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Analysis Of Teladoc Use Seems To Indicate Expanded Access To Care For Patients Without Prior Connection To A Provider

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ABSTRACT Despite the potential benefits of telehealth applications, little is known about their overall impact on care. This is critical because rising health care costs and a shortage of primary care providers make it likely that telehealth services will play an increasingly important role in health care delivery. To help fill this gap in knowledge, we describe early experiences with Teladoc, one of the largest telemedicine providers in the United States, which provides care directly to patients over the telephone or via the Internet. We analyzed claims data for a large California agency serving public employees that recently offered Teladoc as a covered service. The 3,701 Teladoc "visits" we studied were for a broad range of diagnostic categories, the most common of which were acute respiratory conditions, urinary tract infections, and skin problems. Compared to patients who visited a physician's office for a similar condition, adult Teladoc users were younger and less likely to have used health care before the introduction of Teladoc. Patients who used Teladoc were less likely to have a follow-up visit to any setting, compared to those patients who visited a physician's office or emergency department. Teladoc appears to be expanding access to patients who are not connected to other providers. Future research should assess the impact of Teladoc and other telehealth interventions on the quality and cost of care.

Teladoc is one of the largest telehealth providers in the United States, offering patients with minor illnesses around-the-clock access to physicians via telephone or video consultations through the Internet. In 2013 alone Teladoc reported that its six million members nationwide had collectively requested more than 120,000 consults.[1,2] Along with retail clinics, e-visits, and urgent care centers, Teladoc is one of the growing number of alternatives for acute care that focus on convenience and after-hours access.[3]

Health plans and employers have contracted with Teladoc primarily to improve access and decrease costs. As with other telehealth applications, there are several potential benefits and drawbacks to Teladoc.

Because Teladoc uses the telephone and Internet, it can provide medical care at a patient's home or workplace. This could increase access in areas where there is a shortage of other providers. By replacing emergency department (ED) or primary care visits with a Teladoc visit, patients could save time, potentially improving productivity by taking less time away from work. In addition, Teladoc charges only $38 per visit. Thus, using Teladoc to replace at least some office and ED visits could generate large savings for health plans.

However, the use of Teladoc could also lead to unintended consequences such as further frag-

mentation of care, and the impact of Teladoc on the quality of care is unclear. Teladoc physicians do not have access to information that is attainable during a face-to-face visit, such as the results of physical examinations or diagnostic testing. In telephone encounters, Teladoc physicians are unable to use visual cues to aid in diagnosis. Together, these limitations could lead to misdiagnosis and higher rates of follow-up visits—findings that have already been demonstrated with e-visits and telephone consultations.[4,5] It is also unclear whether short delays associated with initiating and participating in a Teladoc consult instead of immediately seeking care in the ED could pose a safety risk for patients with emergent conditions.

Despite the potential benefits and drawbacks of Teladoc, little is known about the overall impact of the use of such telehealth services on care. This is critical because rising health care costs and a shortage of primary care providers make it likely that telehealth will play an important role in health care delivery.[6]

To fill this gap in knowledge, we describe the early experiences with Teladoc of enrollees at a large agency serving public employees across California. We explore the reasons patients sought Teladoc consults and compare the sociodemographic characteristics and care patterns of enrollees who used Teladoc with those of enrollees who used EDs and physicians' offices for similar conditions.

Study Data And Methods

SETTING In April 2012 the California Public Employees' Retirement System (CalPERS) first offered Teladoc as a covered benefit with no copayment to the approximately 300,000 members enrolled in its Blue Shield of California health maintenance organization plan.[7] CalPERS members enrolled in Medicare Advantage or a Medicare supplemental plan were not offered Teladoc as a covered benefit. CalPERS sent informational materials to its enrollees that promoted Teladoc as an alternative to ED visits for nonurgent conditions.

This study describes CalPERS enrollees' experience with Teladoc in the first eleven months of the program, April 2012 through February 2013.

HOW TELADOC VISITS ARE PROVIDED To initiate a Teladoc visit, patients must first create an online account and enter information about their medical history. When they need care, they request a consult with a Teladoc physician via telephone or the Internet. Patients do not list their symptoms as part of the request, and there are no screening questions to assess the urgency of the complaint.

