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Brief Communication

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Pediatric patient portal use in one health system

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ABSTRACT

Objective: The study sought to assess, for children in one large health system, (1) characteristics of active users of the patient portal (≥1 use in prior 12 months), (2) portal use by adolescents, and (3) variations in pediatric patient portal use.
Materials and Methods: We analyzed data from the electronic health record regarding pediatric portal use during 2017-2018 across a health system (39 871 pediatric patients).
Results: Altogether, 63.5% of pediatric patients were active portal users. Children (proxies) who were boys, privately insured, white, and spoke English were more likely to be active users. Common uses involved messaging with physicians, medications, allergies, letters, and laboratory results. By 15 years of age, >50% of adolescents used the portal by themselves (without a proxy). Pediatric portal use varied widely across practices.
Discussion: Pediatric or adolescent portal use is quite high, but large variations exist.
Conclusion: Use of the portal for pediatric care may reflect varying pediatric patient engagement.

Key words: pediatrics, patient portal, health information technology

INTRODUCTION

A goal for most health systems is to engage patients in their own health care. The patient portal, an online service or website that connects the patient to the electronic health record (EHR), can support this goal via 2-way communication with healthcare providers, access to upcoming appointments and to laboratory information, billing, prescription refill requests, medication and problem lists, and health summaries such as vaccination dates.

Patient portal use has grown tremendously.[1] A recent online national survey of insured adults found that among those with a healthcare visit in the past year, 37% had used the portal within 12 months.[1] Variations exist: studies, mostly on adults, have noted that patients with lower socioeconomic status, with lower health literacy, and of minority backgrounds are less likely to use the portal.[2–5]

Even less is known about pediatric portal use, including activation (ie, signing up for the portal), frequency of use, types of services used, or impact on quality or outcomes. A 2014 systematic review noted high parental satisfaction with the concept of the portal, yet only scant evidence for improvement in quality of care due to the portal.[6] A few pediatric studies have noted a positive association between portal use and higher treatment engagement[7] and improved communication between parents and health providers[8] and among health providers.[8,9] A study from one institution assessed pediatric portal usage between 2007 and 2014 and noted rapid uptake, substantial use by parents or guardians, and moderate use by older adolescents.[10] However, this study included both primary care and subspecialty patients, and the authors highlighted the need for examining pediatric portal use in primary care populations.

Most studies of pediatric portal utilization have relied on parent-reported use and perceptions rather than portal-based metrics. Further, little is known about variations in pediatric portal among children, adolescent self-use of the portal, or variations across pediatric providers.[10,11] Better understanding of pediatric and adolescent portal use will help health system leaders meet patient needs.

One way to assess variations in pediatric portal use is to examine utilization throughout a health system so that variations are likely due to patient or provider factors rather than technical, health system, or community-based factors. The objectives of this study were to assess, for pediatric primary care patients in one large health system in which most patients are insured and have access to primary care: (1) characteristics of active users, nonactive users (who activated a portal account but have not used the portal), and nonusers; (2) patterns of adolescent and their proxy portal use; and (3) practice variations in pediatric portal use.

MATERIALS AND METHODS

This study was approved by the institutional review board at the University of California, Los Angeles. We analyzed data from the EHR and patient portal for the 1-year time period August 1, 2017, to July 31, 2018, for children attending 1 of 16 primary care practices within the University of California, Los Angeles Health System. These included 6 pediatric, 6 medicine-pediatrics, and 4 family medicine practices, all using one EHR (Epic Systems, Verona, WI). The portal is currently in English only. Parents or guardians of pediatric patients can obtain proxy access for children under 12 years of age. Adolescents 12-17 years of age may obtain full access and the parent or guardian can request limited proxy access. The portal includes features such as secure messaging with the healthcare team; viewing laboratory and imaging results; requesting prescription refills; viewing immunization records, visit summaries, and upcoming appointments; requesting for release of information; and accessing educational materials. Parent proxies and adolescents are offered portal enrollment at clinical visits. We herein use "pediatric portal use" to denote either proxy or adolescent use unless otherwise specified.

We used structured query language to extract data from the EHR. We first defined a primary care pediatric patient as a child <18 years of age, with ≥1 visit to 1 of these 16 practices within 3 years. We then defined portal use[12] as active portal user (a patient or proxy who logged into the system at least once between August 1, 2017, and July 31, 2018, excluding a login on the portal sign-up day); nonactive user (a patient/proxy who logged in only on the day they signed up for the portal, or who only logged in before this 1-year period), and nonuser (a patient without a portal account during this time period).

