CTEC
California Telemedicine and eHealth Center

If You Bill It, They Will Come

A Literature Review on Clinical Outcomes, Cost-Effectiveness, and Reimbursement for Telemedicine

A Collaborative Policy Development Initiative of the California Telemedicine and eHealth Center

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A Literature Review on Clinical Outcomes, Cost-Effectiveness, and Reimbursement for Telemedicine

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Forward

In 2008, the California Telemedicine & eHealth Center (CTEC) began a year long initiative to consider the impact that reimbursement and other factors have on the full deployment of telemedicine and telehealth in California. This effort, funded by the Blue Shield of California Foundation, included a collaborative policy development with major telemedicine stakeholder groups from healthcare, government, and industry. This report, *If You Bill It, They Will Come. A Literature Review on Clinical Outcome, Cost-Effectiveness, and Reimbursement for Telemedicine,* was one of the foundational documents developed to assist the Collaborative in their discussions and deliberations.

This research project provides a qualitative meta-review of 21 literature reviews on the clinical and cost effectiveness of telemedicine. The review was performed by William D. Leach, PhD, Research Director of the California State University Sacramento Center for Collaborative Policy (CCP).

CTEC would like to thank Dr. Leach and CCP for their efforts. We are certain that the information in this report will prove useful to many other organizations considering how to expand the use of telemedicine.

Christine Martin
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If You Bill It, They Will Come

A Literature Review on Clinical Outcomes, Cost-Effectiveness, and Reimbursement for Telemedicine

Executive Summary

Telemedicine has the potential to significantly improve healthcare outcomes and reduce the rising costs of healthcare delivery. Although telemedicine in California has made significant advances in the past decade, there are still major challenges that have inhibited broader adoption and expansion.

This report, commissioned by the California Telemedicine & eHealth Center (CTEC), examines published research on issues relevant to telemedicine reimbursement, specifically focusing on three primary research areas: clinical efficacy, cost-effectiveness, and obstacles to demand and diffusion. This report identifies strategy options for optimizing the use of telemedicine and offers recommendations for future research efforts.

Key elements of this report are highlighted below.

- Unequivocal evidence of the relative efficacy or cost-effectiveness of telemedicine has not yet materialized despite many years of effort across perhaps 1,500 individual studies.
- The underlying premise for expanding the availability of telemedicine is that payer organizations operating in a competitive marketplace or a client-oriented public sector culture will be responsive to the expressed needs of their customers and clients. If care providers pressure payer organizations to reimburse for telemedicine, and if health plan consumers pressure insurers to cover such services, payer organizations will seek to satisfy the demand.
- To advance telemedicine in the near term using arguments about effectiveness and efficiency, proponents could encourage payers to reverse the burden of proof, which currently rests upon telemedicine. If the default policy were to reimburse for telemedicine, except in cases where research showed inferior outcomes, reimbursement for telemedicine would be the norm instead of the exception.

Telehealth's failure to thrive may frustrate those who have invested time, money, and energy in developing programs and applications and who have worked to advance the spread of the medium. Yet, because of insufficient reimbursement rates, the difficulty in convincing providers to change their practice patterns, and the need to reorganize how organizations and practitioners provide care, perhaps this slow pace of development is precisely what should be expected. Like other technological innovations, telehealth requires time to be widely integrated into the healthcare system. Systematic investigation of variables influencing the pace of diffusion may, however, lead to the development of effective means of encouraging adoption of telehealth technology.

-- Grigsby et al. 2007. "The Slow Pace of Interactive Video Telemedicine Adoption"

Introduction

With so many benefits to telemedicine and telehealth technologies (and so few down-sides), why have relatively few insurance companies and state Medicaid programs readily embraced the idea of reimbursing for telemedicine services? This is a great puzzle for professionals working in the healthcare industry, and particularly for those whose careers involve the practice or advancement of telemedicine. Why would a payer organization choose to discriminate against a particular vehicle for delivering healthcare services—especially if that vehicle is faster, cheaper, or better? In an era of rising healthcare costs and diminishing access to services, telemedicine advocates believe that payer organizations should leap at the chance to encourage (or at least enable) improved modes of healthcare delivery. So why haven't they?

The most common explanation is that doubts remain about the clinical effectiveness and the cost-effectiveness of telemedicine and telehealth. Managers of payer organizations may feel torn between the desire to facilitate modernization of the healthcare system through telemedicine, and their obligation to first establish "an evidence base as a pre-condition for the adoption of new technologies" (Whitten and Kuwahara 2003, 296). Unless the best available science clearly confirms that telemedicine produces better health outcomes, it makes sense that payers would warm slowly to this new mode of care delivery. From this perspective, discouraging the use of unproven technologies is one way payers can reduce their administrative and reimbursement costs while simultaneously curtailing the rising cost of healthcare for consumers.

Viewed from another perspective, private-sector insurance companies and health maintenance organizations are businesses that must compete for customers in a competitive marketplace. From this vantage, consumer demand would be the primary force driving corporate decisions on reimbursement policy. If individuals and employers shopping for health plans prefer the additional flexibility, convenience, and quality that telemedicine promises,

payers would respond by offering health plans that cover more types of telemedicine services. Insurers that reimburse for telemedicine would gain a competitive advantage, which over time would translate into greater market share. Additionally, consumer demand would help shape reimbursement policies of public-sector payer organizations, such as state-run Medicaid programs. These two different perspectives on payers' motives suggest there are multiple pathways for obtaining more widespread coverage for telemedicine. If the calculus of monetary cost versus clinical benefit dominates payers' reimbursement policies, advocates of telemedicine should focus on demonstrating positive outcomes through well-designed benefit-cost analyses and clinical trials; and/or should do a better job of communicating the existing body of research. If, on the other hand, consumer demand is the governing factor, advocates should boost demand by educating patients and doctors about the benefits of telemedicine, for example, or by addressing other barriers to telemedicine adoption. So, which perspective is most salient, and which pathway is most promising?

