Central Valley Health Policy Institute

California State University, Fresno

Telemedicine in the San Joaquin Valley:

Opportunities and Barriers in Adoption

December 2009

Mohammad A Rahman, Ph.D.
John Capitman, Ph.D.
Kudzai Nyandoro, B.S.

THE CALIFORNIA ENDOWMENT

Table of Contents

Despite growing excitement about the potential value of telemedicine and e-health implementation in California, adoption of these technologies has proceeded less rapidly and evenly than most anticipated. Slow progress in telemedicine has been particularly noteworthy in the San Joaquin Valley, even though national and state policies have targeted rural and low-income health service markets as those most likely to benefit from rapid adoption of these technologies. This paper attempts to provide new insights about the barriers that have faced early adopters and explores opportunities for accelerating this process. We address three objectives. The first objective is to explore the attitude of the people in Central California about receiving telemedicine and e-health services. We examine whether people are aware of available telemedicine and e-health services and what their attitudes are towards receiving care through these mediums. We also inquire about their access to internet and other telecommunication mediums and their willingness to use those services to receive health care. The second goal is to understand the barriers faced by the healthcare facilities in the San Joaquin Valley that may act as a hindrance in their adoption of telemedicine and e-health services. The third objective is to find out what changes need to take place so that the providers may overcome the barriers. We attempt to find out whether incentives and/or technical assistance of any sort may facilitate the adoption of telemedicine and e-health services by health care providers.

I. Introduction

Through the convergence of information and telecommunication technologies and by introduction of numerous applications in healthcare domain, telemedicine has been gradually changing the way that health care services are provided. Telemedicine covers various applications – from providing tele-expertise to conducting tele-surveillance – with core function of providing health professionals real-time access to information in the form of texts, images or sounds. One crucial aspect of telemedicine is that it is being developed at the interface of clinical practice and management computerization, thus opening up opportunities for efficiency gains in delivering care. With the advent of internet as a medium for telecommunication, the scope of telemedicine in the form of e-health has increased many-folds. E-health, which has been described as a form of health

information technology (HIT) "that encompasses telemedicine applications as well as electronic health records, remote disease monitoring, online education, and many other electronic tools for delivering services and information" has facilitated extensive and affordable access for sharable medical and health information between consumers and providers, providers and providers and consumers and consumers (Johnston & Solomon, 2008). Another major development in the area of HIT is the Electronic Health Records (EHR) system, a useful and practical e-health application that keeps longitudinal electronic record of patient's health information. The digitization of healthcare delivery system through technological breakthroughs such as these has the potential to reduce costs and improve healthcare quality and efficiency (NIH, 2006).

The healthcare industry in the United States, operating within a complex healthcare delivery and financing system, faces stiff challenges trying to cope with the changing scenarios as this digital transition takes place so that they can provide cost-effective, high-value, affordable healthcare. The diffusion of technology and especially telemedicine and e-health in health care provision has been particularly challenging in California's San Joaquin Valley. The growth of telemedicine in the valley has been slow compared with other regions in California and many regions in the country. This situation is disappointing and yet surprising since the adoption of telemedicine was considered to be a possible solution to the disparities experienced in this region because of lack of access to health care, greater health care needs, and shortage of health care specialists. This is despite the fact that California became one of the first states to have telemedicine legislation (the Telemedicine Development Act of 1996), which allowed telemedicine services to be reimbursed. The law also allowed and promoted the adoption and use of telemedicine, such as real-time video conferencing and store-and-forward systems, to increase access to health care, particularly for rural and underserved areas (Johnston & Solomon, 2008). In 2006 California governor issued the *Executive Order S-06-0* in order to accomplish full health information exchange in the state within ten years. However, it appears that legislation such as these failed to register significant improvements in the adoption of telemedicine or EHR in the San Joaquin Valley raising questions as to the probable reasons behind the phenomenon.

It ought to be mentioned that the San Joaquin Valley has witnessed its own share of the telemedicine experimentation in the 1990s which failed to take off. Endowed with better technology and financial back-up by the state and federal governments, various attempts have been made to reintroduce telemedicine in this region recently. A number telemedicine programs have been implemented in the San Joaquin Valley in the last several years that has gained some traction. Programs such as the Central California Tele-ophthalmology Network which linked 13 rural health clinics in the Central Valley helped in retinal screening of low-income diabetic patients through Eye Picture Archiving Communication System (EyePACS). The Kings View Behavioral Health, a private practice group of clinics based in Fresno, developed a telemedicine and e-health network to provide remote psychiatry services to rural locations (Johnston & Solomon, 2008). University of California Merced launched a program to provide technical support to a tele-health network comprising 6 health clinics so that they can implement telemedicine programs. There are also some efforts in California to increase EHR adoption. California Regional Health Information Organization has been seeking to create a secure HIT network while Kaiser Permanente is playing an important role and has implemented one of the largest private sector EHR systems in the world with its KP Health Connect system which was more than four times the rate of EHR use statewide (California Department of Insurance, 2008).