Teladoc physicians respond to requests twenty-four hours a day, seven days a week. The consulting physician does not have any established relationship with the patient; however, the patient will be matched to a physician licensed to practice in his or her state of residence. The physician receives the patient's request; reviews the patient's medical history; and contacts the patient, usually within twenty to twenty-five minutes after Teladoc receives the request. The visit then occurs over the phone or via video through the Internet. Almost all (98–99 percent) of Teladoc visits for CalPERS enrollees occur by telephone.

The physician diagnoses the patient's condition; discusses the diagnosis and treatment options; and, if indicated, sends a prescription to the patient's preferred pharmacy.

DATA SOURCE For this study, CalPERS supplied deidentified health plan claims data and enrollment information. We obtained the complete medical claims of 2,718 Teladoc users as well as the medical claims of a random sample of 72,191 nonusers of Teladoc from the 306,027 eligible enrollees with Teladoc coverage. We obtained data on all Teladoc users, both children and adults. However, we limited the comparison sample of nonusers of Teladoc to people ages eighteen and older who had been continuously enrolled in their health plan from April 2012 through February 2013 and who were not enrolled in Medicare Advantage or Medicare supplemental plans.

Data provided by CalPERS included enrollees' sex, age, ZIP code of residence, and complete information about health care use—such as site of care, date of service, and diagnoses—from January 2011 through February 2013. We used the data for the period January 2011 through December 2011 to assess enrollees' use of health care before they became eligible for Teladoc and to identify comorbidities.

STUDY VARIABLES The primary *International Classification of Diseases*, Ninth Revision (ICD-9), diagnosis code was available for all visits. In 99.5 percent of all Teladoc claims, only one diagnosis code was listed for each visit. To describe enrollees' use of Teladoc, we reviewed these codes and classified Teladoc visits into the following diagnostic categories: acute respiratory illnesses; urinary tract infections (UTI) and urinary symptoms; skin problems; general advice, counseling, and refills; eye problems; influenza and general viral illnesses; allergies; abdominal pain, vomiting, and diarrhea; vaginitis; back and joint problems; headache; ear infections (internal and external); mental health; vertigo or ringing in the ears; chronic illness; pregnancy-related problems; and other. Specific

codes are listed in the online Appendix.[8]

Acute respiratory illnesses, UTI and urinary symptoms, and skin problems were the three leading diagnostic categories for which adult patients sought Teladoc consults. We identified adult patients who sought care in EDs or physicians' office for these three diagnostic categories during the study period. An ED or office visit was included in our sample if a diagnosis classified as an acute respiratory illness, UTI or urinary symptom, or skin problem was one of the diagnosis codes on the record. Because the same patterns appeared across all three diagnostic categories, we present pooled data in this article.

We calculated the number of comorbid conditions using the Charlson Comorbidity Index.[9] Because we had data from 2011, we captured comorbidities for a full year before Teladoc was offered as a covered service. To measure enrollees' use of health care before the introduction of Teladoc, we calculated the total number of visits for any reason to any health care provider in 2011. We also obtained data from the Census Bureau on the median income in each enrollee's ZIP code.

To assess the timing of visits, we classified visits as weekend or holiday versus weekday visits. Weekend or holiday visits were those that occurred on Saturday, Sunday, or a national holiday during the study period.

We used follow-up visits as a rough proxy for clinical resolution. We first identified "index visits"—that is, the first visit in a twenty-one-day period in which the enrollee sought care at any location (ED, physician's office, or Teladoc) for a diagnosis of acute respiratory illnesses, UTI and urinary symptoms, or skin problems.[10] If the enrollee had a visit to any location in the twenty-one days following the index visit, we classified the subsequent visit as a follow-up visit. We examined follow-up visits both for a diagnosis in the same diagnostic category as the index visit and for any condition.

ANALYSES In our analyses, the health care visit was the unit of analysis. Therefore, a single enrollee could contribute more than one visit. The one exception is when we compared the characteristics of Teladoc users to those of users of other care settings; for this comparison the unit of analysis was the enrollee.

We first examined patterns of Teladoc use among children and adults. We then compared average monthly Teladoc visits to average monthly ED and office visits among adults (but not children) who sought care for the three leading conditions during the study period.

We compared baseline demographic, socioeconomic, comorbidity, and utilization variables across the three groups of adults in our sample—those who visited Teladoc, the ED, or physicians' offices—using chi-square tests and *t* tests. We also used multivariable logistic regression analysis to test for an independent relationship between the type of index visit (Teladoc versus office visit) and follow-up visit to any location within twenty-one days for a diagnosis in the same diagnostic category, adjusting for age, sex, and Charlson comorbidity score.