We assessed portal use by demographic characteristics: age, sex, insurance status (private, public, or other), race (white, black, Latino, other), and primary language spoken at home (English, Spanish, other). We also noted type of practice (pediatric, medicine-pediatrics, or family medicine).

We categorized portal use by proxy or patient, and by the common types of service: appointments requested or cancelled, review of current health issues, medications, allergies, immunizations, health summary, health histories, test results, letters, or messages to health providers.

For objective 1 (portal use) we summarized patient characteristics, overall and stratifying by user type (active/nonactive/nonusers). Comparisons between groups used 1-way analyses of variance for age, and chi-square tests for categorical variables. For objective 2 (adolescent use) and objective 3 (variations across practices), we summarized adolescent use and proxy login rates by age and practice. Comparisons between practice types in terms of active user rates used chi-squared tests. All analyses were performed using R version 3.5.0 (R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Across the health system, 39 871 pediatric patients attended these 16 practices (Table 1).

Overall, 64% of pediatric patients were active users, 14% were nonactive users or had signed up for the portal but not used the portal within 12 months, and 23% were nonusers, not having signed up for the portal. Patients who were younger, male, covered by private

Table 1. Characteristics of active, nonactive, and nonusers of the patient portal among pediatric patients

Covariate	Active user	Nonactive user	Nonuser	*P* value
Population	25 310 (63.5)	5402 (13.5)	9159 (23.0)	
Age, y	7.1 ± 4.9	9.6 ± 5.4	8.9 ± 5.0	<.001
Sex				.029
Female	12 331 (48.7)	2577 (47.7)	4321 (47.2)	
Male	12 979 (51.3)	2825 (52.3)	4838 (52.8)	
Insurance type				<.001
Private	23 528 (93.0)	4512 (83.5)	6503 (71.0)	
Public	1562 (6.2)	801 (14.8)	2496 (27.3)	
Other	220 (0.9)	89 (1.6)	160 (1.7)	
Race/ethnicity				<.001
White/Caucasian	9327 (36.9)	1798 (33.3)	2565 (28.0)	
Black/African American	880 (3.5)	230 (4.3)	470 (5.1)	
Latino/Hispanic	3155 (12.5)	874 (16.2)	2035 (22.2)	
Other/unknown	11 948 (47.2)	2500 (46.3)	4089 (44.6)	
Primary language				<.001
English	25 021 (98.9)	5173 (95.8)	8490 (92.7)	
Spanish	111 (0.4)	187 (3.5)	551 (6.0)	
Other/unknown	178 (0.7)	42 (0.8)	118 (1.3)	

Values are n (%) or mean ± SD.

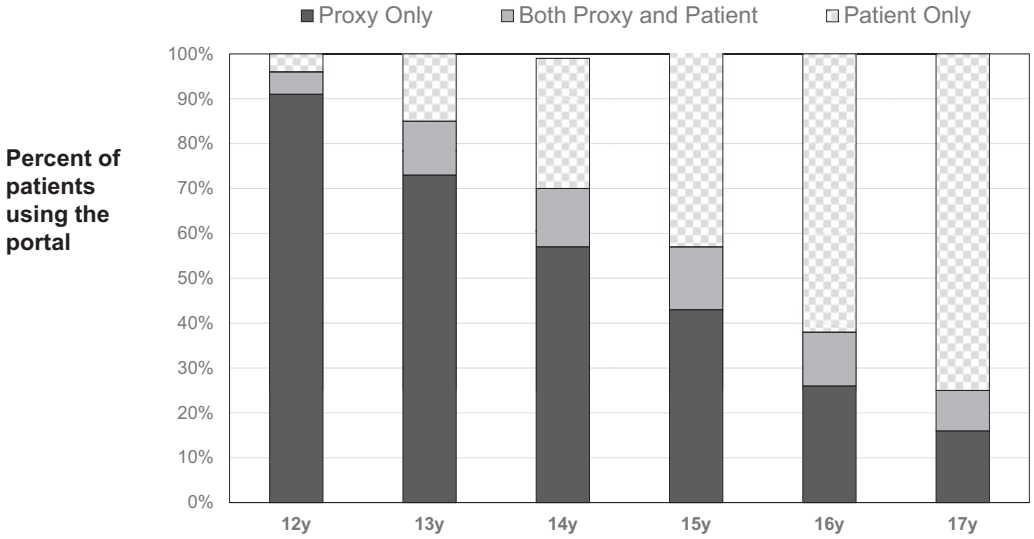

Figure 1. Portal login activity by proxy only, both proxy and patient, or patient only, by patient age.

insurance, white or other or unknown race or ethnicity, and from English-speaking families were more likely to be active portal users.

