

By Robert Pearl

# Kaiser Permanente Northern California: Current Experiences With Internet, Mobile, And Video Technologies

DOI: 10.1377/hlthaff.2013.1005  
HEALTH AFFAIRS 33,  
NO. 2 (2014): 251–257  
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Foundation, Inc.

**ABSTRACT** The US health care system has been slow to adopt Internet, mobile, and video technologies, which have the capability to engage patients in their own care, increase patients' access to providers, and possibly improve the quality of care while reducing costs. Nevertheless, there are some pockets of progress, including Kaiser Permanente Northern California (KPNC). In 2008 KPNC implemented an inpatient and ambulatory care electronic health record system for its 3.4 million members and developed a suite of patient-friendly Internet, mobile, and video tools. KPNC has achieved many successes. For example, the number of virtual "visits" grew from 4.1 million in 2008 to an estimated 10.5 million in 2013. This article describes KPNC's experience with Internet, mobile, and video technologies and the obstacles faced by other health care providers interested in embracing them. The obstacles include the predominant fee-for-service payment model, which does not reimburse for virtual visits; the considerable investment needed to deploy these technologies; and physician buy-in.

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Internet, mobile, and video technologies have transformed the retail, travel, and financial industries, among others, yet they have had a much more limited impact on health care.<sup>1–4</sup> Underutilization in health care is not because of an absence of consumer demand or a lack of recognition of the benefits those technologies can deliver in the health care setting. Indeed, health policy analysts recognize the potential gains involved in the greater use of such advanced information technologies and widely encourage their adoption.<sup>3</sup>

Instead, the underuse of Internet, mobile, and video technologies in health care is driven by two factors: the predominant fee-for-service payment model, which reimburses providers only for face-to-face visits;<sup>5</sup> and the barriers posed by the financial and other resources necessary to implement these technologies and integrate them into care delivery workflows.

Despite those challenges, the health care system is taking up these technologies at an increasing pace. One organization that has successfully done so is Kaiser Permanente. This article presents Kaiser Permanente Northern California (KPNC) as a case study in how these technologies can improve outcomes and increase convenience. The article also considers the impact that changing models of health care organization, delivery, and payment, as well as technological advances will have on the adoption of these technologies by health care providers across the United States.

## Kaiser Permanente Northern California

KPNC serves a technologically sophisticated patient population in Silicon Valley, San Francisco, Sacramento, and the Central Valley of California. It provides comprehensive medical care to

3.4 million members through the 8,000 physicians of the Permanente Medical Group (TPMG) and twenty-one Kaiser Foundation hospitals.

In 2008 KPNC completed the multiyear implementation of an inpatient and ambulatory care electronic health record system. By making comprehensive patient information available regardless of the location of the physician or patient, the system paved the way for the subsequent development of patient-friendly Internet, mobile, and video tools. These efforts were facilitated by the organization's structural and economic advantages, which included a fully integrated organizational structure that allowed data to flow more easily across patient care settings; prepayment at the delivery system level; the absence of fee-for-service disincentives; and physician-leaders with the experience and authority to implement new approaches rapidly.

KPNC's early experience with online tools, particularly those allowing patients to access their medical information, refill prescriptions, make appointments, and communicate with providers through secure e-mail, was described by Anna-Lisa Silvestre and colleagues in 2009.<sup>6</sup> Since that time, patients' use of these and other tools, which I describe below, has grown substantially. Today KPNC provides more than a hundred Internet, mobile, and video applications that give patients the ability to review disease- and procedure-specific information; access their personal health information; manage their health care by making appointments, ordering refills, and exchanging secure e-mail messages with providers; and participate in virtual care in lieu of an office visit.

### General Health Information

For more than a decade KPNC's patients as well as the general public have had access to online health information via [kp.org](http://kp.org) and physicians' home pages. The [kp.org](http://kp.org) website received more than thirty-four million visits in the third quarter of 2013 alone. One-quarter of these visits were to the mobile version of [kp.org](http://kp.org).