Using Teladoc to replace at least some office and ED visits could generate large savings for health plans.

LIMITATIONS Our analyses have various limitations. First, we describe only the early experiences of CalPERS with Teladoc. Thus, we cannot generalize our findings to entities outside of California. Second, visit patterns might change as enrollees gain more experience with Teladoc.

Third, we limited our comparison to weekend or holiday versus weekday visits when examining whether Teladoc disproportionately served enrollees after hours. Because of data limitations, we probably underestimated the extent to which Teladoc provided after-hours care (for example, care provided at 9:00 p.m. on a Tuesday).

Fourth, we used follow-up visits as a rough proxy for clinical resolution. However, we had no independent contact with enrollees to assess clinical resolution.

Fifth, we adjusted for age and comorbidities in our analysis of follow-up visits. Nonetheless, we cannot rule out residual (incompletely controlled) confounding and thus the possibility that adult Teladoc users had fewer follow-up visits because they were younger and healthier than adult enrollees who received care in other settings.

Finally, we relied on diagnosis codes to categorize visits. It is possible that the codes we used were not always accurate.

Study Results

From April 2012 through February 2013, 2,718 adults and children who were CalPERS members

(0.9 percent of all eligible members) had a total of 3,701 Teladoc visits, with an average of 1.36 visits per Teladoc user. Monthly Teladoc visits remained relatively stable during the study period, although there was a significant dip in the number of visits during the summer months (Exhibit 1).

During the study period, 2,066 (76 percent) Teladoc users had a single visit, and 200 (7 percent) had three or more visits. Across our sample of 74,550 adult enrollees, including both users and nonusers of Teladoc, the average number of monthly visits for all conditions were 291 Teladoc visits, 39,431 office visits, and 883 ED visits. Thus, Teladoc visits accounted for a very small proportion of health care use.

Teladoc users sought care for 395 distinct diagnosis codes overall. The leading three categories of reasons for visits by children and adults were acute respiratory illnesses, UTI and urinary symptoms, and skin problems (Exhibit 2).

The top nine categories accounted for 80 percent of all Teladoc visits. The reasons for the remaining 20 percent of visits included allergies, mental health, vaginitis, vertigo, headache, chronic illness (such as asthma and hypertension), and chest pain. Excluding children from the analysis had no impact on the ordering of the leading nine conditions.

We compared the characteristics and follow-up patterns of adult enrollees who visited Teladoc, the ED, or a physician's office for the three leading diagnostic categories (Exhibit 3). Teladoc users were more likely to be younger than enrollees who visited physicians' offices for similar conditions. Teladoc users were more likely to have fewer chronic conditions and to not have used health care in 2011 compared to enrollees who visited the ED or physicians' offices for similar conditions.

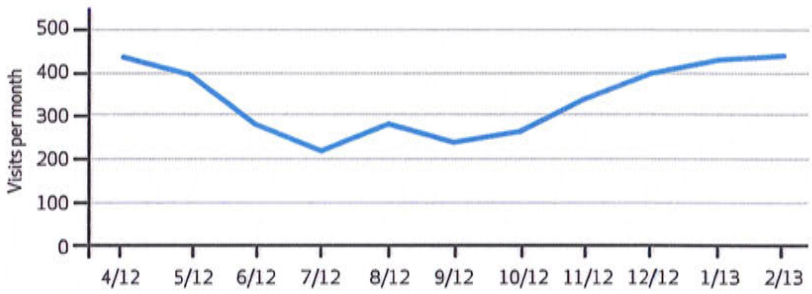
Women made up a slightly larger proportion of Teladoc users, compared to enrollees who visited the ED and physicians' offices (Exhibit 3). And Teladoc users lived in slightly more affluent communities than users of other settings.

We also explored utilization characteristics across the three care settings for the leading diagnostic categories (Exhibit 4). Thirty-four percent of Teladoc visits occurred on weekends and holidays, in contrast to 8 percent of office visits. The timing of Teladoc visits closely resembled the timing of ED visits.

Across the leading conditions, Teladoc visits were less likely than visits to the ED or physicians' offices to result in a follow-up visit for a similar condition in any setting (Exhibit 4). Six percent of Teladoc visits resulted in a follow-up visit for a similar condition, in contrast to 13 percent of office visits and 20 percent of ED visits.