Despite success stories such as these, widespread telemedicine adoption has not taken place and providers remain skeptical about short-term prospects. A number of studies and reports have deliberated on the barriers to adoption of telemedicine and e-health programs in California. Some of the issues that have been pointed out include among others infrastructural, technological, financial, regulatory, legal and user related issues (Johnston & Solomon, 2008, Wootan, Craig, Patterson, 2006). The adoption of EHR by providers in the region has been problematic too due to issues such as high implementation and maintenance costs, higher costs related to transition in terms of time and personnel training, unequal financial rewards, equipment costs, and lack of technical computer expertise (Wulsin & Dougherty, 2008). A 2008 California Health Care

Foundation survey found that only 13% of the hospitals in California accomplished full implementation of EMR, 42% only partially implemented and the remaining 45% did not implement at all. Community clinics lagged further behind with only 9% in the process of implementing and 61% not exploring EMR (CHCF, 2008). Even among the end users, the new technology is not wide spread. A survey found that only 3 percent of California consumers said they had participated in a telemedicine session within the previous 12 months (Johnston & Solomon, 2008).

Telemedicine has proven to save money and improve care. The pilot project of the California Health Care Foundation (CHCF) funded EyePACS program (used for retinal screening) was observed to have a significant impact. Over two years, the EyePACS system was utilized to screen over 12,000 patients, of whom about half were diagnosed with some level of retinopathy. In addition, about 15% were referred to a specialist. According to CHCF estimates the state experienced substantial fiscal benefits by expanding this form of telemedicine services to other facilities (CHCF, 2008).

II. Potentials for Telemedicine for Increasing Access to Care in the San Joaquin Valley

Telemedicine can be a useful medium of increasing access to health care in the SJV. This is because telemedicine is believed to address the geographic and/or economic mal-distribution of resources which can adversely affect the availability of a wide-spectrum of health care services in a particular area. However, it is worth noting that although the state of California has been a leader in telemedicine innovation and promotion, its adoption by health care providers is not geographically uniform. A survey by California Telemedicine & eHealth Center (CTEC) confirms to the fact that while telemedicine has made some inroads in northern and southern California, the healthcare providers in the SJV has been much reluctant in adopting this new technology (CTEC, 2003). This is in spite of the fact that the federal and state governments along with private enterprises are offering various grants and loans and technical assistance schemes to

promote telemedicine and e-health. However, not much is known about the reasons behind this phenomenon.

There are several ways in which telemedicine can play a critical role in improving access to specialized care in the Valley. A few critical ones among many are as follows.

- Improving Access to Primary and Specialized Care: There is evidence that many rural areas in the San Joaquin Valley in California have a disproportionate shortage of health care providers compared to their urban counterparts (Table 1). One way to overcome this problem is for these rural healthcare facilities to adopt telemedicine technology. There is a great potential to increase specialty care access if health facilities in this region adopt innovation and new technology such as telemedicine and e-health.

Table 1: Access to Care in California by Specialties

Regions	*All MDs/100000*	*All Specialists /100000*	*Primary Care MDs /100000*
San Joaquin Valley	173	87	43
Northern/Sierra Co.	226	107	55
Central Coast	274	116	79
Southern California	294	120	86
Sacramento Area	310	132	89
Greater Bay Area	415	170	122
California	302	126	87

- Addressing Chronic Disease: Chronic disease and diabetes in particular, is a major concern in the U.S. and the SJV. It is reported that one out of every five health care

dollars in the U.S. is spent caring for someone with diagnosed diabetes. It is contended that telemedicine is the future of treating chronic diseases and reducing associated health care costs. Recent legislation (AB 329) authorizing California's Medical Board to expand statewide efforts to treat chronic diseases using telemedicine is a major boost. SJV with its high numbers of Hispanic residents who lack access to services can benefit from using telemedicine to better manage and treat their illnesses.

- Telemedicine would not only benefit patients, but also serve as an educational opportunity for doctors, nurses and other providers who practice in rural areas.

III. Data and Methodology

We report on two surveys conducted by CVHPI in an effort to understand issues regarding barriers and opportunities related to telemedicine adoption in the San Joaquin Valley. The first is a telephone-based survey regarding people's attitude towards telemedicine and e-health. The second is a face-to-face interview of health care providers and managers at various facilities across the Valley.

In this report, both quantitative and qualitative analytical methods were used for analysis. Quantitative techniques were used to analyze data obtained from the telephone survey while qualitative methods were used to analyze the data obtained from the interviews.