The [kp.org](http://kp.org) website offers patients disease-specific programs for patients to move through at their own pace. Programs include videos, electronic newsletters, and interactive online tools for ailments as disparate as cold and flu, headaches, and back pain. Similar programs are available for patients facing surgeries such as aortic valve replacement and diagnostic procedures such as colonoscopy. These programs are intended to increase patients' understanding of their medical problems, prepare patients for upcoming procedures and diagnostic tests, and support shared decision making. Patients can

obtain self-care information and answers to common questions about conditions from [kp.org](http://kp.org). They can also access videos that offer coaching from physicians that is targeted to the particular combination of common difficulties they are experiencing.

In some cases, patients can enter their symptoms, and a physician-developed algorithmic program will assess whether the symptoms indicate that the patient should consult a health care provider. When a medical consultation is required, the patient is instructed to call the twenty-four-hour Appointment and Advice Call Center to speak directly to a nurse or physician. Patients also have the option of using online tools to contact their personal physician, or any physician they have seen in the past three years, directly through secure e-mail at any time.

In 2012 more than 59,000 patients collectively viewed 108 types of preoperative or preprocedure videos; 40,000 patients obtained information about a specific medical condition; and 33,000 obtained updates on their medical problems through online newsletters. These numbers represent a fivefold increase in newsletter subscribers and a twofold increase in videos watched and care programs used since 2008.

In an internal KPNC survey conducted in 2013, more than 90 percent of patients reported that the preoperative and preprocedural programs improved their understanding. An internal KPNC report in 2009 found that patients who had used these programs required approximately one fewer visit related to the intervention, compared to patients who had not used them.<sup>7</sup>

### Accessing Personal Information And Managing Care

In addition to viewing health information on the [kp.org](http://kp.org) website, more than 1.2 million KPNC members in the third quarter of 2013 signed up to use the site's secure features to access their personal health information and manage their health care by making appointments, ordering refills, and communicating with providers via secure e-mail. The advantages and convenience are significant: These applications can be accessed via the Internet wherever people are, whenever they want, and at no additional cost. In addition, anyone with a legal health care proxy can use these services for someone else.

As of September 2013 approximately 73 percent of KPNC patients had registered on the [kp.org](http://kp.org) website, allowing them to use the site to choose a personal physician, schedule appointments, view their laboratory results, and order refills for home delivery or pickup at any KPNC pharmacy (Exhibit 1). And as of Decem-

ber 2013 more than 42,000 patients had logged onto KP Preventive Care, a mobile application that allows users to review the status of preventive health care screenings, communicate with their physician, or schedule tests such as mammograms.

## Virtual Care Delivery

Every patient needs to visit a clinician's office at some point in time. However, at other times virtual alternatives to the office visit—conducted via secure e-mail, telephone, or video—can provide patients with the right level of care, accessible at their convenience.

KPNC members can send secure e-mail messages directly to their primary care physicians or any specialists who are treating them. This allows patients to ask providers nonurgent questions; give providers additional information, including attached images; or submit completed forms. In many cases, physicians can resolve a patient's problem without scheduling an office visit. And if necessary, a physician can refer the patient directly to a specialist via e-mail.

For example, a patient with a rash can send a dermatologist a secure e-mail message with an attached digital image of the affected area. KPNC dermatologists are able to make a definitive diagnosis and prescribe the appropriate treatment in 80 percent of the cases that involve only digital communication. Thus, they can provide rapid diagnosis and treatment, without the patient's having to miss work or school for an office visit.