In their insightful literature review on telemedicine reimbursement decisions, Whitten and Kuwahara (2003, 295) highlight a study of reimbursement policies in another high-growth sector of non-traditional healthcare services—complementary and alternative medicine (also known as "integrative medicine"). Pelletier and Astin (2002) conducted telephone interviews with a sample of 10 managed care organizations and insurers. All company representatives interviewed in 2000 indicated that market demand was a primary motivator for covering complementary and alternative medicine. Potential cost-effectiveness and demonstrable clinical efficacy were also important, but less important than market demand. This isolated result from a different, but related, healthcare sector suggests that consumer demand may be at least as important as clinical and cost effectiveness in shaping payers' reimbursement policies for telemedicine.

If Whitten and Kuwahara's thesis is correct, and payers respond to both the "pull" of consumer demand as well as the "push" of supply-side considerations, then both perspectives are salient; but their relative salience provides little leverage for discerning the most promising strategy to promote reimbursement. Instead, the relative *feasibility* of the two pathways may be more instructive.

The following literature review demonstrates that unequivocal evidence of the relative efficacy or cost-effectiveness of telemedicine has not yet materialized despite many years of effort across perhaps 1,500 individual studies. In other words, researchers have generally achieved either inconclusive results, or have determined that telemedicine outcomes are *neither better nor worse* than traditional modes of delivery. Exceptions to this general finding can be found for telemedicine applications in selected medical specialties—such as telepsychiatry and certain home care programs—for which evidence of clinical efficacy is fairly robust. However, the practical implication is that proponents of telemedicine likely will need to wait a very long time before the weight of the evidence supports telemedicine as the *preferred* delivery vehicle for most heath services. To advance telemedicine in the near term using arguments about effectiveness and efficiency, proponents could encourage payers to reverse the burden of proof, which currently rests upon telemedicine. If the default policy were to reimburse for telemedicine, except in cases where research showed inferior outcomes, reimbursement for telemedicine would be the norm instead of the exception.

The second pathway to reimbursement is to address obstacles that discourage expanded use of telemedicine by patients and healthcare providers. The underlying premise is that payer organizations operating in a competitive marketplace or a client-oriented public sector culture will be responsive to the expressed needs of their customers and clients. If care providers pressure payer organizations to reimburse for telemedicine, and if health plan consumers pressure insurers to cover such services, payer organizations will seek to satisfy the demand. "If you bill it, they will come."

Background

In February 2008, CTEC launched a major initiative to respond to California's growing need for expanded telehealth programs and the need for adequate and appropriate support structures. This collaborative effort brought together major stakeholders to develop recommendations on policy to support the full integration of the spectrum of telemedicine and telehealth technologies and programs throughout California's healthcare systems. The desired outcome of the Collaborative is the development of recommendations on policy and program support that can be used as a platform for the discussion and adoption of policy that will advance the use of telehealth.

To better inform the Collaborative's deliberations, the project team commissioned the California State University, Sacramento Center for Collaborative Policy to perform a meta-literature review. The purpose of this literature review is to compile a review of published research on issues relevant to telemedicine reimbursement. The literature review focused on three primary research areas including: research on clinical efficacy, research on cost-effectiveness, and obstacles to demand and

diffusion of telemedicine services. The key findings of the literature review, along with findings from the statewide focus group convenings, and a national scan of other states' reimbursement policies assisted the Collaborative members with identifying and prioritizing issues, challenges, and opportunities in telehealth reimbursement.

Methods and Organization of the Report

This report provides a qualitative meta-review of 21 literature reviews on the clinical and cost effectiveness of telemedicine. The 21 articles reviewed here are representative of all review articles published on this topic since 2000. All 21 articles were published in peer-reviewed journals between January 2000 and December 2006. Older review articles were excluded to privilege more current research in this rapidly developing field. An extensive search of article databases uncovered no telemedicine literature reviews published between January 2007 and June 2008. Because the most recent review articles on this topic were published in 2006, and cover primary literature on telemedicine published through 2004 or 2005, one limitation of this meta-review is that it does not reflect findings from original primary sources published between 2006 and 2008. This limitation is addressed further in the concluding section on *Recommendations for Future Research.*

Each review article typically surveyed two-dozen to three-dozen original studies published in scientific journals. The smallest number of studies reviewed in a single article was seven, and the highest number of studies reviewed was 306. Most review articles started with database searches that generated several hundred potentially relevant articles, and then narrowed the list to a few dozen that satisfied various criteria for study quality and that matched the topical focus of the article. For example, eight of the 21 review articles focused mainly on clinical outputs or outcomes for particular medical specialties (e.g. psychiatry) or patient populations (e.g. geriatrics). Another six review articles focused on clinical outputs or outcomes across a range of medical conditions, with some focusing on particular types of telemedicine technologies such as store-and-forward or live-interactive video consultations. Another four review articles focused on socio-economic outcomes, and three looked at both clinical and economic outcomes.