The telephone survey, conducted with the Social Science Lab at California State University Fresno, included respondents in 2371 randomly selected households in four counties in the Central Valley (Tulare, Fresno, Kings and Madera). The study uses descriptive statistics to understand the use of major communication mediums by people in the Valley and how use varies by factors such as age, gender and racial ethnicity. The telephone numbers were purchased from Scientific Telephone Samples, a company that provides phone numbers to research centers conducing random-digit dialing surveys and

interviews were conducted in these counties from June through August, 2007. Respondents were initially screened to make sure they lived in one of the four selected counties. If they did, they were asked to complete a short survey on technology and health. Of the total 2,371 respondents interviewed, 55.3% (1311) lived in Fresno County, 25.6 (608) in Tulare County, 10.0% (238) in Kings County, and 9.0% (214) in Madera County. Data were weighted by age (under 55 and 55 or older), Hispanic/non-Hispanic (self-identified), and gender. Weights were computed by using the 2006 American Community Surveys for these four counties for those 18 years of age and older. Weights were also applied to make the samples proportional to the county's population.

For the second set of survey, qualitative iterative strategy was undertaken for analyzing data obtained from in depth interviews. Several health care providers in the San Joaquin Valley were identified and contacted for interviews. They included Federally Qualified Health Centers (FQHCs), Rural Health Clinics (RHCs), and Private independent practices, as shown in Table 2.

Table 2: Telemedicine Interview Subjects in the Sample

Programs	Number of Participants	Type of Facility
Program 1	2	FQHC
Program 2	2	RHC
Program 3	1	Private Practice
Program 4	2	FQHC
Program 5	1	RHC

For this report, the interview transcripts and field notes were read to extract common impression and preliminary categorizations. After the interview contents were classified in respect to those categories, the emerging patterns and themes were identified and discussed among the researchers. Finally, the analyses were compared and adjusted after a thorough and consensus discussion with the researchers. In addition, this report also highlights two telemedicine initiatives in the San Joaquin Valley and discusses the

impact of their programs and the challenges that they are facing. One of them is UC Merced's telemedicine network program which was facilitated by UC Davis. The second is Livingston Medical Group, who carried out the EyePACS program funded by CHCF.

IV. Use of E-health/Telemedicine among Residents in the San Joaquin Valley

A majority of the people in the SJV have limited access to care because of economic hardship and/or remote location of their workplace and residence. Knowing whether they have access to the internet, land or cellular phones and whether they are willing to use these mediums as vehicles of exchanging personal health data can provide useful information regarding the effectiveness of telemedicine and e-health as an alternative channel of care for such populations.
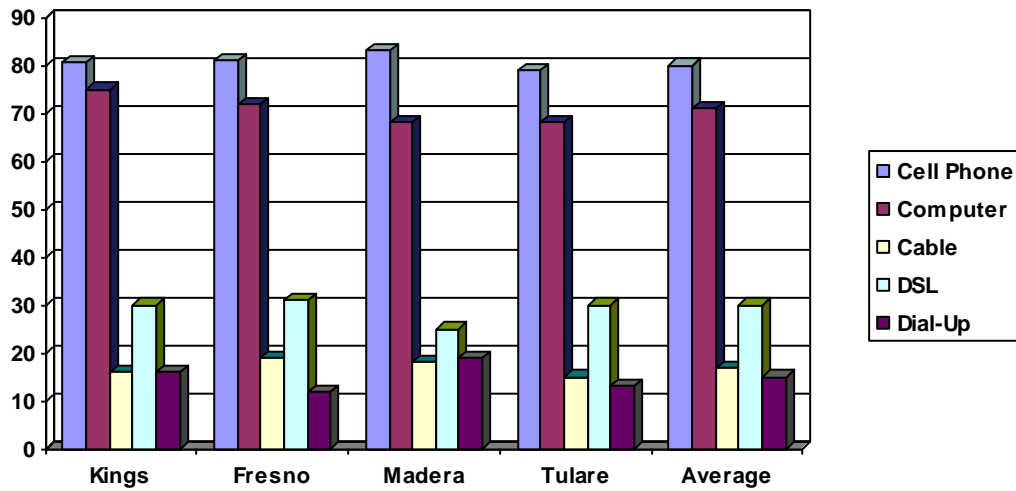
In this section we note the attitude and practice of the residents of four counties in this region towards their use of internet and other communication mediums in seeking medical and health information. Such information varies from disease management to receiving reminders for taking pills, accessing prescription and drug information. Here we look at the following issues.

- Access to computers and internet
- Use of internet, land and cell phones to access health care information
- Willingness to use internet and other communication devices to access health care services and information

Access to Personal Communication Technology

- People in this region have good access to communication devices. About 80% use cell phones.
- A large number of households also have access to the Worldwide Web. More than two-thirds of the people have computer in their homes and nearly 60% have access to the internet through dialup, DSL, or cable.

Graph 1: Modes of IT/Communications in Four SJV Counties

- The younger generation has the edge in the use and access to technology. In general, people over the age of 55 are less likely to use cell phones, computers and the internet.

- Compared to other racial/ethnic groups, Hispanics have limited access to cell phones, computers and the internet. The difference in internet access is more pronounced.