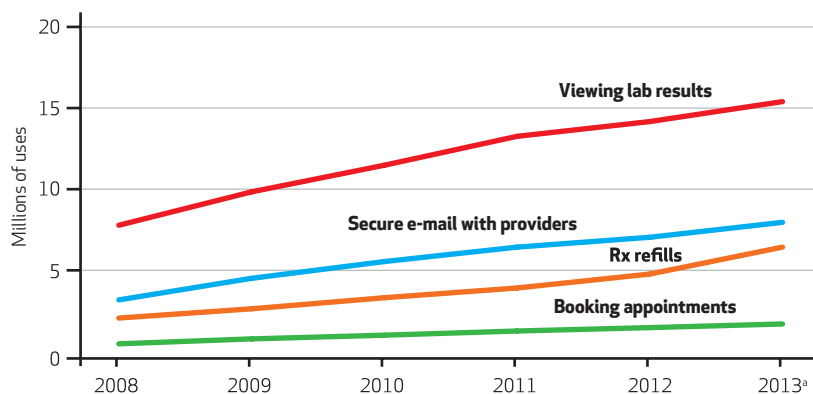
Eighty-seven percent of respondents to a 2013 internal survey of KPNC members who had registered to use the secure features of kp.org reported that their secure e-mail encounters with physicians did a very good or excellent job of meeting their needs. Since 2008 the number of secure messages sent by patients has increased by almost 20 percent per year, on average. The number of secure e-mail messages that KPNC received in 2013 is expected to total 8.2 million (Exhibit 1).

KPNC physicians have been expected to answer nonurgent patient e-mail within two business days—a response time that has been achieved in 98 percent of cases. In 83 percent of cases, physicians responded to such messages the same day. In 2014 KPNC physicians are expected to answer these messages within twenty-four hours.

For more than a decade KPNC has offered patients telephone visits of ten to fifteen minutes with a physician as an alternative to office visits. The advent of mobile phones made telephone visits increasingly appealing to patients. Specifically, mobile phones have given patients the pri-

### EXHIBIT 1

Use Of Online Applications At kp.org, 2008–13



**SOURCE** Internal data from Kaiser Permanente Northern California. <sup>a</sup>Estimated values based on data for the first three quarters of the year.

vacy needed to call their physicians from almost anywhere and at any time. KPNC is expected to have provided more than 2.3 million telephone visits in 2013, compared to around 640,000 in 2008.

Similar to patients' satisfaction with secure e-mail reported above, 85 percent of respondents to a 2013 survey of KPNC patients who had a telephone visit with a physician reported that their telephone visits were very good or excellent in meeting their needs.

To further improve the convenience and quality of care, KPNC clinicians across specialties have begun testing and, in some cases, implementing video visits with patients using an encrypted web-based video interface built into TPMG's physician web pages (My Doctor Online). In 2013 practitioners in forty-eight medical and surgical departments across KPNC used video technology to provide patient care. Region-wide adoption of this technology has begun in some specialties. Three examples are presented below to demonstrate the technology's potential to improve the quality of care and increase convenience for patients.

The first example of KPNC's video visit technology is support for pregnant women at risk for substance abuse. Through KPNC's Early Start Program, pregnant women are screened for drug and alcohol abuse. Women identified as being at risk are referred to a licensed substance abuse counselor, who conducts psychosocial assessments of patients and develops care plans that may include follow-up visits.<sup>8</sup>

A 2008 study<sup>8</sup> found that the rate of fetal demise was 0.5 percent in a group of women who participated in the full program, compared to 7.1 percent in a control group. Similarly, the rate

# 73%

## Registered

As of September 2013 approximately 73 percent of KPNC patients had registered on the kp.org website.

of preterm birth (before thirty-seven weeks of gestation) among substance-abusing pregnant women in the control group was 2.1 times the rate of comparable women in the Early Start Program.<sup>8</sup>

In an effort to reach women who were unable to participate in the full Early Start Program in person because of travel or job constraints, nine of the local Early Start medical center–based programs are using video to conduct follow-up visits with enrolled women. Between January and November 2013, video appointments were used as part of the Early Start Program for 289 women. The use of video visits in Early Start is estimated to have prevented multiple fetal deaths and reduced the number of preterm babies born to these mothers by half.<sup>8</sup> Comparing the effectiveness of the in-person and video versions of the Early Start Program will be the subject of a future research project.

The second example of KPNC's video visit technology concerns appointments with college students taking Accutane for acne. Use of this very effective medication requires frequent assessments of the patient's clinical response and monitoring of his or her psychological response. Depression and suicidal ideation are two known complications. Monthly evaluation of patients for those complications is needed, together with immediate cessation of the medication's use should they develop.

