ORIGINAL RESEARCH

Prevalence and Factors Associated with Family Physicians Providing E-Visits

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Purpose: **The use of telemedicine has grown in recent years. As a subset of telemedicine, e-visits typically involve the evaluation and management of a patient by a physician or other clinician through a Web-based or electronic communication system. The national prevalence of e-visits by primary care physicians is unclear as is what factors influence adoption. The purpose of this study was to examine the prevalence of family physicians providing e-visits and associated factors.**

Methods: **A national, cross-sectional practice demographic questionnaire for 7580 practicing family physicians was utilized. Bivariate statistics were calculated and logistic regression was conducted examining both physician level and practice level factors associated with offering e-visits.**

Results: **The overall prevalence of offering e-visits was 9.3% (n = 702). Compared with private practice physicians, other physicians were more likely to offer e-visits if their primary practice was an academic health center/faculty practice (odds ratio [OR], 1.73; 95% CI, 1.03 to 2.91), managed care/health maintenance organization (HMO) practice (OR, 9.79; 95% CI, 7.05 to 13.58), hospital-/health system–owned medical practice (not including managed care or HMO) (OR, 2.50; 95% CI, 1.83 to 3.41), workplace clinic (OR, 2.28; 95% CI, 1.43 to 3.63), or federal (military, Veterans Administration [VA]/Department of Defense) (OR, 4.49; 95% CI, 2.93 to 6.89). Physicians with no official ownership stake (OR, 0.44; 95% CI, 0.28 to 0.68) or other ownership arrangement (OR, 0.29; 95% CI, 0.12 to 0.71) had lower odds of offering e-visits compared with sole owners.**

Conclusion: **Fewer than 10% of family physicians provided e-visits. Physicians in HMO and VA settings (ie, capitated vs noncapitated models) were more likely to provide e-visits, which suggests that reimbursement may be a major barrier. (J Am Board Fam Med 2019;32:868–875.)**

Keywords: **Cross-Sectional Studies, Delivery of Health Care, Family Physicians, Logistic Models, Primary Care Physicians, Surveys and Questionnaires, Telemedicine**

Telemedicine has long been a part of the medical vernacular, beginning with the April 1924 issue of Radio News magazine, which depicted a patient using a television and microphone to communicate with a doctor. Since that time, telemedicine—which leverages communication technology to deliver health care at a distance—has grown in use and received increased support through grant funding, payment models, and legislation.[1–3] One form of telemedicine that holds promise for transforming health care is the electronic visit or e-visit. E-visits typically involve the evaluation and management of a patient by a physician or other health care provider through a Web-based or other electronic communication system.[4] E-visits have the potential to reduce access barriers, such as lack of transportation or rural residence, since patients can access health care from their home. E-visits could also improve the efficiency and quality of health care by reducing the number of in-person office visits and improving documentation of patient-physician communica-

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tion.[5,6] While there are notable advantages of e-visits, studies of health care systems that have implemented e-visits suggest that this technology may be underutilized.

Studies examining adoption of e-visits suggest that a small percentage of physicians have adopted e-visits[7–14]; however, a large nationally representative study has not been conducted. Adoption rates may lag due to implementation barriers, such as lack of reimbursement, practice guidelines, or quality measures.[5–7,15] Health care providers have also raised concerns regarding liability (since care is delivered without seeing the patient), workflow integration, and increased physician workload, particularly if patients inappropriately or excessively use e-visits or do not provide sufficient information and followup is needed.[5,6,16,17] Among health care systems that have adopted e-visits, there is evidence demonstrating the benefits of e-visits. Studies have shown that implementation of e-visits has reduced office visit utilization and health care spending and improved patient satisfaction.[7,13,15,16,18–22] Comparing the quality of care delivered in office visits versus e-visits, researchers found no differences in the frequency of follow-up visits (a proxy measure for treatment failure or misdiagnosis).[12,23] To explore whether e-visits might have unintended consequences, such as increasing physician workload, researchers have examined the appropriateness of e-visit use among patients and found that patients appropriately used the service and provided sufficient information for diagnosis.[24,25] Researchers have also found that e-visits require less provider time than in-person office visits.[11]

It is still unclear how many primary care physicians have adopted e-visits or what factors influence providers' adoption rates. Prior studies exploring telemedicine more broadly (ie, not e-visits specifically) have found that organizational-level factors, such as teaching status, nonprofit ownership, system affiliation, and rural location were associated with telemedicine adoption.[1,26] Research on electronic health records (EHRs) have found that provider-level factors, such as age and physician specialty, influence EHR adoption.[27,28] For e-visits, it is likely that a similar set of factors influence e-visit provision. The purpose of this study was to examine the prevalence of family physicians providing e-visits and associated factors.