Table 3: Access to Personal Telecommunication/IT by Age and Race/Ethnicity

	Age		*Race/Ethnicity*	
	Under 55	Over 55	Hispanic	Non-Hispanics
Have Cell Phones	83	77	73	85
Have PC at home	74	66	55	81
Have Internet Access (Dialup/DSL/Cable)	51	41	42	72

Use of Personal Telecommunication Technology for Accessing Healthcare Services

- Most residents in the Valley have used the phone to get in touch with a doctor or a nurse

- Hispanics are more likely to go to the doctor's office to get in touch with a doctor or nurse than non-Hispanics.
- There is very little use of emails as a medium to get in touch with health care providers.

Table 4: Contacting providers (doctor and nurses) by Age and Race/Ethnicity

	Age		*Race/Ethnicity*	
	Under 55 yrs.	Over 55 yrs.	Hispanics	Non-Hispanics
Goes to the office to get in touch with doctor/nurse	33	27	40	26
Uses phone to get in touch with doctor or nurse	88	91	82	91
Uses e-mail to get in touch with doctor or nurse	4	4	2	4

Willingness to Use Personal Telecommunication Technology to Access Healthcare Services

- People are willing to use at least one medium which include using emails and cell phones to make appointments, to get prescriptions and drug info, to get lab test results and to get reminders for taking pills.
- Willingness to receive such services did vary by age: persons older than 55 years of age were less willing to access telemedicine services compared to respondents who were less than 55 years of age.
- Hispanics were more willing to receive these services by using tele-health compared to other races.
- There were no apparent discrepancies in willingness to use telemedicine by gender.

Table 5: Willingness to use IT/Communication service to access healthcare info/services

	Age		Race		Gender	
	< 55 yrs.	>55 yrs.	Hispanics	Non-Hispanics	Male	Female
Would use email/cell to make appointments	77	51	74	64	67	68
Would use email/cell to get prescriptions and drug info	75	51	69	65	63	67
Would use email/cell to get lab test results	68	43	62	57	56	60
Would use email/cell to get reminders for taking pills	57	27	57	40	44	48

The findings from this study imply that overall there is a very good potential for extensive use of e-health and tele-health services in the SJV. Most people expressed their willingness to use technology to access health care information and services. Although it may be a bit challenging to address the needs of elders because of their lower comfort with using these technologies and uneasiness concerning maintain information privacy, the younger generation on the other hand is quite enthusiastic.

V. Telemedicine/E-health in the SJV: Providers Perspective

Over the last one decade attempts have been made to increase the use of telemedicine in the SJV. However, the rate of adoption has been very slow. This is in spite of the fact that many state and federal agencies have allocated large sums of funds to be used by health care organizations and physicians. The distribution of funds has been

skewed towards a few well-funded programs and networks that provided care to inmates in prisons and in some cases home health care. The diffusion of technology in the rural areas and its integration with the health care system has been hindered not by the telemedicine per se, but by several environmental factors.

There are a number of telemedicine programs that have been undertaken by various organizations in the Central Valley. The scope of the programs and the challenges faced by them are worth looking into. Two programs, Livingston Medical Group and the UC Merced Tele-health Network program are presented here in order to get better insights from their experiences.

UC Merced Tele-health Network

UC Merced brought together a small network of Valley clinics to form a local telemedicine user group. The clinics are San Joaquin General Hospital, French Camp (Specialty Site), Castle Family Health, Atwater (Specialty Site), John C. Fremont Clinic, Greeley Hill, Sierra Kings Hospital, Reedley, United Health Center, Kerman, National Health Services, Oildale. The clinics each have telemedicine network connections and equipment and are in the process of developing their own unique programs. Some provide specialties via telemedicine system while others only to dial out for care.

It is an early point in the development of these programs. Each site is currently practicing patient interactions, developing and formalizing their individual programs, and networking with other sites to develop key partnerships. Web-based tools that are used include specialty/CME calendar postings, links to billing/training tutorials, physicians directory of specialty services, specialist bios and form kits, customizable internal marketing materials, industry updates etc. UC Merced assists in partnering and developing Valley sites with development, implementation and program design. It functions as a "go to" for support to sites when questions/challenges come up and provides updated telemedicine information to partners. The program serves as a Valley liaison with other telemedicine efforts in the state.

The network faces a number of challenges, including a limited range of specialties and few specialists are available to network participants, the programs are proving expensive and complex to operate during the start-up period; reimbursement for services is still incomplete. New program development is challenging and since this initiative is dependent on state resources to support operations, California's ongoing budget woes can adversely impact growth and expansion of the network.

Livingston Medical Group Telemedicine Program

Livingston Medical Group (LMG), a federally qualified health center, has been offering primary and preventive health care services to Livingston and surrounding communities since 1970. LMG has implemented a telemedicine program that provides retinal screenings and subsequent diagnosis/image interpretations to its patients that do not have an established relationship with an ophthalmologist. The program was implemented in June of 2009. LMG owns and operates one site and the camera is located in an exam room that is smaller than the standard size.