This report provides a qualitative review of 14 articles published since 2001 that examine obstacles to the diffusion of telemedicine technology. The review focuses on two categories of barriers—those that impede demand for telemedicine among patients, and those that impede demand by healthcare providers. The premise of the review is that overcoming these obstacles to demand among doctors, employers, and patients would place competitive pressure on insurance companies and health maintenance organizations to cover more telemedicine services.

Research on Clinical Efficacy: Limited Studies and Mixed Results

To summarize the evidence presented across all 21 review articles in a single word, one could say that the results are "mixed." To a significant degree, the tone struck by the various authors in their summary statements and conclusions depends on how high they set the bar for standards of proof. Authors that are more liberal in their standards are more sanguine in their conclusions. Other authors are quite explicitly reluctant to make positive statements about telemedicine unless studies use very robust research designs, such as randomized controlled trials. These review authors also privilege studies that compare telemedicine outcomes to outcomes of conventional medicine, rather than simply showing benefits relative to no treatment. For example, Currell et al. (2001) reviewed seven clinical trials that were well-designed for the small numbers of patients. "Although none of the studies showed any detrimental effects from the interventions, neither did they show unequivocal benefits and the findings did not constitute evidence of the safety of telemedicine." They conclude that there is "little evidence of clinical benefits" and "variable and inconclusive results for other outcomes such as psychological measures."

Many authors, such as Hersh et al. (2002), lament having found "very few high-quality studies." Similarly, Hailey et al. (2002) report that most of the available literature refers only to pilot projects and short-term studies. "Good-quality studies are still scarce and the generalizability of most assessment findings is rather limited." Other authors find problems with small sample sizes (Hersh et al. 2001a) and a lack of sufficient detail and transparency in reporting study methods and results (Hailey 2005). Hersh et al. (2001a) conclude that "while the use of telemedicine is small but growing, the evidence for its efficacy is incomplete. Many of the studies are small and/or methodologically limited, so it cannot be determined whether telemedicine is efficacious."

Patient Satisfaction is High; Provider Satisfaction is Mixed

Despite mixed or inconclusive evidence for clinical effectiveness, one evaluation criterion on which telemedicine consistently receives high marks is patient satisfaction. Mair and Whitten (2000) focused on patient satisfaction in a review of 32 studies on clinical consultations between healthcare providers

and patients involving real time interactive video. Although all of the reviewed studies exhibited methodological shortcomings, Mair and Whitten found "good levels of patient satisfaction" across the board. They conclude "teleconsultation is acceptable to patients in a variety of circumstances." In their qualitative review of teledermatology research, Eedy and Wootton (2001, 703) cite findings from five original studies that show high patient satisfaction—especially with videoconferencing and the prospect of receiving a rapid diagnosis while avoiding the time and cost of traveling to a hospital.

One original study worth noting is Nesbitt et al.'s (2000) retrospective review of 1,000 consecutive telemedicine consultations in the University of California, Davis Telemedicine Program. Videoconferencing units were used to integrate care between the UC Davis Medical Center in Sacramento and several urban or suburban primary care clinics and rural hospitals. Patients and primary care physicians reported high levels of satisfaction on a 5-point Likert scale. Demand for specialist consultations via videoconference was highest among the rural clinics.

Telepsychiatry—Strong Evidence of Good Clinical Outcomes

One specialty with strong support across the literature reviews is telepsychiatry and telemental health. Positive outcomes for this field are evident in three review articles that compared a wide range of telemedicine applications (Hailey et al. 2002; Hersh et al. 2002; Roine, Ohinmaa, and Hailey 2002) as well as two reviews focusing specifically on telepsychiatry.

Hilty et al. (2004) reviewed approximately two-dozen studies published since 1965 that compared telepsychiatry with services delivered in person or through other technologies. Although few of these studies directly assessed clinical outcomes or cost-effectiveness, evidence was available for other types of outcomes, leading the authors to make a strong endorsement, "Telepsychiatry is effective." Specifically, they conclude, "Telepsychiatry is feasible, increases access to care, enables specialty consultation, yields positive outcomes, allows reliable evaluation, has few negative aspects in terms of communication, generally satisfies patients and providers, facilitates education, and empowers parties using it."

Monnier, et al. (2003) examined 68 telepsychiatry studies published between March 2000 to March 2003, and concluded "telepsychiatry assessments can produce reliable results, telepsychiatric services can lead to improved clinical status, and patients and clinicians are satisfied with treatment delivered via telepsychiatry." Sounding a cautionary note, they remind the reader that "methodologically sound studies in the area of telepsychiatry are still infrequent."

Telediabetes Care—Mixed Results on Clinical Outcomes

Diabetes care is one area of practice where the findings are particularly mixed. As summarized by Hersh et al. (2001b), "The value of home glucose monitoring in diabetes mellitus is conflicting." Jackson et al. (2006) examined 26 well-designed studies of telephone or computer-assisted interactive information technology for adults with diabetes. "Six of 14 interventions demonstrated moderate to large significant declines in hemoglobin A1c levels compared with controls. Most studies reported overall positive results and found that IT-based interventions improved healthcare utilization, behaviors, attitudes, knowledge, and skills."