Between January and November 2013, KPNC's video technology enabled more than 550 dermatology video visits. The majority of these were for students taking Accutane while attending college—patients for whom in-person visits were either not possible or disruptive to their academ-

ic pursuits.

The third example of KPNC's video visit technology is related to after-hours medical care. Patients with urgent, but not emergent, medical problems often have no alternative to the emergency department (ED) after urgent care clinics close in the evening.

Between January and November 2013, physicians working in the Appointment and Advice Call Center made more than 350 after-hours video visits to KPNC patients. These visits often provided immediate and convenient solutions for people who otherwise would have had to travel to an ED for a clinical evaluation. Patients requiring immediate in-person care were directed in the video visit to seek care at a nearby ED. The physician then placed the information in the patient's electronic health record, facilitating treatment when the patient arrived at the ED.

Alternatives to in-person visits have the potential to provide convenient, high-quality medical care at lower cost than in-person visits. Based on current trends, I expect that by 2016, with the expanded use of video, the number of virtual visits—including secure e-mail, telephone, and video encounters—in KPNC will surpass the number of in-person office visits, which has remained relatively unchanged since 2008 (Exhibit 2).

### Impact On Quality Of Care And Cost

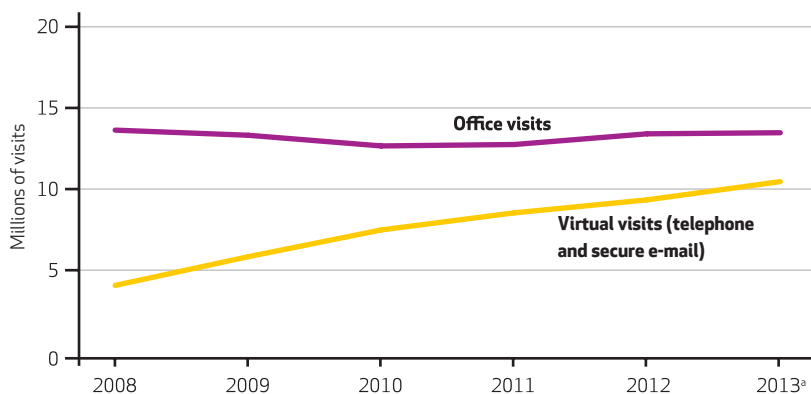
KPNC's quality outcomes are consistently in the top 10 percent nationally, as measured by the National Committee for Quality Assurance.<sup>9</sup> In addition, KPNC is one of only eleven programs in the United States to have achieved and maintained a five-star Medicare Advantage rating.<sup>10</sup>

Assessing the relative impact of Internet, mobile, and video technologies on KPNC's quality of care and patients' satisfaction is difficult because these technologies were deployed at the same time that other quality of care innovations were introduced. In the case of quality measures, electronic outreach to patients—combined with the ability to review and schedule needed preventive services—has had a favorable impact on KPNC's results. Furthermore, a 2013 internal patient satisfaction survey found that new KPNC members using secure messaging were more likely to be satisfied with their care and to reenroll in the KPNC health plan, compared to members who did not use secure messaging.

Assessing the overall impact of new technologies on cost is also difficult. Internet, mobile, and video interactions with patients are less expensive per visit than office visits. However, KPNC patients have increasingly used these technology-driven alternatives. To date, the increasing

#### EXHIBIT 2

**In-Person And Virtual Patient-Physician Visits, Kaiser Permanente Northern California, 2008-13**



**SOURCE** Internal data from Kaiser Permanente Northern California. **NOTE** Virtual visits are encounters via telephone or secure e-mail; they do not include video visits. \*Estimated values based on data for the first three quarters of the year.

use of Internet, mobile, and video alternatives has apparently not had an impact on the number of traditional office visits (Exhibit 2).

The advantages offered by Internet, mobile, and video technologies for patient care have made these technologies central to KPNC's efforts to achieve superior quality and service while keeping costs competitive. The technologies are especially appealing to KPNC members who are infrequent users of health care and to those who are relatively resistant to usual outreach methods and vulnerable to untreated chronic conditions in the long run.

