California Health Benefits Review Program

Assembly Bill 1771: Telephonic and Electronic Patient Management – CHBRP Report Appendices

A Report to the 2013-2014 California Legislature April 25, 2014

APPENDIX to a Report for the 2013–2014 California State Legislature

Appendices for the Analysis of Assembly Bill 1771
Telephonic and Electronic Patient Management

April 25, 2014

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The California Health Benefits Review Program (CHBRP) was established in 2002 to provide the California Legislature independent analysis of the medical, financial, and public health impacts of proposed health insurance benefit mandates and repeals per its authorizing statute.[1] The program was reauthorized in 2006 and again in 2009. CHBRP's authorizing statute defines legislation proposing to mandate or proposing to repeal an existing health insurance benefit as a proposal that would mandate or repeal a requirement that a health care service plan or health insurer: (1) permit covered individuals to obtain health care treatment or services from a particular type of health care provider; (2) offer or provide coverage for the screening, diagnosis, or treatment of a particular disease or condition; (3) offer or provide coverage of a particular type of health care treatment or service, or of medical equipment, medical supplies, or drugs used in connection with a health care treatment or service; and/or (4) specify terms (limits, timeframes, copayments, deductibles, coinsurance, etc.) for any of the other categories.

An analytic staff in the University of California's Office of the President supports a task force of faculty and staff from several campuses of the University of California to complete each analysis within a 60-day period, usually before the Legislature begins formal consideration of a mandate or repeal bill. A certified, independent actuary helps estimate the financial impacts. A strict conflict-of-interest policy ensures that the analyses are undertaken without financial or other interests that could bias the results. A National Advisory Council, drawn from experts from outside the state of California provides balanced representation among groups with an interest in health insurance benefit mandates or repeals, reviews draft analyses to ensure their quality before they are submitted to the Legislature. Each report summarizes scientific evidence relevant to the proposed mandate, or proposed mandate repeal, but does not make recommendations, deferring policy decision making to the Legislature. The State funds this work through an annual assessment on health plans and insurers in California. All CHBRP reports and information about current requests from the California Legislature are available on the CHBRP website, www.chbrp.org.

[1] Available at: www.chbrp.org/documents/authorizing_statute.pdf.

PREFACE

This report provides an analysis of the medical, financial, and public health impacts of Assembly Bill 1771. In response to a request from the California Assembly Committee on Health on February 25, 2014, the California Health Benefits Review Program (CHBRP) undertook this analysis pursuant to the program's authorizing statute, which established CHBRP to provide independent and impartial analysis of proposed health insurance benefit mandates and repeals.

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CHBRP gratefully acknowledges all of these contributions but assumes full responsibility for all of the report and its contents. Please direct any questions concerning this report to:

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APPENDICES

Appendix A: Text of Bill Analyzed

On February 25, 2014, Assembly Committee on Health requested that CHBRP analyze AB 1771. CHBRP analyzed the version of AB 1771 that was amended on March 11, 2014.

An act to add Section 1374.14 to the Health and Safety Code, and to add Section 10123.855 to the Insurance Code, relating to health care coverage.

The people of the State of California do enact as follows:

SECTION 1.

The Legislature hereby finds and declares all of the following:

(a) The lack of primary and specialty care physicians continues to be a significant barrier to individual access to health care services, a barrier that will only be exacerbated by health care reform efforts that will increase the number of insured individuals.

(b) The term "telehealth," as defined in Section 2290.5 of the Business and Professions Code, includes telephonic and electronic patient management, which means the use of electronic communication tools, such as the telephone and electronic mail, to enable treating physicians to evaluate and manage their existing patients in a manner recognized by the American Medical Association, Current Procedural Terminology codes.

(c) Telephonic and electronic patient management is an effective strategy to address the problems associated with the physician shortage in California, as it increases physician practice efficiency through the reduction of unnecessary office visits and increases productivity by allowing physicians to treat more patients.