By contrast, Farmer, et al. (2005) reviewed 26 studies of telemedicine interventions to support self-monitoring of blood glucose levels (specifically, HbA1c.) and found disappointing results:

"Results pooled from the nine [randomized controlled trials] with reported data did not provide evidence that the interventions were effective in reducing HbA1c. …Telemedicine solutions for diabetes care are feasible and acceptable, but evidence for their effectiveness in improving HbA1c or reducing costs while maintaining HbA1c levels, or improving other aspects of diabetes management is not strong. "…Recent endorsements of diabetes telemedicine as sound, effective, cost-effective and practical are premature. Trials do not provide evidence of effectiveness in reducing HbA1c and have generally been small, brief, and based around infrequent transmission of blood glucose data."

Evidence of Good Clinical Outcomes for 21 Telemedical Specialties

A number of review articles found support for the clinical efficacy of telemedicine in other specific medical specialties. For example, Hailey (2004) examined 46 studies that compared telemedicine with a non-telemedicine alternative. Of these, 24 were judged to be of high or good quality, 11 fair to good quality, and 11 as having limited or unacceptable validity.

"New evidence on the efficacy and effectiveness of telemedicine was given by studies on geriatric care, intensive care and some of those on home care. For a number of other applications, reports of clinical or economic benefits essentially confirmed previous [inconclusive] findings."

In an earlier study, Hailey et al. (2002) reviewed 66 "scientifically credible" studies that included comparison with a non-telemedicine alternative.

"Thirty-seven of the studies (56%) suggested that telemedicine had advantages over the alternative approach, 24 (36%) also drew attention to some negative aspects or were unclear whether telemedicine had advantages and five (8%) found that the alternative approach had advantages over telemedicine. The most convincing evidence on the efficacy and effectiveness of telemedicine was given by some of the studies on teleradiology (especially neurosurgical applications), telemental health, transmission of echocardiographic images, teledermatology, home telecare and on some medical consultations… Few papers considered the long-term or routine use of telemedicine. For several applications, including teleradiology, savings and sometimes clinical benefit were obtained through avoidance of travel and associated delays. Studies of home care and monitoring applications showed convincing evidence of benefit, while those on teledermatology indicated that there were cost disadvantages to health-care providers, although not to patients."

Hersh et al. (2002) reviewed 58 articles representing "three classes of application that historically required face-to-face encounters: office/hospital-based, store-and-forward, and home-based telemedicine." They report finding the strongest evidence for clinical efficacy of psychiatry and dermatology. They found "reasonable evidence" for the quality of physical examinations and medical histories taken via telemedicine, and "some evidence" for efficacy in cardiology and certain areas of ophthalmology.

Hersh et al. (2001a) focused on 28 studies of pediatric and obstetric telemedicine and home-based telemedicine. For store-and-forward telemedicine, they find "some evidence of comparable diagnosis and management decisions" in the areas of pediatric dental screening, pediatric ophthalmology, and neonatology. For self-monitoring/testing telemedicine, they find improved access to care in the areas of pediatrics, obstetrics, and clinician-indirect home telemedicine.

"Access is particularly enhanced when the telehealth system enables timely communication between patients or families and care providers that allows self-management and necessary adjustments that may prevent hospitalization. There is some evidence that this form of telemedicine improves health outcomes, but the study sample sizes are usually small, and even when they are not, the treatment effects are small."

Hersh et al. (2001b) examined 25 studies that evaluated either home-based or office/hospital-based telemedicine.

"The strongest evidence for the efficacy of telemedicine in clinical outcomes comes from home-based telemedicine in the areas of chronic disease management, hypertension, and AIDS. There is also reasonable evidence that telemedicine is comparable to face-to-face care in emergency medicine and is beneficial in surgical and neonatal intensive care units as well as patient transfer in neurosurgery."

Hersh et al. (2006) examined 97 studies, and find mixed evidence on the efficacy of store-and-forward services in dermatology, wound care, and ophthalmology. Studies of office/hospital-based telemedicine show the greatest efficacy in practices that involve verbal interactions such as videoconferencing for diagnosis and treatment in specialties like neurology and psychiatry.

Roine, Ohinmaa, and Hailey (2002) reviewed 34 articles that assessed at least some clinical outcomes. Most referred to pilot projects and short-term studies of low quality. Still, the authors find "relatively convincing evidence of effectiveness" for teleradiology, teleneurosurgery, telepsychiatry, transmission of echocardiographic images, and email consultations and video conferencing between primary and secondary healthcare providers.

Regarding telemedicine for asthma, Wainwright and Wootton (2003) report finding comparatively few studies, with most referring to pilot trials and short-term feasibility studies. Still, "early results are encouraging."

Louis et al. (2003) examined 18 observational studies and six randomized controlled trials involving homecare telemonitoring for heart failure.

"Observational studies suggest that telemonitoring; used either alone or as part of a multidisciplinary care program, reduce hospital bed-days occupancy. Patient acceptance of and compliance with telemonitoring was high. Two randomised controlled trials suggest that telemonitoring of vital signs and symptoms facilitate early detection of deterioration and reduce readmission rates and length of hospital stay in patients with heart failure. One study also showed a reduction in readmission charges. One substantial randomised controlled study showed a significant reduction in mortality at 6 months by monitoring weight and symptoms in patients with heart failure; however, no difference was observed in readmission rates. Another randomised study comparing video-consultation performed as part of a home healthcare programme for patients with a variety of diagnoses, suggested a reduction in the costs of hospital care, which offset the cost of video-consultation… One randomised study showed no difference in outcomes between the telemonitoring group and the standard care group."