In addition to health benefits, the technologies allow patients in many cases to obtain medical care without missing work or school, reducing absenteeism and increasing productivity. For example, at five large Silicon Valley companies, on-site clinics staffed by TPMG physicians use video technology to allow employees to obtain immediate specialty consultations in addition to the primary care available in the clinic.

In TPMG's annual survey of career-track physicians, more than 90 percent of respondents said that the availability of online tools has allowed them to provide higher-quality care for their patients. In addition, the availability of sophisticated, cutting-edge technology has proved to be attractive to the medical school graduates whom TPMG recruits.

## Challenges

KPNC's experience with Internet, mobile, and video technologies has not been without major challenges. First, KPNC needed to comply with all of the standards in the Health Insurance Portability and Accountability Act (HIPAA) of 1996, ensuring that patients using the technologies had appropriate levels of privacy and security. This required the encryption of transmitted data and the use of secure passwords to protect access to patients' data.

Initially, KPNC required patients come to a provider's office to complete the authentication process, which was inconvenient for the patient and required additional staff time and training. KPNC subsequently implemented a sophisticated online authentication process to support patient registration, which reduced the time and cost of the process.

Second, cost savings for the new technologies have been slow to materialize. This is partly because of the time lag between the necessary investments in capital and training and the broad adoption of the technologies by patients.

For example, it took six years of concerted effort and the improved registration process described above to increase the online registered

patient base from 20 percent of KPNC's members to 73 percent. In addition, although virtual visits are less expensive than office visits, they still take significant physician time and in some cases require a follow-up office visit.

Third, adoption of the technologies has not been even across patient groups. For example, 71.6 percent of KPNC members ages 30–70 have registered for secure features on the kp.org website, including accessing their medical records, engaging in secure messaging with physicians, making appointments, and refilling prescriptions. In contrast, only 51.2 percent of members older than 70 have registered.

Access to electronic tools also varies across ethnic groups and geographic subregions. For example, in 2008, 50.2 percent of white non-Hispanic adults used secure features on the kp.org website, compared to 34.1 percent and 36.4 percent of African Americans and Latinos, respectively.<sup>11</sup> In the same year, 43.9 percent of adults in the Santa Clara Medical Center service population reported using secure features on kp.org,<sup>12</sup> compared to 32.7 percent of adults in the Fresno Medical Center service population.<sup>13</sup> Thus, it has been necessary to maintain parallel paper, phone, and in-person systems to make medical information available, support care systems, and communicate with members.

Finally, the increasing use of technology by patients has required additional time for “desktop medicine,” particularly for primary care physicians. *Desktop medicine* is a term physicians use for reviewing patients' lab and test results, planning and conducting outreach to patients for screening and preventive care, responding to patients' e-mail, following up with patients by phone, and renewing prescriptions. The average TPMG primary care physician receives fifteen to twenty secure e-mail messages each day, and physicians' schedules had to be revised to include time to respond.

KPNC also needed to provide staff to fill in for physicians when they are away from the office, so that patients' communications do not go unanswered and physicians do not face a large backlog of secure e-mail and test results on their return. KPNC now schedules coverage for all e-mail to physicians who are out of the office for more than a day.

## Barriers To Broader Adoption

Adoption rates of Internet, mobile, and video health care technologies across the country have been hampered by economic disincentives and operational challenges. Medicare does not reimburse providers for virtual care unless very stringent criteria are met (for example, patients are

# 5-star

## Rating

KPNC is one of only eleven programs to have achieved and maintained a five-star Medicare Advantage rating.

located in a Health Professional Shortage Area).<sup>14</sup> Commercial insurers reimburse for virtual care via phone or video connections only in the twenty-one states that require them to do so.<sup>15</sup> This obviously restricts the number of practices offering these options in other states.