(d) In addition, studies have shown that telephonic and electronic patient management reduces costs and yields positive results for health care payers due to the reduced use of costly services and reported improvements in quality of care.

(e) Consumers of health care will benefit from telephonic and electronic patient management in many ways, including expanded access to physicians, faster and more convenient treatment, better continuity of care, and reduced lost work time and health care costs.

(f) While some third-party payers reimburse physicians for telephonic and electronic patient management, some do not even though that reimbursement would assist in improving the physical and economic health of the state.

SEC. 2.

Section 1374.14 is added to the *Health and Safety Code*, to read:

1374.14.

(a) Notwithstanding any other law, a health care service plan shall, with respect to plan contracts issued, amended, or renewed on or after January 1, 2015, cover physician telephonic and electronic patient management services and reimburse those services at the same level and amount as face-to-face patient encounters with similar complexity and time expenditure.

(b) This section shall not be construed to authorize a health care service plan to require the use of telephonic and electronic patient management services when the physician has determined that those services are not medically appropriate.

(c) This section shall not be construed to alter the scope of practice of a health care provider or authorize the delivery of health care services in a setting, or in a manner, that is not otherwise authorized by law.

(d) All laws regarding the confidentiality of health information and a patient's rights to his or her medical information shall apply to telephonic and electronic patient management services.

(e) This section shall not apply to a patient under the jurisdiction of the Department of Corrections and Rehabilitation or any other correctional facility.

(f) For purposes of this section, "telephonic and electronic patient management services" means the use of electronic communication tools, such as the telephone and electronic mail, to enable treating physicians to evaluate and manage existing patients in a manner recognized by the American Medical Association, Current Procedural Terminology codes.

SEC. 3.

Section 10123.855 is added to the *Insurance Code*, to read:

10123.855.

(a) Notwithstanding any other law, a health insurer shall, with respect to policies of health insurance issued, amended, or renewed on or after January 1, 2015, cover physician telephonic and electronic patient management services and reimburse those services at the same level and amount as face-to-face patient encounters with similar complexity and time expenditure.

(b) This section shall not be construed to authorize a health insurer to require the use of telephonic and electronic patient management services when the physician has determined that those services are not medically appropriate.

(c) This section shall not be construed to alter the scope of practice of a health care provider or authorize the delivery of health care services in a setting, or in a manner, that is not otherwise authorized by law.

(d) All laws regarding the confidentiality of health information and a patient's rights to his or her medical information shall apply to telephonic and electronic patient management services.

(e) This section shall not apply to a patient under the jurisdiction of the Department of Corrections and Rehabilitation or any other correctional facility.

(f) For purposes of this section, "telephonic and electronic patient management services" means the use of electronic communication tools, such as the telephone and electronic mail, to enable treating physicians to evaluate and manage existing patients in a manner recognized by the American Medical Association, Current Procedural Terminology codes.

SEC. 4.

No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.

Appendix B: Literature Review Methods

Appendix B describes methods used in the medical effectiveness literature review conducted for this report. A discussion of CHBRP's system for grading evidence, as well as lists of Medical Subject Headings (MeSH) terms, Keywords, and Publication Types follows.

As previously detailed in the *Introduction*, AB 1771 defines telehealth as the use of electronic communication tools, Including telephone, e-mail, live videoconferencing, and store-and-forward.

The literature search was limited to studies published in English from January 2000 to present. Studies that enrolled persons of all ages in any country were included. The following databases of peer-reviewed literature were searched: MEDLINE (PubMed), the Cochrane Database of Systematic Reviews, the Cochrane Register of Controlled Clinical Trials, the Cumulative Index of Nursing and Allied Health Literature, EconLit, and Web of Science. In addition, websites maintained by the following organizations that index or publish systematic reviews and evidence-based guidelines were searched: the Agency for Healthcare Research and Quality, International Network of Agencies for Health Technology Assessment, National Health Service Centre for Reviews and Dissemination, National Guidelines Clearinghouse, National Institute for Health and Clinical Excellence, World Health Organization, and the Scottish Intercollegiate Guideline Network.