Perhaps the greatest contribution of this meta-review is that it provides a substantially more positive

assessment of the clinical outcomes of telemedicine than is detectable from the perspective of any single review article. Individual review articles typically identify positive benefits of telemedicine in zero to five types of applications. For example, Hersh et al. (2002) lament, "Despite the widespread use of telemedicine in most major medical specialties, there is strong evidence in only a few of them that the diagnostic and management decisions provided by telemedicine are comparable to face-to-face care." This quote illustrates the conclusion and tone found in the majority of review articles.

This meta-review, however, has identified 21 specialties for which at least one review article found significant evidence of either satisfactory outcomes achieved through telemedicine or superior outcomes from telemedicine relative to conventional medical practice. These findings are summarized in Table 1.

Research on Cost-Effectiveness: Economic Benefits are Hard to Confirm

Review articles on cost-effectiveness reach conclusions that mirror those for clinical efficacy. Namely, methodological weaknesses prevent most studies from documenting clear economic outcomes. Review authors prefer to see studies that compare costs of telemedicine to costs of convention medicine, and that measure not just costs but also benefits. However, as Ohinmaa and Hailey (2002) explain, "In economic analyses of telemedicine, many studies are simply cost descriptions… For decision-making purposes cost-effectiveness and cost-benefit analyses would provide much better information." A number of authors have articulated standards for conducting rigorous studies of the cost-effectiveness and economic efficiency of telemedicine (RuckdÃ£schel et al. 2006; Mair et al.2000; Ohinmaa and Hailey 2002; Hailey and Crowe 2000; Hailey 2005; Reardon 2005).

In one critical survey of the field, Kristiansen and Poulsen (2000) reviewed 30 studies, which they rated as having low to moderate quality on average. "Sixteen studies concluded that telemedicine was a cost-saver, three concluded the opposite, while the others had more "neutral" conclusions." They summarize their findings thusly:

"Telemedicine technologies can save costs, but their impact on health outcome is largely unknown. Whether a specific technology is a cost-saver will depend on its type, the cost structure of the healthcare system, patient volume, and geographic factors. Taking into account the limitations of the studies, we conclude that the cost-effectiveness of telemedicine methods is not established."

Another unfavorable review is provided by Whitten, et al. (2002), who examined 55 articles containing actual cost-benefit data. Of these, only 24 were judged to be of substantial quality to merit review. All but four of these restricted their analysis to simple cost comparisons. Considering a number of additional methodological limitations in this body of work, the authors conclude starkly, "There is no good evidence that telemedicine is a cost-effective means of delivering healthcare."

Hyler and Gangure (2003) reviewed 12 studies "with samples of more than ten persons or programs focused specifically on the cost of telepsychiatry." They find mixed evidence of cost-effectiveness, breaking the 12 studies into four categories of outcomes:

"Seven of the studies reported that telepsychiatry was worth the cost. One study reported that telepsychiatry was not financially viable. Three studies reported the break-even number of consultations, the number that make telepsychiatry comparable in cost to in-person psychiatry. One review concluded that the lack of a clear business plan contributed to the difficulty of determining whether any of the programs was cost-effective."

One recurring theme in the literature is the idea that telemedicine saves time and money for patients, but creates additional expense and delay for providers. For example, after reviewing 29 studies, Håkansson and Gavelin (2000) conclude that few had demonstrated cost-effectiveness, partly because, "benefits for the patients in the form of reduced travel and waiting time must often be weighed against increased provider costs." Similarly, Eedy and Wootton (2001, 704) find that three original studies comparing the cost-effectiveness of real-time teledermatology with conventional hospital outpatient appointments "showed advantages for the patients in terms of time off work, loss of income to the patient or productivity by the employer as well as time and expense of travelling to hospital." On the other hand, "Real-time teledermatology was less advantageous to the healthcare system, being more expensive (£132´10 vs. £48´73) and time-consuming for the [general practitioner] and dermatologist."

Other review articles draw more reassuring conclusions. Monnier, et al. (2003) examined 68 telepsychiatry studies, and found that the balance of evidence "supports the notion that telepsychiatry is a cost-effective means of delivering mental health services." Roine, Ohinmaa, and Hailey (2002) conclude that cost-savings can be found in the field of teleradiology, especially the transmission of CT scan images.

Table 1.

Review articles claiming significant support for listed socioeconomic benefits of telemedicine or for clinical benefits for particular telemedicine specialties.

	Socio-economic				Telemedicine Specialties Showing Evidence of Clinical Benefits																					
	cost or cost-effectiveness	patient access to care	patient satisfaction	provider satisfaction	geriatric care	intensive care	home care / self-monitoring	radiology	mental health / psychiatry	echocardiographic images	dermatology	Consultations, inter-provider	physical exam / health history	cardiology	ophthalmology	dentistry	neonatology	hypertension (home care)	AIDS (homecare)	emergency	surgery	diabetes / glucose monitoring	neurosurgery	heart failure home care	asthma
Hailey 2004					X	X	X																		
Hailey et al.2002	X						X	X	X	X	X	X													
Hersh et al.2002									X		X			X	X										
Hersh et al.2001a		X					X								X	X	X								
Hersh et al.2001b							X										X	X		X	X				
Hersh et al.2006																		X		X					
Mair and Whitten 2000			X																	X					
Nesbitt et al.2000			X	X																					
Roine et al.2001	X							X	X	X		X													
Jackson et al.2006																						X			
Hilty et al.2004		X							X																
Monnier et al.2003									X																
Hyler and Gangure 2003	X																								
Jennett et al.2003	X	X																							
Louis et al.2003			X																					X	
Wainwright and Wootton 2003																									X
Hyler and Gangure 2003	X																								

Note: Findings of harm, ineffectiveness, or inconclusive results are not depicted in this table.