Among all patients, 5% of active users logged in only once over the 12-month period, another 5% logged in twice, and the remaining 90% logged in 3+ times (mean = 38.2 ± 53.2; median = 20 [interquartile range = 1-49], range = 1-785).

Figure 1 depicts adolescent portal activity by age, showing use during the 1-year period by proxy only, proxy plus patient, or patient only. Four percent of 12-year-olds used the portal by themselves, increasing to nearly 60% by 15 years of age and 75% by 17 years of age (Figure 1). Proxy or patient-only use did not vary by sex.

Table 2 shows types of portal services used among all portal users (not just active users). Within each category of portal use (eg, messaging with physician/practice), some patients used only one type of use, while others used several or all types.

Common uses included messaging with physicians or practices, reading or updating or renewing medications, reviewing immunization records or health histories or allergies, reading letters from the physician, and checking on laboratory studies. Of the 333 114 portal sessions by these patients, 73.3% was by web access and 26.7% was by mobile phones.

The proportion of a practice's pediatric patients who were active users varied from 25% to 75% of the pediatric populations of the 16 practices (Figure 2). The proportion of a practice's pediatric patients who were active portal users varied by practice type ($P < .001$): pediatric (66.4%), medicine-pediatrics (58.8%), and family medicine (47.7%).

Table 2. Types of portal services used by all pediatric patients or proxies

Patient portal use	Percent of pediatric portal users (n = 37 114)[a]
Portal use by proxy	75.9
Messaging with physician/practice	
Read message	75.3
Wrote message	35.4
Appointments	
Requested	13.2
Cancelled	8.7
Medications	
Read	40.5
Updated	2.5
Medication renewal	
Read	14.0
Requested renewal	4.3
Allergies	
Viewed page	43.3
Updated allergies	0.9
Immunizations read	57.4
Health summary read	
Read health summary	28.9
Read medical history	25.0
Read visit summary	4.9
Letters read	46.9
Laboratory (test) results	
Read list	61.0
Read details	37.7

[a]Percent of all pediatric portal users in these practices (ie, not just active portal users).

DISCUSSION

This is one of the first studies to assess portal use among primary care pediatric patients by querying the EHR to determine utilization of various portal services rather than surveying parents. In this large health system, two-thirds of pediatric patients used the portal within 12 months, although portal use varied by patient characteristics. Most adolescents became the primary users of the portal for their own care by 15 years of age. Pediatric patients used the portal for a variety of services, similar to use by adults.[12,13] Finally, pediatric portal use varied tremendously across primary care practices within the health system, with pediatric practices having higher pediatric portal use than family medicine practices.

Although some studies have reported low portal use,[14–16] we found high pediatric utilization of the portal. The types of portal services used ranged from communications with physicians to checking on medications, immunizations, allergies, and laboratory results. These findings complement and expand those of Steitz et al,[10] who noted, in an earlier era, high pediatric use for messaging