Diabetic patients in need of a retinal screening are identified by primary care providers at LMG. Most identified patients are seen the same day as their visit but some are rescheduled for another day. The service is available 5 days a week from 8:00 am to 5:00 pm and is part of the Diabetes Care Program. Patients are brought into a room that does not have a lot of light and are explained the process they are about to undergo. The photographer then takes between 8-10 photos of the eye. After the appointment is over, the photographer uploads the images to a program called EYEPacs. An optometrist at Castle Family Health Centers (Atwater, CA) then reviews and interprets the images. Within 48 hours the results can be found in the EyePACS program.

Health clinics operating such telemedicine program can face a number of challenges. The health workers who are engaged in implementing or assisting do not necessarily have fundamental skills required to run telemedicine programs to begin with; health clinics implementing such programs should be well prepared to designate substantial time for their training. Another challenge for the administrators could be that they may at first find it difficult to get accustomed with the standardized way that telemedicine programs work, particularly in terms of patient management, scheduling follow-up visits, informing patients, billing and reimbursement, and interacting with the off-site specialists.

The in-depth survey of health care providers in the SJV identified several factors in the slow diffusion of telemedicine adoption:

- Perception of benefits and limitation of telemedicine by doctors and administrators in the SJV

- Identification of major obstacles in adoption of telemedicine

- Necessary incentives to promote telemedicine

Perceived Benefits and Limitations by Providers

Adoption of telemedicine and e-health practices by healthcare providers takes places through complex processes. A plausible explanation of the adoption process of new technology such as these can be deduced from Rogers' theory of 'diffusion of innovation' (Rogers, 1962). The theory describes the underlying dynamics of technological adoption by individuals and organizations. This theory, which is based on sociological and psychological parameters assert that decisions of adoption of a new technology depends on five key aspects of an innovation. The characteristics are:

a) **Relative advantage:** how superior the new technology is perceived to be over the existing one;

b) **Compatibility**: how consistent it is with the needs, past experiences, and present values of the user;

c) **Complexity**: how difficult it is to understand and use;

d) **Trialability:** how convenient is it to try out for some time on a limited basis;

e) **Observability**: how visible are the results.

Practicing physicians and administrators were asked about their perceptions of the benefits and limitation of telemedicine in their practices based on these key characteristics. The findings have been presented in the following tables. Several issues regarding perceived benefits and limitations as pointed out by providers stand out.

Benefits

Implementation of telemedicine services has these potential benefits:

- Improve access to specialty care. It can save time and cost related travel to seek specialty care and ensure continuity of care.

- Improves availability of diagnostics services beyond regular office hours and accelerate the treatment process.

- Enhances the image of the healthcare facility since it uses state of the art diagnostics techniques and may increases patients' confidence in treatment.

Table 6: Perceived Telemedicine Benefits and Limitation of Providers

Dimensions	*Perceived Benefits*	*Perceived Limitations*
Relative Advantage (compared to face-to-face)	• After hour diagnosis • Increase patient's access to specialist care • Decrease travel and time • Continuity of care	• Cannot replace onsite physician • Cannot substitute all sorts of care
Complexity (organizational, planning and implementation)	• Relatively easy to use • Adds more work	• Downloading images can be problematic • Can pose to be complex for those with little or no technological background
Compatibility (with acceptable standards or norms of practice)	• Facilitates diagnosis after hours • Accelerates access to specialized care • Mid level staff resent tech role instead of direct patient role	• Need patient/physician contact for some diagnosis • Dealing with telemedicine/system while seeing patient can be a botheration • Cannot replace face to face visits
Trialability (ease of training and adopting)	• Trainings are available	• Learning a new technology can pose difficulty • Trainings takes time
Cost	• No personal costs incurred	• No direct financial benefits
Image	• Can improve own professional image in patient's eyes • Reputation improves as patients feel comfortable at facilities where specialty care is available	• Technology related errors can damage the reputation

Limitations

Several limitations to telemedicine were also pointed out:

- Telemedicine cannot replace onsite physician availability. It cannot substitute all sorts of care and face to face visitation and for some diagnosis physicians may need or prefer patient/physician physical contacts.

- Learning a new technology can sometime be difficult especially for those who suffer from technophobia. Dealing with telemedicine system while seeing patient can be distracting. Re-credential hospital credentialed physicians to use telemedicine is time consuming and expensive.

- It can be damaging and problematic if errors are made while using telemedicine services.

Perceived Benefits and Limitation by Administrators

The administrators view telemedicine in a very different light since they are the ones who have multiple tasks to accomplish while deciding on taking on a new technology. They not only look at the bottom line but also have to consider administrative, operational and organizational factors while adopting a new system of delivering care. The following table points out their points of view.