While noting methodological limitations, Jennett et al. (2003) provide one of the most sanguine pictures of the field based on a review of some 306 studies:

"Specific telehealth applications have been shown to offer significant socio-economic benefit, to patients and families, health-care providers and the health-care system. The main benefits identified were: increased access to health services, cost-effectiveness, enhanced educational opportunities, improved health outcomes, better quality of care, better quality of life and enhanced social support. Although the review found a number of areas of socio-economic benefit, there is the continuing problem of limited generalizability."

Obstacles to Demand and Diffusion of Telemedicine Services

This section draws upon 14 articles published since 2001 that examine obstacles to the diffusion of telemedicine technology. The premise is that rising demand for telemedicine among doctors, employers, and insured individuals would place competitive pressure on insurance companies and health maintenance organizations to cover more telemedicine services. The status quo has inertia on its side because bureaucracies rarely change unless pressured from outside (Hannan and Freeman 1984). Payer institutions are unlikely to change their reimbursement policies for telemedicine unless they see a groundswell of new demand for telemedicine from patients and providers. Accordingly, this section of the report focuses on barriers to the adoption and utilization of telemedicine from the perspective of individuals and organizations that provide or consume telemedicine services.

Barriers to Greater Demand from Patients

Lack of telemedicine awareness. As with any new medical technology, patients are unlikely to know it exists unless their doctor prescribes it, or they hear about it through news media or medical industry advertising. Of these three modes of education, doctor referral is the most potent. As Menachemi et al. (2004, 630) reason, "For the most part, patients are likely to use telemedicine if their healthcare providers recommend it." Drawing lessons from the pharmaceutical industry's recent success with direct marketing to patients, Menachemi et al. (2004, 630) further argue that "pull strategies aimed at patients can be very successful in creating demand" for telemedicine.

Lack of referrals from PCPs. However, patients are unlikely to hear about telemedicine options from their primary care physicians (PCP). To date, specialists account for the majority of physicians actively employing telemedicine technologies (Burton et al. 2007). General practitioners are an essential missing link for many telemedicine systems. Grigsby et al. (2007, 654) highlight the need for active recruitment of generalists into the telemedicine fold:

"As a rule, most of the effort invested in adoption and diffusion of telemedicine among physicians has focused on specialists, rather than on stimulating demand among the PCPs upon whom the system depends for patient referrals. This emphasis on specialists fails to address the need to increase the volume of telemedicine services. Although it is important to have consultants available in sought-after specialties, too few PCPs take advantage of available services."

Concerns about privacy and confidentiality. Patients' uncertainty about privacy protections are another frequently highlighted barrier to diffusion of telemedicine. HIPPA-related issues are a concern in every field of care, but are especially heightened when medical information is digitized and transmitted over the Internet or through other electronic means. The degree of anxiety varies according to the type of medical condition and the type of information being collected and transmitted. For example, Eedy and Wootton (2001, 703) report that dermatology patients are frequently shy about being filmed or photographed when their presenting condition occurs on the face or other, more intimate parts of the body.

For an American public that is highly conscious of the risk of identity theft, breach of one's electronic medical records can seem a matter of "when, not if." Promises of confidentiality ring hollow for the millions of Americans who have received apologetic letters from their employer, alma matter, bank, or HMO describing an instance of unauthorized access to computer files containing their personal information.

Older patients' discomfort with technology. Acceptance of telemedicine by geriatric patients is an area with special challenges and special significance (Magnusson et al. 2006, 229). As the American population ages, and seniors account for a growing proportion of all patients, opportunities to extend telemedicine services to this demographic become increasingly important. Special concerns include the lack of face-to-face contact and physical touch that defines telemedicine (literally, medicine at a distance), and that carries special meaning for aging patients. Considering the tendency in American society for seniors to become socially isolated to a greater degree than in other cultures, interaction with caregivers and medical personnel often becomes an important source of social contact for older people. Other obstacles to geriatric applications include the fact that seniors frequently have less experience and comfort with computer-assisted technologies. However, this issue will fade over time as tech-savvy boomers become the next cohort of senior citizens. A more

persistent issue surrounds the accessibility of IT interfaces such as video screens and keyboards for patients with diminishing hearing, vision, and motor-skills. Seniors will grow to accept telemedicine faster if future applications of the technology can address these issues adequately.

Barriers to Greater Demand from Providers

According to Grigsby et al. (2007), "It is customary to attribute the slow diffusion of telemedicine to barriers such as coverage and payment policy, interstate licensure issues, nonuniform engineering standards, and concerns over confidentiality and liability." At the risk of honoring custom, this section briefly reviews these barriers and others, including the personal, institutional, and systemic influences emphasized in Grigsby et al.'s research.

Concerns about standards of care and malpractice liability. Unclear standards of care can create hesitance on the part of healthcare providers worried about malpractice liability. Physicians cannot be sued for malpractice if they apply the appropriate standard of care (Venable 2005. 1191). In one sense, however, delivering healthcare services through tele-technologies should not require *new* standards. This idea has recently emerged as a point of consensus in Canadian telemedicine policy reform initiatives: "A guiding principle exists, i.e. that policies and accompanying guidelines in technology enabled care, should mirror those that exist in usual care or research, whenever possible. Public and patient safety and quality care are central" (Jennett and Watanabe 2006, 11).