Methods

Data

We analyzed data from the 2017 American Board of Family Medicine (ABFM) Family Medicine Certification Examination practice demographic registration questionnaire for those seeking to continue their certification.[29] The questionnaire is a mandatory component of examination registration and is completed 3 to 4 months before examination day. The questionnaire asks about scope of practice, practice organization, practice location, practice ownership, practice size, and provider specialty mix, among others. The examination is administered twice per year and if physicians registered for both the spring and fall examinations, we kept their most recent responses. Physicians who did not provide direct patient care or who did not practice outpatient continuity care were excluded. Other demographic data were obtained from ABFM administrative databases.

Variables

We used a question that asked, "Please estimate your total typical number of hours worked per week across all your practice locations in each of the categories below. This should sum to your typical total hours per week; please do not double count hours. Please do not include volunteer or on-call time out of the office." The response options to this question were: Direct patient care (excluding on-call or volunteer time); Administrative activities (including charting); Telephone patient care; E-visits; Teaching/precepting; and Other. If a physician entered a nonzero response, this variable was recoded to indicate they offered E-visits, otherwise it was coded to indicate they did not offer E-visits. It should be noted that the respondents were not presented with a standard definition of e-visits; however, because this question was presented along with an option for telephone patient care, it is assumed that respondents were able to distinguish between traditional patient phone calls and e-visits using more modern Web-based or other electronic communication systems.

Analysis

For the bivariate analysis, χ^2 tests were used for categorical variables and *t*-tests were used for continuous variables. For the logistic regression, the dependent variable was e-visit adoption (yes or no)

and covariates included: race, ethnicity, gender, practice site ownership status, practice site size, practice site specialty, faculty status, hours providing direct patient care, years in practice, primary practice site type, and individual scope of practice (ISOP) score.[30] ISOP scores range from 0 to 30 and a higher score indicates a higher scope of practice for an individual physician. The response options for all categorical variables can be found in Table 1. All analyses were conducted using R 3.3.1 (R Project for Statistical Computing, R Foundation; http://www.r-project.org/). The American Academy of Family Physicians institutional review board approved this protocol.

Results

After exclusions our analytic sample was 7580 family physicians (Table 1), the majority of which were non-Hispanic (93.0%, n = 7053), white (72.2%, n = 5470), male (56.6%, n = 4288), graduates of US medical schools (78.0%, n = 5896), with an average age of 51.7 years (SD = 8.98). The overall prevalence of offering e-visits was 9.3% (n = 702).

In the bivariate analysis, statistically significant differences were found for gender ($P = .041$, n = 7580), with women more likely to offer e-visits than men, and medical school training ($P = .018$, n = 7563), with United States Medical Graduate (USMG)s more likely than International Medical Graduate (IMG)s to offer e-visits.

Furthermore, those with a partial ownership in their practice were likely than other ownership types to offer e-visits ($P < .001$, n = 7580); physicians in larger practices were more likely than those in smaller practices to offer e-visits ($P < .001$, n = 7580); and family medicine and primary care practices were more likely to offer e-visits than practice sites with a multiple specialty mix ($P < .001$, n = 7580). Core or voluntary faculty were found to be more likely than nonfaculty to offer e-visits ($P = .001$, n = 7580) as were those who worked between 9 and 32 hours per week ($P < .001$, n = 7580). Those physicians practicing in a federal (military, Veterans Administration/Department of Defense) system or managed care/health maintenance organization (HMO) were more likely than other practice types to offer e-visits ($P < .001$, n = 7580). Finally, those physicians with a broader scope of practice were more likely to offer e-visits ($P = .002$, n = 7580). There were no statistically significant differences found for race ($P = .559$, n = 7580), ethnicity ($P = .606$, n = 7580), years in practice ($P = .180$, n = 7580), or age ($P = .295$, n = 7580).

In the logistic regression, several variables were found to be associated with a family physician offering e-visits (Table 2). Compared with sole owners, those physicians with no official ownership stake (odds ratio [OR], 0.44; 95% CI, 0.28 to 0.68) or some other kind of ownership arrangement (OR, 0.29; 95% CI, 0.12 to 0.71) had lower odds of offering e-visits.