Table 7: Perceived Telemedicine Benefits and Limitation of Providers

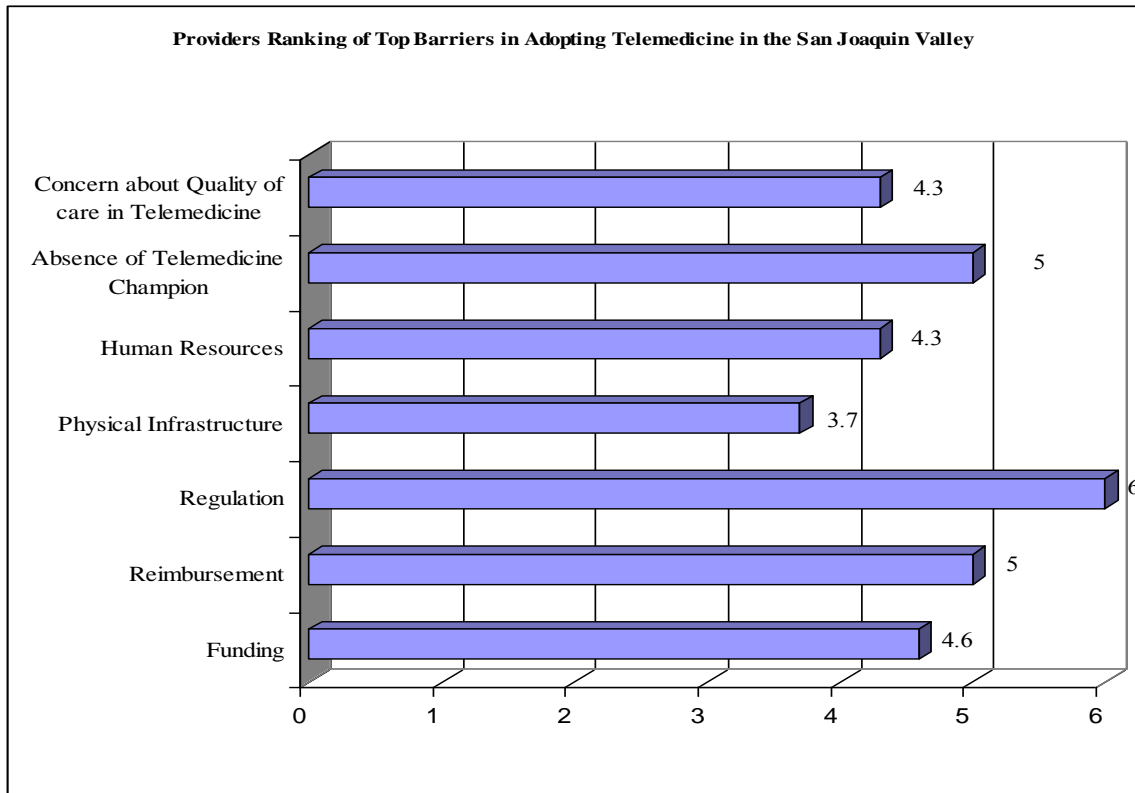| Dimensions	Perceived Benefits	Perceived Limitations
Operational	• EHR may lead to a reduction in staffing requirements • Minimal concerns about privacy issues based on HIPPA laws	• Medical staff bylaws some time do not embrace telemedicine wholly • TM requires additional space and staffing • Cross-training of staff may be required • Scheduling consideration can slow productivity • Requires patients to stay in clinic longer to see both PCP and specialist • Staff training requires additional funding • Limited understanding about malpractice issues; not certain yet
Infrastructural	• Once established, infrastructure maintenance is less cumbersome	• Requires IT support resulting in additional staffing • Bidding for infrastructural purchase can be a hassle and slow the process
Acceptability	• Can be a time saver for specialist • May improve the image of facility	• Specialists can screen with telemedicine but some will still require hands on appointment to follow up • TM can be intimidating – which is true of anything new • Can be difficult for technophobes to adopt
Financial	• Outside funding sources are available	• Reimbursement is a challenge • Capital costs associated with start-up TM is a concern • Software may be required to be repurchased in regular intervals • Uncertain about financial benefits
Administrative		• Limited internet and internet based services for some • Adds more administrative work • Communication between providers must be good to meet standards of care • Reimbursement process may add to administrative workload

Based on these findings the administrators may have to take the following issues into consideration before they take up telemedicine practices.

- Cross-training of staff may be required since TM does not support full-time additional staff
- Scheduling consideration can slow productivity if clinics have high no-show rates
- Staff training key to success – plan for effective and sustainable training – TM will fail without staff training
- Electronic Health Records (EHR) may lead to a reduction in staffing requirements and thus operational efficiencies

VI. Major Barriers in the Adoption of Telemedicine in the SJV

The providers and administrators interviewed expressed several major obstacles in the diffusion of telemedicine technology and its adaptation among the healthcare providers in the SJV. The following table demonstrates the weights put on several obstacles on a scale of 0-10 where 0 is the lowest obstacle and 10 being the highest.