Another Canadian initiative, the National Telehealth Outcome Indicators Project, based at the University of Calgary, used a consensus process that resulted in 34 approved Telehealth Outcome Indicators. The stated purpose of the indicators is to assist in evaluating telemedicine quality, access, acceptability and cost; but they could also be used to inform a debate on standards of care.

Concerns about privacy liability. A related obstacle for physicians is uncertainty regarding privacy law (Venable 2005) and legal liability in store-and-forward programs (Scheinfeld 2005a; 2005b). Here again, delivering healthcare services through telehealth technologies does not necessarily introduce any new legal principals or obligations. On the other hand, the nature of the IT technologies used in transmitting personal medical records creates heightened concern about privacy and confidentiality. Transmitting information electronically requires special attention to issues of encryption and cyber security. The novelty of this form of medical practice creates some uncertainty regarding how the courts will interpret legal standards of care (Benger 2000, 162). Eedy and Wootton (2001, 704), predict a greater role for legislative remedies in the European system:

"While both common and statute law can prevent the unauthorized interception and disclosure of medical data and protect patients' rights within the U.K., the sending of teledermatology information across borders presents real dangers for maintaining confidentiality. Harmonization of laws under the European Union, together with the increasing right of the citizen to obtain medical services in other parts of the European Union, will undoubtedly bring more comprehensive regulations."

Concerns about informed consent. In geriatric telemedicine, another source of anxiety about ethical and legal obligations concerns standards of informed consent for patients suffering from dementia or diminished ability to understand their medical options and rights (Magnusson et al. 2006, 230). For example, telehealth applications for home-based monitoring and surveillance are particularly promising for geriatric patients, but require the patient to understand what information is being transmitted, how it will be used, and by whom (Benger 2000, 162).

Interstate licensure issues. State licensing requirements can create obstacles for the practice of telemedicine across state lines. As Menachemi et al. (2004) explain, "Currently, most state regulations require that consulting physicians have a practicing license in the patient's state. Since, medical licensure is granted at the state level, this poses a problem for physicians using telemedicine across state lines." Focusing on Georgia as a case study in state licensing issues, Venable (2005, 1196-1204) has called for legislation to (a) allow out-of-state physicians to obtain a special telemedicine license; (b) establish mutual recognition agreements with other states; and/or (c) press for a national licensure program that would simplify the practice and regulation of telemedicine through a universal standard.

Short-term costs versus long-term benefits. Another obstacle is the large up-front investment frequently needed to initiate a telemedicine program. By studying a particular telediabetes program that had operated continuously for 10 years, Whittaker et al. (2004) conclude that having program administrators with a long-term outlook is one of the main keys to success.

Lack of clinician training and recruitment. Grigsby et al. (2007, 645) conclude that "reimbursement issues are important determinants of the rate of adoption, but that by themselves they do not fully

account for the slow diffusion of telemedicine." Instead they point to inadequate training or passive recruitment of providers as being a root cause of diffusion problems. An interesting case study, in which reimbursement can be ruled out as a possible explanation, is the United States Army's telemedicine infrastructure installed in more than 30 Army medical treatment facilities in Europe. Using site visits and interviews, Lam and Mackenzie (2005) discovered the facilities have been underutilized for patient care.

"The majority of providers interviewed felt that they had not been given adequate information on the role of telemedicine systems in provision of healthcare; operational and support policies had not been developed adequately; cost–benefit of use was not clearly demonstrated; and that many organizational impediments existed. Additionally, the lack of strong clinician proponents was repeatedly cited."

Doubts about effectiveness and efficiency. Clinicians will not be proponents unless they are confident about the effectiveness and efficiency of telemedicine. However, clinicians often harbor greater doubts about the technology than their patients. For example, whereas patient satisfaction is high in the field of teledermatology, Eedy and Wootton (2001, 704) report physician dissatisfaction stemming from "lack of rapport with patients, inability to palpate lesions or carry out diagnostic tests" and the perception that telemedicine is unduly time-consuming. Other sources of dissatisfaction stemmed from small-bandwidth systems and low quality digital images – issues that are probably moot in modern telemedical systems.

Promoting Demand for Telemedicine through Reimbursement Legislation

The self-reinforcing relationship between telemedicine reimbursement and adoption by physicians and patients is a vicious circle. That is, without the opportunity to receive reimbursement for telemedicine services, providers have little incentive to invest time and other resources in establishing telemedicine programs. And without widespread adoption of telemedicine from providers and patients, payer organizations have little incentive to revisit their existing reimbursement policies.

Government intervention is a tried and true remedy for breaking out of vicious circles. As of 2006, at least five states had passed legislation mandating private insurance coverage of medical services provided by telemedicine—California, Louisiana, Texas, Oklahoma, and Kentucky—and 34 states cover telemedicine through Medicaid (Whitten and Buis 2006; Brown 2006; *Psychiatric News* March 19, 2004).

Strategy Options

"It would appear that telemedicine proponents in the US who are seeking universal coverage for telemedicine might be best served in stimulating consumer demand and provider acceptance and adoption. Of course, rigorous outcomes studies that effectively document the clinical and economic outcomes will ensure reimbursement over the long term…Yet, research... implies that consumer and market demand might prove an effective strategy for more consistent reimbursement policies across payer sources."