The odds of offering e-visits tended to increase with each 1-point increase in Individual Scope of Practice score (ISOP; OR, 1.05; 95% CI, 1.03 to 1.08). Other physician-level characteristics associated with offering e-visits were identifying as black or African-American (OR, 1.46; 95% CI, 1.05 to 2.02) compared with white physicians, holding volunteer/clinical faculty status (OR, 1.41; 95% CI, 1.16 to 1.71) compared with no faculty status, and working 9 to 16 (OR, 1.63; 95% CI, 1.13 to 2.34) or 25 to 32 (OR, 1.62; 95% CI, 1.31 to 2.00) hours per week compared with more than 40 hours per week.

Compared with private practice physicians, other physicians were more likely to offer e-visits if their primary practice was an academic health center/faculty practice (OR, 1.73; 95% CI, 1.03 to 2.91), managed care/practice (OR, 9.79; 95% CI, 7.05 to 13.58), hospital-/health system–owned medical practice (not including managed care or HMO) (OR, 2.50; 95% CI, 1.83 to 3.41), workplace clinic (OR, 2.28; 95% CI, 1.43 to 3.63), or federal (military, Veterans Administration/Department of Defense) (OR, 4.49; 95% CI, 2.93 to 6.89).

Conclusions

Using a large national sample of frontline primary care physicians, we found that fewer than 10% of family physicians provided e-visits. To our knowledge, this is the first study to examine the prevalence of e-visit adoption on a national level; previous studies have only explored adoption within a health care organization or system.[7–10] We also found that organizational-level factors (eg, practice type) and physician-level factors, such as time devoted to patient care and scope of practice, influence e-visit adoption. Other studies have examined the influence of organizational- and physician-level factors on adoption of other forms of telemedicine[1,26,31–33] but not e-visits.

Table 1. Individual and Practice Characteristics of Practicing Physicians Who Registered for the 2017 American Board of Family Medicine Certification Examination by Whether They Provided e-Visits or Not

Variable	Total (N = 7580)	Do Not Offer E-Visits (N = 6878)	Offer E-Visits (N = 702)	*P* Value
Race, n (%)				.559
American Indian or Alaska Native	69 (0.9)	62 (0.9)	7 (1.0)	
Asian	1115 (14.7)	1011 (14.7)	104 (14.8)	
Black or African American	459 (6.1)	406 (5.9)	53 (7.6)	
Native Hawaiian or Other Pacific Islander	36 (0.5)	32 (0.5)	4 (0.6)	
Other	431 (5.7)	395 (5.7)	36 (5.1)	
White	5470 (72.2)	4972 (72.3)	498 (70.9)	
Ethnicity, n (%)				.606
Hispanic or Latino	527 (7.0)	482 (7.0)	45 (6.4)	
Non-Hispanic	7053 (93.0)	6396 (93.0)	657 (93.6)	
Gender, n (%)				.041
Female	3292 (43.4)	2961 (43.1)	331 (47.2)	
Male	4288 (56.6)	3917 (56.9)	371 (52.8)	
Medical school training*, n (%)				.018
IMG	1667 (22.0)	1538 (22.4)	129 (18.4)	
USMG	5896 (78.0)	5325 (77.6)	571 (81.6)	
Practice site ownership status, n (%)				<.001
No official ownership stake (100% employed)	4770 (62.9)	4352 (63.3)	418 (59.5)	
Partial owner or shareholder	1427 (18.8)	1247 (18.1)	180 (25.6)	
Self-employed as a contractor (including locums)	240 (3.2)	219 (3.2)	21 (3.0)	
Sole owner	1051 (13.9)	976 (14.2)	75 (10.7)	
Other	92 (1.21)	84 (1.22)	8 (1.14)	
Practice site size, n (%)				<.001
Solo practice	953 (12.6)	887 (12.9)	66 (9.4)	
2 to 5 providers	2624 (34.6)	2449 (35.6)	175 (24.9)	
6 to 20 providers	2323 (30.6)	2102 (30.6)	221 (31.5)	
>20 providers	1680 (22.2)	1440 (20.9)	240 (34.2)	
Practice site specialty mix, n (%)				<.001
Family medicine only	3940 (52.0)	3627 (52.7)	313 (44.6)	
Multiple specialties (not only primary care)	1594 (21.0)	1393 (20.3)	201 (28.6)	
Primary care specialty mix (Family Medicine, Internal Medicine and/or Pediatrics)	2046 (27.0)	1858 (27.0)	188 (26.8)	
Faculty status, n (%)				.001
No	5130 (67.7)	4695 (68.3)	435 (62.0)	
Yes, core/salaried faculty	744 (9.8)	672 (9.8)	72 (10.3)	
Yes, volunteer/clinical faculty	1706 (22.5)	1511 (22.0)	195 (27.8)	
Hours per week worked, n (%)				<.001
0 to 8	277 (3.7)	260 (3.8)	17 (2.4)	
9 to 16	469 (6.2)	418 (6.1)	51 (7.3)	
17 to 24	803 (10.6)	717 (10.4)	86 (12.3)	
25 to 32	1712 (22.6)	1501 (21.8)	211 (30.1)	
33 to 39	1360 (17.9)	1242 (18.1)	118 (16.8)	
40 or more	2959 (39.0)	2740 (39.8)	219 (31.2)	