Studies were included in the medical effectiveness literature review if they addressed the use of telephone, e-mail, live videoconferencing, or store-and-forward technologies to provide patient care. Studies of other telehealth technologies, such as remote patient monitoring, were excluded, because AB 1771 does not address them. CHBRP also excluded studies of the use of telehealth technologies for educational purposes because AB 1771 concerns coverage and reimbursement for patient care.

Two reviewers screened the title and abstract of each citation retrieved by the literature search to determine eligibility for inclusion. The reviewers acquired the full text of articles that were deemed eligible for inclusion in the review and reapplied the initial eligibility criteria.

Abstracts for 267 articles, were found in the literature review, 64 were reviewed for potential inclusion in this report, and a total of 36 articles were included in the medical effectiveness review for AB 1771.

Evidence Grading System

In making a "call" for each outcome measure, the medical effectiveness lead and the content expert consider the number of studies as well the strength of the evidence. Further information about the criteria CHBRP uses to evaluate evidence of medical effectiveness can be found in CHBRP's *Medical Effectiveness Analysis Research Approach.*[2] To grade the evidence for each outcome measured, the team uses a grading system that has the following categories:

[2] Available at: www.chbrp.org/analysis_methodology/docs/medeffect_methods_detail.pdf.

- Research design;
- Consistency of findings;
- Generalizability of findings to the population whose coverage would be affected by a mandate; and
- Cumulative impact of evidence.

CHBRP uses a hierarchy to classify studies' research designs by the strength of the evidence they provide regarding a treatment's effects. CHBRP classifies research by levels I–V. Level I research includes well-implemented randomized controlled trials (RCTs) and cluster RCTs. Level II research includes RCTs and cluster RCTs with major weaknesses. Level III research consists of nonrandomized studies that include an intervention group and one or more comparison groups, time series analyses, and cross-sectional surveys. Level IV research consists of case series and case reports. Level V represents clinical/ practical guidelines based on consensus or opinion.

CHBRP evaluates consistency of findings across three dimensions: statistical significance, direction of effect, and size of effect.

Generalizability refers to the extent to which a study's findings can be generalized to a population of interest. For CHBRP, the population of interest is the segment of California's diverse population to which a proposed mandate or repeal would apply.

The grading system also contains an overall conclusion that encompasses findings in these four domains. The conclusion is a statement that captures the strength, consistency, and generalizability of the evidence of an intervention's effect on an outcome. The following terms are used to characterize the body of evidence regarding an outcome:

- Clear and convincing evidence;
- Preponderance of evidence;
- Ambiguous/conflicting evidence; and
- Insufficient evidence.

A grade of *clear and convincing evidence* indicates that there are multiple studies of a treatment and that the large majority of studies have strong research designs, consistently find that the treatment is either effective or not effective, and have findings that are highly generalizable to the population whose coverage would be affected. This grade is assigned in cases in which it is unlikely that publication of additional studies would change CHBRP's conclusion about the effectiveness of a treatment.

A grade of *preponderance of evidence* indicates that the majority of the studies reviewed are consistent in their findings that treatment is either effective or not effective and that the findings are generalizable to the population whose coverage would be affected. Bodies of evidence that are graded as *preponderance of evidence* are further subdivided into three categories based on

the strength of their research designs: strong research designs, moderate research designs, and weak research designs.

A grade of *ambiguous/conflicting evidence* indicates that although some studies included in the medical effectiveness review find that a treatment is effective, a similar number of studies with equally strong research designs suggest the treatment is not effective.

A grade of *insufficient* evidence indicates that there is not enough evidence available to know whether or not a treatment is effective, either because there are too few studies of the treatment or because the available studies have weak research designs. It does not indicate that a treatment is not effective.