Graph 2: Providers' Ranking of Top Barriers to Telemedicine Adoption

Providers Ranking of Top Barriers in Adopting Telemedicine in the San Joaquin Valley

Barrier	Value
Concern about Quality of care in Telemedicine	4.3
Absence of Telemedicine Champion	5
Human Resources	4.3
Physical Infrastructure	3.7
Regulation	6
Reimbursement	5
Funding	4.6

The major obstacles in telemedicine adoption are delineated below:

- **Regulations:** It appears that an important obstacle in adopting telemedicine in the SJ Valley is the absence or lack of understanding of regulations related to telemedicine. Interviewees stated that they are apprehensive of special regulations that need to be adhered to in adopting telemedicine. There are uncertainties on administrator and providers mind as regards to liability in an event of a medical disaster and the legal status of a telemedicine based diagnosis in a medico legal framework.

- **Reimbursement:** Inadequate reimbursement is a critical stumbling block in adaptation of telemedicine as noted by the interviewees. The amount of payment is sometimes not very lucrative to attract many specialists to join

the program. In some instances FQHC/RHC can only bill for one encounter with PC and cannot bill for the TM specialty visit.

- **Telemedicine Champion:** The key to adoption and successful telemedicine program is in many ways dependent on whether the health care organization has a staff who is a "telemedicine champion". This person's interest and ability to motivate others including other physicians to join a 'cause' can go a long way to establish telemedicine. Many of the interviewees expressed that lack of such personalities across the region is a key detriment in the growth of telemedicine facilities.

- **Funding:** There is a general awareness of availability of funding from state or federal levels. But most of the time they are highly competitive and requires a lot of preparation and meeting of conditions to apply for such grants. The initial costs (sunk investment) of installing telemedicine or electronic health records is a major deterrent since it is difficult to project future flow of returns from such an investment.

- **Human Resources:** Implementation of telemedicine requires that organizations are prepared to handle related management and human resources issues. Telemedicine in many senses can be a labor intensive process that involves co-ordination between the technical, clinical and support staff of collaborating entities. Training the doctors, nurses and technicians on a continuous basis is critical. The human resources needed to run a smooth telemedicine system is sometimes challenging as it is difficult to attract or retain them. It is understood that the one of the main challenges of success of telemedicine depends on the management's commitment to a long term strategy to achieve competitive advantage by developing a localized human resource base.

- **Quality of Care:** Telemedicine is a departure from traditional face to face interactions between health care providers and patients. There are concerns among many providers and administrators regarding the effectiveness of telemedicine as a reliable medium for treating all forms of illnesses. It was noted that physicians who have not observed telemedicine in practice were of that opinion.

- **Physical Infrastructure:** Non-availability to hi-speed internet connections in some locations is a serious hindrance to achieving telemedicine coverage across the region. Such connectivity is the backbone of any telemedicine and e-health services.

History and Geography: Other Critical Barriers

Interviews with healthcare professionals also revealed two distinct factors that adversely affect diffusion of telemedicine and e-health in the SJV. The first is a failed experiment with telemedicine in the 1990s and the second is the absence of a top-notch teaching medical institution in the region.

- *Unpleasant Experience with Telemedicine in the Past.* In the early and mid 1990s a few health care providers in California began experimenting with telemedicine. The services included radiology, remote monitoring, home care etc. A number of health care providers that took part in the experimentation were from the SJV. However, the experiments failed to bear much traction for many reason including slow connectivity of internet speed and poor image quality of transferred data. The first generation telemedicine equipments were also not up to the standard. The failure of those experiments is fresh in the memory of many health care providers and practitioners. Although there has been marked improvements in the field of telemedicine a many in the healthcare profession are very cautious in adopting telemedicine readily.

- *Absence of Major Telemedicine Network Hub.* The success of telemedicine program in California has a geographical aspect to it. Most of the successful and well established providers that use multi-faceted telemedicine programs are located in the northern and southern parts of the state. These facilities are usually located near prominent medical educational institutions. These medical education institutions employ a number of specialist doctors in various specialties who participate in telemedicine practices. Another benefit of having such medical institutions in the geographical area is that they have better professional and social ties with local regional health care facilities which can help foster telemedicine networking. The SJV region lacks the presence of such large medical education institutions with adequate specialists to serve as a major telemedicine 'network hub'.

- *Contractual Arrangements with Providers.* Some health care facilities in few locations in the region have contractual agreements with physicians who work for them for stipulated number of hours or days and who also have their own private practices in the locality. It has been suggested that it is difficult to persuade these providers into engaging them for telemedicine services since they feel a threat of losing patients to specialists in a far of place. It has also been stated that some physicians have a stigma of using telemedicine services since its use may adversely affect their reputations (by making them seem incompetent in dealing with various illness).

VII. Making Telemedicine Work in the SJV: Some Recommendations

So what measures would encourage health care providers and managers in this region to adopt telemedicine services? Based on the discussions with the various health care providers and managers it was noted that their primary concern with telemedicine

centered around a few major challenges. The policy recommendations based on the dialogues with them are presented below.