Continued

Table 1. Continued

Variable	Total (N = 7580)	Do Not Offer E-Visits (N = 6878)	Offer E-Visits (N = 702)	*P* Value
Years in Practice, n (%)				.180
0 to 10	1991 (26.3)	1811 (26.3)	180 (25.6)	
11 to 20	2555 (33.7)	2316 (33.7)	239 (34.0)	
21 to 29	2135 (28.2)	1920 (27.9)	215 (30.6)	
30 or more	899 (11.9)	831 (12.1)	68 (9.7)	
Primary practice type, n (%)				<.001
Private practice	2645 (34.9)	2480 (36.1)	165 (23.5)	
Academic health center	517 (6.8)	472 (6.9)	45 (6.4)	
Federal (military, Veterans Administration/Department of Defense)	400 (5.3)	348 (5.1)	52 (7.4)	
Managed care/HMO practice	407 (5.4)	268 (4.0)	139 (19.8)	
Hospital-/health system-owned	2513 (33.2)	2277 (33.1)	236 (33.6)	
Safety Net	726 (9.6)	690 (10.0)	36 (5.1)	
Other	372 (4.9)	343 (5.0)	29 (4.1)	
Scope of practice, mean (SD)	13.2 (3.7)	13.1 (3.7)	13.6 (3.6)	.002
Age in years, mean (SD)	51.7 (9.00)	51.7 (9.0)	51.4 (8.6)	.295

HMO, health maintenance organization; IMG, international medical graduate; USMG, United States medical graduate, SD, standard deviation.
*17 omitted for missing data.

The primary factor related to whether a physician offered e-visits was their primary practice type, with the largest differences in HMO and Veterans Affairs (ie, capitated vs noncapitated models). This result suggests that a primary barrier to implementation of e-visits remains reimbursement. Studies exploring secure messaging between physicians and patients and e-visits have reported lack of reimbursement models as a key barrier to e-visit adoption.[5,34] A Current Procedural Terminology code has been created for e-visit billing and a few health systems have had success negotiating reimbursement for e-visits from private payers.[5,35,36] Within the broader field of telemedicine, reimbursement continues to be a barrier for adoption but has improved in recent years due to increased attention from policy makers, changes in legislation, and a move from fee-for-service to value-based payment models.[2] Therefore, it is possible that reimbursement for e-visits will expand over time. Future studies should develop reimbursement criteria, quality measures, and test payment models for e-visits.

Our study found that physicians with fewer than 40 hours a week devoted to patient care were more likely to adopt e-visits. This finding suggests that integrating e-visits into workflow may be a barrier to adoption for physicians who have all their time devoted to patient care. This may be particularly important for family physicians since the profession is increasingly adopting part-time work schedules to balance work demands.[37] Prior studies of e-visits suggest that workflow integration is a key barrier to adoption since responding to electronic communication is time consuming.[5,16,38] Recognizing this concern, some health care systems have allotted time in the physicians' workday for managing e-visit patients or designated other members of the health care team to manage e-visits.[5,38] For example, researchers have compared 2 e-visit models—1 delivered by physicians and 1 delivered by advanced practice providers—and found that advanced practice providers were able to provide a greater number of e-visits, likely due to differences in availability.[38] Future studies are needed that test strategies for maximizing integration of e-visits into workflow to ensure that health care providers have sufficient time to manage e-visit patients.