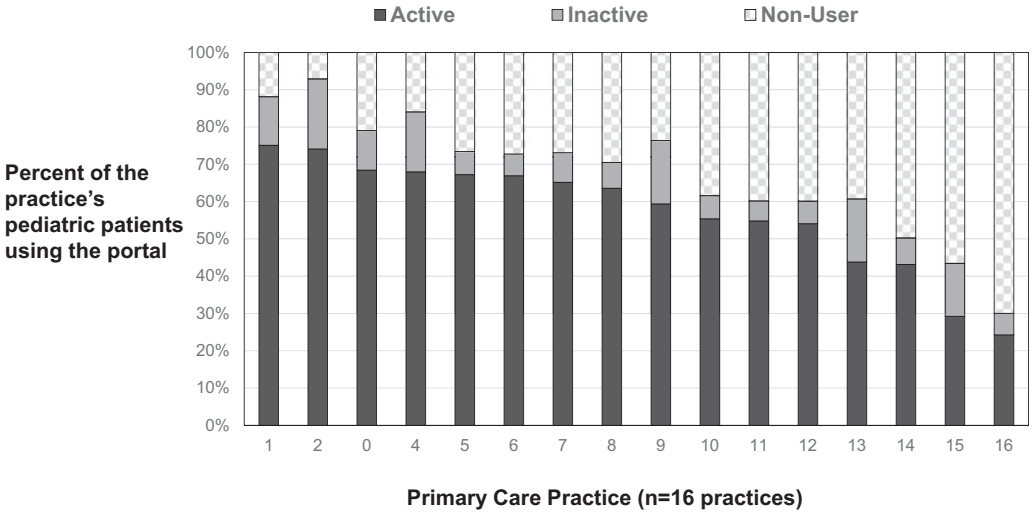

Figure 2. Portal use across the 16 primary care practices.

and test results for children in primary care or subspecialty care at an institution. Further, the portal has become a 2-way interaction for many pediatric patients: one-third of pediatric portal users wrote messages to their pediatric physician and nearly one-tenth used the portal to cancel an appointment or renew or update a medication. This may reflect better engagement of patients in their own health care.[17] Studies of the impact of portal use have been mostly on adult use, and findings have been mixed,[18,19] thus, more studies are needed to assess the impact of pediatric portal use or portal-based interventions on pediatric quality and outcomes.

Although pediatric portal use was high, it was not evenly distributed. Minority and non-English pediatric populations had lower use of the portal, consistent with the few other studies of pediatric portal use.[5,6,20] Clearly, patient portals need to adapt to the health literacy and cultural needs of the populations being served. This might include outreach to hard-to-reach populations by clinic staff to help enroll patients and to teach patients how to navigate the portal, incorporating other language versions of the portal in addition to English, adapting health literacy and linguistic innovations into the portal, and engaging patients in redesigning the portal to enhance usability.

We found high use of the portal by adolescents themselves, particularly after 14 years of age. Of note, adolescents had to create their own login and password to be self-users of the portal. Given the potentially sensitive and confidential nature of adolescent health care, these are encouraging findings. High use among older adolescents was also noted by Steitz et al[10] for a combination of primary care and subspecialty pediatric patients[10] and by Thompson et al[11] for adolescents in 3 primary care clinics. Studies are needed to assess whether self-use among adolescents leads to improved communication, quality of care, and receipt of needed services.[6,11,21,22]

The wide variability in portal use across practices was surprising given that these practices are all part of the same health system with a single EHR. This may represent differences in comfort and interest in the patient portal by health providers, in addition to possible differences in patient populations across practices. These findings highlight opportunities for health systems to train providers on the importance of the portal and the potential for enhancing care by enrolling patients on the portal. In addition, future research is needed to disentangle patient-, provider-, and practice-level factors associated with pediatric patient portal use to optimally target interventions to increase usage and impact of the portal.

In addition to being one of the few studies of pediatric portal use, one study strength is that we assessed portal use directly via the EHR, rather than by patient self-report. By focusing within a single health system, we were able to identify large variations in portal use that are likely due to health provider, practice, or patient factors, rather than EHR- or portal-related factors. Study limitations include unclear generalizability to other health systems and lack of data about barriers to portal use. Our definition of an active portal user as a patient who used the portal $\geq$1 time within a 12-month period beyond the activation has been employed before,[10] but there is no gold standard for defining active portal users. Regarding adolescent use, we were unable to delve into details of the decision-making process for when and how adolescents took over their own use of the portal; also, it is possible that some parents may have logged in as the adolescents themselves. In addition, we did not study the impact of portal usage on quality of pediatric care, or differential impact by patient-level factors. Future studies should assess impact of portal use on quality of care and outcomes.

We conclude that pediatric portal use in this one health system is robust, encompassing two-thirds of patients and a variety of types of portal services. Adolescent self-use of the portal is high after 14 years of age. Although wide variations exist across practices, use of the portal for pediatric care may reflect enhanced pediatric patient engagement in their own health care.

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AUTHOR CONTRIBUTIONS

PS conceptualized the design of the study, drafted the manuscript, and led the review and revision of the manuscript. SV performed all data analyses, contributed substantially to the interpretation of the data, and revised the manuscript. RV, CA, DO, MS, NL, and CFL

all provided substantial contributions to the conception, design, and interpretation of the work, and revised the manuscript. All authors provided final approval of the version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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CONFLICT OF INTEREST STATEMENT

None declared.

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