Some health plans recognize the benefits of virtual care and are considering reimbursing providers for it. However, there is no consensus on criteria or reimbursement rates for virtual visits, and payers remain concerned that reimbursement for virtual visits in a fee-for-service system risks driving up volume and cost.

Physicians have been slow to integrate new technologies into their practices, and most are leery of moving in this direction. This reluctance is related to physician demographics: Approximately half of US physicians are older than age fifty-five, and members of that demographic group have been slower than younger people to adopt new technologies.<sup>16</sup> In addition, physicians who have been in practice for a long time have well-established workflows and are less amenable to change than providers who are newer to practice. And adopting new technologies involves capital and operational costs.<sup>17</sup>

Adopters of new technologies have found them to be slow and of poor quality.<sup>18</sup> And even when an individual physician office has broad implementation of advanced information technology systems, the lack of operational integration with colleagues' offices, hospitals, and laboratories has made it difficult to share data.

Finally, simply putting new technologies in place does not automatically add value or reduce costs. For these tools to deliver benefits, the ways in which care is organized and delivered must change. Using these technologies in a meaningful way requires physician leaders who are comfortable with technology and capable of working collaboratively with other care providers to improve the entire care delivery system.

## Signs Of Progress

Despite the barriers described above, there is cause for optimism that the use of Internet, mobile, and video technologies will proliferate. Changes in the health care system's organizational structure, payment models, and systems to support information technology are intersecting in ways that will facilitate the use of new technologies. For example, recent actions by the federal government have encouraged the formation of accountable care organizations (ACOs) and bundled payment models and have rewarded the implementation and meaningful use of information technology.

### INTEGRATION AND COORDINATION OF CARE

Consolidation in health care is taking place at a rapid pace.<sup>19</sup> This trend, coupled with the promotion of ACOs by Medicaid and commercial insurers, will foster increased cooperation among—and, ultimately, integration of—providers.

**PAYMENT MODELS POISED FOR CHANGE** It is premature to declare the demise of fee-for-service reimbursement. However, the movement from “pay for volume” to “pay for value” has begun. Medicare has taken the first steps in redefining reimbursement for physicians participating in Shared Savings ACOs.<sup>20</sup> The combination of penalties for hospitals based on readmissions within thirty days of discharge<sup>21</sup> and the Medicare Five-Star Quality Rating System<sup>22</sup> will reward organizations that effectively use new technologies to raise quality and lower cost. In addition, private payers are building on the framework of shared savings in the Affordable Care Act, using pay-for-performance schemes that include rewards for increased value and improved health outcomes, bundled payments, and capitated arrangements.<sup>23,24</sup>

All of these trends are likely to accelerate with the introduction of health insurance Marketplaces, or exchanges. Once regulatory and accrediting agencies such as Medicare and commercial health plans assign value to care delivered virtually that is comparable to the value assigned to care delivered in the office, the advantages to organizations that invest in technologically enabled care will increase dramatically.

**DIMINISHING TECHNOLOGY BARRIERS** Electronic health record systems are maturing, and their installation is being supported because of the meaningful-use provisions in the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009, which require providers to have increased connectivity in order to receive higher levels of reimbursement.<sup>25</sup>

Internet speeds have increased, and high-definition resolution for image transmission and video connections has become less expensive. Data storage through cloud computing will lower the costs further.

## Conclusion

In response to the Affordable Care Act's support for ACOs and the incentives created by HITECH's meaningful-use provisions, the structural and economic advantages that Kaiser Permanente Northern California now has—integration, aligned incentives, and the presence of an electronic health record system—will become increasingly common. Downward reimbursement pressure from government and commercial payers will force providers to become more effi-

cient in their operations.

The implementation and effective use of relatively inexpensive Internet, mobile, and video technologies offer hospitals, physician groups, and health plans a way to improve their performance. Physicians and organizations that provide greater value to patients through these technologies will likely expand their patient bases,

which in turn will enable them to invest in newer technologies that will lower costs further.

This process has already begun among some doctors and medical groups.<sup>26</sup> Determining how best to translate the potential of these new technologies into practice in the broader community will be the next, and biggest, challenge. ■

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