Family physicians that had a higher scope of practice and an ownership stake in their practice were more likely to adopt e-visits. In previous studies of family physicians, researchers have found that higher scope of practice is associated with higher job satisfaction.[39] Past theories and studies of implementation suggest that individuals who are more satisfied with their jobs may be more receptive to

Table 2. Predictors of Offering E-Visits from Logistic Regression Model

Variable	OR (95% CI)
Race	
American Indian or Alaska Native	1.28 (0.57 to 2.89)
Asian	0.95 (0.73 to 1.24)
Black or African American	1.46 (1.05 to 2.02)
Native Hawaiian or Other Pacific Islander	0.94 (0.31 to 2.86)
Other	1.00 (0.68 to 1.48)
White	Reference
Ethnicity	
Hispanic or Latino	Reference
Non-Hispanic	1.07 (0.75 to 1.52)
Gender	
Female	Reference
Male	0.91 (0.76 to 1.08)
Medical school training	
IMG	Reference
USMG	1.10 (0.87 to 1.40)
Practice site ownership status	
No official ownership stake (100% employed)	0.44 (0.28 to 0.68)
Partial owner or shareholder	0.79 (0.52 to 1.19)
Self-employed as a contractor (including locums)	0.57 (0.31 to 1.05)
Sole owner	Reference
Other	0.29 (0.12 to 0.71)
Practice site size	
Solo practice	Reference
2 to 5 providers	0.96 (0.65 to 1.41)
6 to 20 providers	1.26 (0.83 to 1.91)
>20 providers	1.45 (0.93 to 2.26)
Practice site specialty mix	
Family medicine only	Reference
Multiple specialties (not only primary care)	1.06 (0.84 to 1.34)
Primary care specialty mix (Family Medicine, Internal Medicine and/or Pediatrics)	1.01 (0.82 to 1.25)
Faculty status	
No	Reference
Yes, core/salaried faculty	1.02 (0.71 to 1.48)
Yes, volunteer/clinical faculty	1.41 (1.16 to 1.71)
Hours per week worked	
0 to 8	0.84 (0.49 to 1.43)
9 to 16	1.63 (1.13 to 2.34)
17 to 24	1.28 (0.96 to 1.71)
25 to 32	1.62 (1.31 to 2.00)
33 to 39	1.14 (0.89 to 1.45)
40 or more	Reference
Years in practice	
0 to 10	Reference
11 to 20	1.10 (0.86 to 1.42)
21 to 29	1.31 (0.91 to 1.87)
30 or more	1.05 (0.62 to 1.77)
Primary practice type	
Private practice	Reference
Academic health center	1.73 (1.03 to 2.91)
Federal (military, Veterans Administration/Department of Defense)	4.49 (2.93 to 6.89)
Managed care/HMO practice	9.79 (7.05 to 13.58)
Hospital-/health system-owned	2.50 (1.83 to 3.41)
Other	2.28 (1.43 to 3.63)
Safety Net	1.06 (0.68 to 1.66)
Scope of Practice	1.05 (1.03 to 1.08)
Age in years	1.00 (0.98 to 1.02)

CI, confidence interval HMO, health maintenance organization; IMG, international medical graduate; OR, odds ratio; USMG, United States medical graduate.

change and innovation,[40,41] which may explain this finding.

It is also interesting that in neither the adjusted nor unadjusted analyses were age or years in practice a statistically significant predictor of offering e-visits. Previous studies have found that older physicians are less likely or slower to adopt EHRs than younger physicians are.[27,42] Although some may have the impression that older physicians do not "do tech," we found no evidence of that here.

There are several limitations to this study that need to be considered. The term, "e-visit," was not presented with a standard definition to the respondents and we are making an assumption that, because "telephone patient care" was another option, respondents were able to uniformly operationalize a definition of e-visits. The data are cross-sectional, so we are unable to determine if the rates of e-visit adoption are changing. Finally, these data are self-reported by the physicians and we did not independently verify the accuracy of their responses.

In conclusion, our study found that there was a low level of adoption of e-visits among family physicians, suggesting there are numerous implementation barriers to overcome. Adopting health care systems have implemented guidelines, such as excluding conditions that include a significant visual diagnostic component or patients that do not have

a prior relationship with the provider managing the e-visit.[38,43] Further research is needed to examine which conditions and patients can be effectively managed with e-visits and ensure reimbursement and quality of care and documentation in these situations.

To see this article online, please go to: http://jabfm.org/content/32/6/868.full.

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