-- Pamela Whitten and Emily Kuwahara. 2003. "Telemedicine from the Payer Perspective"

This report essentially accepts and expands upon Whitten and Kuwahara's 2003 thesis that supply, demand, and reimbursement policies for telemedicine reinforce one another. Proponents of telemedicine can elevate any one element of the triad by promoting the other two. This idea is very much in line with the "Diffusion of Innovation" (Rogers 1995) analysis employed by Menachemi et al. (2004), who conclude that "telemedicine proponents need to address the uncertainty associated with using telemedicine for each of the key adopter groups." These adopter groups correspond to physicians and hospital administrators (supply), patients (demand), and payers (reimbursement).

Each of the following strategy options are consistent with such a three-pronged approach, and follow from the literature review findings detailed in the body of this report. Whether any particular corporation or advocacy organization should pursue one or more of these options depends on the unique goals and circumstances of the organization. These generic strategies are provided as examples to spur further discussion and analysis.

Strategy Option 1

Support legislation requiring state Medicaid programs and private insurance companies and managed care organizations to reimburse for telemedicine.

Strategy Option 2

Support state and federal legislation establishing national and/or dual state-national licensure systems as advocated by Venable (2005).

Strategy Option 3

Encourage payers to reverse the burden of proof, which currently rests upon telemedicine. According to the cultural norms of most payer organizations, telemedicine should not be reimbursed unless its clinical and economic benefits can be shown to equal or exceed those for "conventional" medicine. Currently, methodological limitations plague most

research on clinical and cost effectiveness. Except in a number of subspecialties, direct comparisons between telemedicine and conventional medicine are either unavailable, inconclusive, or show mixed results. There is no preponderance of evidence that conventional medicine produces better or safer outcomes. If telemedicine and conventional medicine were held to the same standard, payers would not feel compelled to discriminate between the two when establishing reimbursement policy.

Strategy Option 4

Publicize the original finding from Table 1 of this report, which shows relatively robust evidence of efficacy can be found for a larger number of medical specialties than previously thought. Individual review articles typically identify positive benefits of telemedicine in zero to five types of applications. By contrast, this meta-review (a review of 21 review articles) identifies 21 telemedicine specialties for which at least one review article found significant evidence of either satisfactory outcomes or superior outcomes relative to conventional medical practice.

Strategy Option 5

Promote more aggressive recruitment of general practitioners into existing telemedicine systems. Referral from primary care providers is the most potent means of increasing demand among patients. Telemedicine facilities and specialists are frequently underutilized. PCP referral is currently a weak link in the chain of supply, demand, and reimbursement.

Strategy Option 6

Promote research and development of telehealth applications for older patients. As the American population ages, and tech-savvy Boomers become the next cohort of senior citizens—they will constitute a large population with high demand for healthcare services and a high level of familiarity with modern technology. Considering that the current consumer market for telegeriatrics is suppressed by patients' lack of comfort with computers and information technology, the future market for telegeriatrics will grow rapidly.

Recommendations for Future Research

Research Recommendation 1

Conduct a Current Literature Review on Studies of Clinical and Economic Outcomes Published 2005 to Present

The most recent literature reviews on this topic were published in 2006, and cover primary literature on telemedicine published through 2004 or 2005. In a rapidly evolving field such a telemedicine, information quickly becomes outdated. Now would be a good time to review original evaluations of telemedicine published 2005 through 2008. Original research published only a few years ago probably does not represent the current state-of-the-art.

Research Recommendation 2

Conduct an Original Survey of Insurers and Managed Care Organizations to Understand How They Decide Whether or Not to Reimburse for Telemedicine

In 2000, Pelletier and Astin completed the third in a series of panel interviews with leaders of managed care organizations to identify the factors that drive their reimbursement policy decisions for alternative medicine (such as acupuncture or chiropractic care). A similar investigation modeled after (or partnering with) Pelletier and Astin could help address this question for telemedicine. As Nesbitt et al. (2000) have argued, "additional research must investigate the reasons why some payers, patients, and providers resist participation in these services."

Using surveys and interviews, Grigsby et al. (2007) and Barton et al. (2007) have made considerable progress in understanding barriers to diffusion of telemedicine from the perspective of physicians' and telemedicine program administrators. Similarly, Palsbo (2004) has made some progress in surveying 35 of the 51 state Medicaid programs to understanding barriers to reimbursement, focusing on telerehabilitation. Finally, Whitten and Buis (2006) surveyed 63 providers of telemedicine services, and asked them about their success in obtaining reimbursement. However, our literature search uncovered no comparable survey of private insurers or MCOs focused on understanding reimbursement issues from the payer's perspective.

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California Telemedicine and eHealth Center
Telehealth Optimization Initiative

Companion Publications

The following publications were developed as part of the Telehealth Optimization Initiative and are available from the California Telemedicine and eHealth Center. These reports provide more detail on topics covered in the Major Findings and Recommendations Report. The full report and companion publication are available from CTEC at www.CTEConline.org

Optimizing Telehealth in California:
An Agenda for Today and Tomorrow
Full Report of Major Findings and Recommendations
January 2009

If You Bill It, They Will Come.
A Literature Review on Clinical Outcomes,
Cost-Effectiveness, and Reimbursement for Telemedicine
January 2009

Telehealth Optimization
Summary of Focus Group Methodology and Responses
January 2009

National Telemedicine Reimbursement Scan
April 2009

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