Reimbursement

- Reimbursements for telemedicine services need to be increased to incentivize its adoption. At current reimbursement rates and lower utilization of telemedicine services it may be difficult for health care facilities to breakeven. In particular, unique specialist payment rates and revenue sharing possibilities for the region needs to be worked out. If providers are convinced that telemedicine is a profitable venture, they will make extra efforts to adopt it.

Regulatory Procedures

- Procedure manuals, internal policies, medical staff by-laws, nature of IT support required for various healthcare settings, etc. needs to be streamlined in order to be transparent about the regulations that are required for adoption and practice of telemedicine. At present, many providers are unclear/unaware of regulatory procedures in terms of reimbursement from the government and the private sector (what is covered and how much); credentialing of staff (whether all concerned staff need to be accredited or not); conformity with HIPPA; legal and liability concerns, etc.

Exposure to Telemedicine

- The healthcare providers and administrators in the region need to be directly exposed to telemedicine systems. Workshops can be arranged for hands on demonstration showing how telemedicine works in reality and in clinical settings. Seminars can be arranged to inform potential users of

telemedicine services which may help clear up some contentious issues to allay the concerns of many regional providers. There is also a need to nourish a number of selected programs and turn them into success stories which can then encourage other healthcare facilities to follow suit. In addition, funds should be made available to train personnel for use and implementation of telemedicine and e-health.

Valley Centered Telemedicine Grants

- Most organizations are aware of outside funding sources from the state of federal governments. However, the healthcare facilities in the region lack the capacity and resources to compete for these state or federal grants. It is proposed that some direct 'resource' grants – equipment, software etc. – should be allocated for providers in the region which can promote its use and ultimately lead to adoption and expansion of telemedicine services. It is suggested that marketing strategies such as that of drug companies may be adopted where telemedicine services needs to be promoted by providing 'samples' for interested health care facilities.

Role of Primary care Physicians and Non-physicians

- Since this region has acute shortage of experts and specialist physicians, it is suggested that consideration should be given on how to expand the role of primary care physicians and non-physicians in practicing telemedicine for selected services (e.g. roles of APN).

Valley centered telemedicine practice model

- There are organizations in the SJV that have successfully integrated telemedicine in their business model that needs to be studied more carefully. The lessons learned from their successes can serve as the basis

for other organization who wants to successfully integrate telemedicine in their practice. Future studies should focus on the positive deviances from these handful organizations to develop a telemedicine practice model that is uniquely based on the Valley experience.

In conclusion, it should be reiterated that the problem of non-adoption of telemedicine in the valley stems from the culmination of several factors including the patient mix in terms of their insurance, reimbursement rates and procedures, infrastructural shortcomings, unclear regulations, managerial challenges in dealing with telemedicine, lack of specialist doctors available/willing to participate in telemedicine and dearth of 'champion' physicians dedicated to telemedicine. Although there are statewide funding sources for equipment and software, lack of funding for training on use and handling telemedicine/e-health can easily stymie a well funded program. It is recommended that the state and federal government needs to put more attention in developing the manpower related to these programs when funds are made available to healthcare providers in rural communities. Finally, it can be said that a holistic approach needs to be adopted for telemedicine to take roots in the valley.

Bibliography

California Health Care Foundation (2008). The State of Health Information Technology in California.

Rogers, Everett M. (1995). *Diffusion of Innovations* Fourth Edition The Free Press New York

Johnston, B., & Solomon, N. A. (2008, July). *California Health Care Foundation.* Retrieved August 4, 2009, from California Health Care Foundation: http://www.chcf.org/documents/policy/TelemedicineInCA.pdf

California Department of Insurance (2008). Personal Health Records: A Helpful Tool for A Healthier You KP HealthConnect

National Institutes of Health (2006). National Center for Research Resources: Electronics Health Records Overview.

Puskin, D. S., Kumekawa, J. K., Blackwell, M., Beers, E. T., Dobyski, C., England, W., et al. (2001, January). *Telemedicine Publications.* Retrieved December 13, 2008, from U.S. Department of Health and Human Services: ftp://ftp.hrsa.gov/telehealth/report2001.pdf

Schoeman, J. A., Keeler, J., Moiduddin, A., & Hamlin, B. N. (2006, August). *NORC Walsh Center for Rural Health Analysis.* Retrieved June 21, 2009, from National Opinion Research Centerat the University of Chicargo: http://www.norc.org/NR/rdonlyres/6A09114C-1B4D-4834-A942-8D6E0EDB799B/0/HIT_Paper_Final.pdf

Wootan, Craig, Patterson, edited "Introduction to Telemedicine". The Royal Society of Medicine Press Ltd. 2006.

Wulsin, L., & Dougherty, A. (2008). Health Information Technology-Electronic Health Records: a Primer. *California Research Bureau*. Retrieved from http://www.library.ca.gov/crb/08/08-013.pdf