EXHIBIT 1

Monthly Number Of Teladoc Visits Among 2,718 Children And Adults, April 2012–February 2013



SOURCE Authors' analysis of claims data from the California Public Employees' Retirement System.

The lower follow-up visit rate for Teladoc visits versus office visits was also seen after we adjusted for age, sex, and comorbidity score (odds ratio 0.44; $p < 0.01$).

Discussion

Our analysis found that in the first eleven months after Teladoc's introduction, a small number of CalPERs enrollees in California were using Teladoc for a diverse set of conditions. Adult Teladoc users were younger and healthier and lived in more affluent communities than enrollees who visited physicians' offices or the ED for similar conditions. Teladoc users were also less likely to have used health care before Teladoc's introduction.

And contrary to concerns expressed in the literature,[4,5] the rate of follow-up visits was not higher for Teladoc visits than for visits to other care settings. In fact, enrollees who used Teladoc had fewer follow-up visits than enrollees who

EXHIBIT 2

Leading Reasons For Teladoc Visits By Children And Adults, April 2012–February 2013

	Visits	
Condition	**Number**	**Percent**
Acute respiratory illnesses	1,151	31.1
Urinary tract infections and urinary symptoms	439	11.9
Skin problems	335	9.1
Abdominal pain, vomiting, and diarrhea	231	6.2
Back and joint problems	190	5.1
Influenza and general viral illnesses	172	4.7
General advice, counseling, and refills	169	4.6
Eye problems	138	3.7
Ear infections (internal and external)	137	3.7
All others	739	20.0

SOURCE Authors' analysis of claims data from the California Public Employees' Retirement System.
NOTE Percentages do not sum to 100 because of rounding.

EXHIBIT 3

Characteristics Of Adult Enrollees With Teladoc, Office, And Emergency Department (ED) Visits, April 2012–February 2013

	Enrollees who visited for top three conditions					
	Teladoc (*n*=1,287)		Office (*n*=20,907)		ED (*n*=1,099)	
	Number	Percent	Number	Percent	Number	Percent
SEX						
Male	423	33	7,798	37	405	37
Female	864	67	13,109	63	694	63
AGE (YEARS)						
18–30	254	20	3,571	17	336	31
31–50	702	55	9,221	44	443	39
51 or more	331	25	8,115	39	330	30
COMORBIDITIES						
0	1,116	87	16,363	78	741	67
1	143	11	3,312	16	248	23
2 or more	28	2	1,232	6	110	10
MEDIAN ANNUAL INCOME IN ZIP CODE (2011 DOLLARS)						
Less than $45,000	203	16	3,050	15	182	17
$45,000–$65,000	436	34	7,525	36	427	39
More than $65,000	645	50	10,307	49	489	44
VISITS IN 2011						
0	271	21	1,543	7	116	11
1	93	7	1,307	6	68	6
2 or more	923	72	18,057	87	915	83

SOURCE Authors' analysis of claims data from the California Public Employees' Retirement System. **NOTES** The enrollee is the unit of analysis and is not counted more than once for any single location (Teladoc, office, or ED). The top three conditions are acute respiratory illnesses, urinary tract infections and urinary symptoms, and skin problems. Differences in each category are significant ($p < 0.01$).

visited EDs and primary care offices.

ACCESS Our results indicate that Teladoc might have increased access for the small subset of enrollees who used it, although this finding requires further investigation. More than one-third of Teladoc visits occurred on weekends and holidays, and 21 percent of Teladoc visits were made by patients who had not used health care

EXHIBIT 4

Follow-Up Care And Timing Of Teladoc, Office, And Emergency Department (ED) Visits, April 2012–February 2013

	Visits for top three conditions					
	Teladoc (*n*=1,674)		Office (*n*=39,143)		ED (*n*=1,215)	
	Number	Percent	Number	Percent	Number	Percent
TIMING OF VISITS						
Weekdays	1,110	66	36,168	92	781	64
Weekends and holidays	564	34	2,975	8	434	36
FOLLOW-UP VISITS WITHIN 21 DAYS AFTER INITIAL VISIT (UNADJUSTED)						
For similar condition	100	6	5,089	13	243	20
For any reason	151	9	18,006	46	631	52
	Odds ratio	**95% CI**	**Odds ratio**	**95% CI**	**Odds ratio**	**95% CI**
FOLLOW-UP VISITS WITHIN 21 DAYS AFTER INITIAL VISIT (ADJUSTED)[a]						
For similar condition	0.44	0.36, 0.55	Ref	Ref	1.72	1.47, 2.01
For any reason	0.12	0.10, 0.14	Ref	Ref	1.30	1.15, 1.48

SOURCE Authors' analysis of claims data from the California Public Employees' Retirement System. **NOTES** CI is confidence interval. Ref is reference. Differences in each category are significant ($p < 0.01$). [a]Adjusted for age, sex, and Charlson comorbidity score.

