasingly high prevalence of digital technology access and usage among families coupled with the rate at which technology changes creates an opportunity to continually reenvision the ways in which health care practices interact with patients and families. Internet, e-mail, texting, and social media offer a range of potential formats for
information transfer, including text, audio, and video files. Moreover, the various types of digital technologies provide flexibility to tailor interventions according to patient and family preference. Finally, despite potential intermittent access, technological advances may offer additional ways to reach traditionally hard-to-reach populations. It would be worthwhile to follow shifting access patterns over time and to develop a broader research agenda on how digital technology can be optimized to promote health and reduce health disparities.

CONCLUSIONS
Reported access to Internet, smartphones, and social media is widespread in an urban underserved pediatric primary care population. Nearly all respondents reported regular use of ≥ 1 form of digital technology or connection. This highly prevalent use of digital technology coupled with a strong caregiver interest in receiving medical information digitally creates an opportunity to develop innovative techniques for communicating with a traditionally hard-to-reach population.

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