Teladoc has distinct advantages because it uses simple, inexpensive technologies that are widely accessible.

in 2011.

Teladoc might have been the entry point into the health care system for people who did not have frequent contact with a primary care provider or had difficulty accessing their regular physician. It might also have served people who could not take time off work to obtain health care.

Increasing access and convenience is important for all patients. However, the population of patients attracted to Teladoc—a more affluent and likely more technologically savvy group—might have fewer access needs then people living in areas characterized by a shortage of primary care or socioeconomic disadvantage. Further research is needed to understand whether Teladoc might be improving access for patients with lower incomes and those in rural areas and, if not, whether it could be positioned to do so in the future.

COST Our analysis did not explore the issue of cost. However, on a per visit basis, it is highly likely that Teladoc visits (which cost $38 a visit and had very low follow-up rates) are less expensive for payers, compared to visits to physicians' offices and the ED. However, it is unclear to what extent Teladoc visits are substituting for office or ED visits and to what extent they represent new use of health care for conditions that would have resolved themselves without intervention. If Teladoc visits do represent new use, they could lead to increased utilization and costs.

QUALITY Our findings provide some insights regarding the quality of care. First, it is reassuring that Teladoc patients were less likely than enrollees who used other care settings to have follow-up visits to any setting for a similar condition. If we consider follow-up to be a rough proxy for clinical resolution, there is very little evidence of misdiagnosis or treatment failure in Teladoc visits.

This could mean that Teladoc providers are successfully diagnosing and treating a wide range of illnesses via telephone consultations. However, it is also possible that Teladoc patients are seeking care for complaints that are so minor that follow-up vists are not necessary. Alternatively, the severity of illness might be comparable across care settings, but the threshold for Teladoc patients to seek follow-up care in a face-to-face encounter might be higher.

We found that Teladoc served patients with surprisingly diverse diagnoses. In contrast to retail clinics that have a very limited menu of services, Teladoc does not restrict its care to selected conditions. At retail clinics the top three categories of diagnoses represent 72 percent of their business.[11] In contrast, the top three categories of diagnoses represent 52 percent of Teladoc's business (Exhibit 2).

PROS AND CONS There are both potential advantages of and concerns about the Teladoc approach. By serving a broader group of patients with differing needs, Teladoc can play a larger number of roles than retail clinics can. In addition to treating nonurgent acute conditions, Teladoc might serve the roles of triage and education. As such, it could have a much larger impact on the health care system as a whole than retail clinics do.

In contrast to other forms of telemedicine that require specialized equipment, Teladoc has distinct advantages because it uses simple, inexpensive technologies that are widely accessible. Ease of use clearly facilitates the expansion of Teladoc to new groups of patients.

However, because Teladoc's scope of practice is broader, people may present with symptoms that cannot be managed effectively over the telephone. For example, it is unclear to what extent skin problems can or should be treated without the use of photos or videos, or whether strep throat can be diagnosed without a physical exam.[12]

Our results indicate that Teladoc providers saw patients with many diagnoses that typically require a physical exam, diagnostic testing, or both. Without the use of additional technology, Teladoc will continue to be limited in its ability to support the diagnosis and management of many conditions. Additional research is needed to address questions about the quality of care, such as rates of antibiotic prescribing across settings, the management of conditions that require physical exams or diagnostic testing, and the use of Teladoc by patients with potentially emergent conditions.

Conclusion

Additional work is needed to fully explore the impact of Teladoc on access, quality, and costs.

However, our research suggests that Teladoc is offering a useful and potentially cost-effective service.

Because alternatives to the ED and physicians' offices for acute care, such as Teladoc, are growing rapidly, a clear understanding of early experiences with Teladoc can help predict the likely impact of these alternatives. ■

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NOTES

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8 To access the Appendix, click on the Appendix link in the box to the right of the article online.

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