In addition to grading the strength of evidence regarding a treatment's effect on specific outcomes, CHBRP also assigns an overall grade to the whole body of evidence included in the medical effectiveness review. A statement of the overall grade is included in the Executive Summary and in the Medical Effectiveness section of the text of the report. The statement is accompanied by a graphic to help readers visualize the conclusion. In the case of AB 1771, the report includes two overall grades and two figures because the amount and strength of evidence differs for telephone calls and e-mails on the one hand and live videoconferencing and store-and-forward on the other.

Search Terms

The search terms used to locate studies relevant to AB 1771 were as follows:

MeSH terms used to search PubMed

- Communication
- Cost-Benefit Analysis
- Costs and Cost Analysis
- Electronic Mail/utilization
- Emergency Health Service
- Emergency Medical Services/utilization
- Emergency Service, Hospital/utilization
- Health Services Accessibility
- Hospital/utilization
- Hospitalization
- Medication Compliance
- Office Visits/utilization
- Outcome Assessment (Health Care)
- Patient Satisfaction
- Physician-Patient Relations
- Primary Health Care/utilization
- Quality of Health Care
- Quality of Life
- Remote Consultation/utilization
- Rural population
- Telecommunication
- Teleconsultation
- Telehealth
- Telemedicine/economics/utilization
- Telephone
- Telepsychotherapy
- Time factors
- Treatment Outcome
- Utilization Review
- Videoconferencing

Keywords used to search PubMed, Cochrane Library, Scopus and Web of Science

- communication
- consultation
- costs
- effects
- e-mail
- emergency visits
- ER visits
- face-to-face
- hospitalization
- impacts
- patients and providers
- patient satisfaction
- phone consultation
- physician- patient
- primary care
- provider and patient
- office visits
- quality of life
- outcomes
- secure messaging
- service use
- store-and-forward
- teleconsultation
- teledermatology
- telehealth
- telemedicine
- telephone consultation
- telepsychiatry
- utilization
- videoconference
- videoconferencing
- web messaging

Publication types:

- Clinical Trial
- Comparative Study
- Controlled Clinical Trial
- Meta-Analysis
- Practice Guideline
- Randomized Control Trial
- Systematic Reviews

Appendix C: Summary Findings on Medical Effectiveness

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
Telephone, e-mail, store-and-forward	Atherton et al., 2012	Systematic review	Phone, e-mail, web-based, or text communication compared to usual in-person care or no access to e-mail or web One study in dermatology included store-and-forward technology by taking pictures of affected areas and e-mailing the images to the doctor for feedback	Patients ranged from children to elderly adults. Studies included a wide variety of diseases and conditions	5 USA, 2 Norway, 1 Canada, 1 Australia
Store-and-forward	Barbieri et al., 2014	Prospective study	Store-and-forward teledermatology compared to in-person dermatology	Patients who were hospitalized for any indication and in need of dermatologic consultation. More than half were women and the mean age was 55.2	USA
Telephone	Bunn et al., 2005	Systematic review	Telephone call consultations or triage compared to in-person care	Most in-person settings included were primary care. Patients had a variety of diseases and conditions	USA, UK, Denmark
Store-and-forward	Chen et al., 2014	Comparison study	Assessment of cutaneous wounds by surgeons using store-and-forward compared to in-person visits	Wound care patients who had access to a digital camera or mobile phone camera with e-mail capability who sought treatment in an outpatient setting	Taiwan

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
Store-and-forward	Conlin et al., 2006	Randomized trial	Remote retinal imaging via nonmydriatic compared to in-person retinal imaging	Diabetes patients who received primary care at Department of Veterans Affairs (VA) ambulatory care clinics. The study included mostly males averaging 67 years of age	USA (Boston)
Telephone, live videoconferencining	Currell et al., 2000	Systematic review	Studies included compared various telemedicine modalities (including telephonic communication, and video communication) to in-person care	Patients ranged from children to elderly adults. Diseases and conditions included diabetes, hypertension, cardiovascular disease, and unspecified conditions treated with surgery	Canada, UK, USA
Live videoconferencing	Duchesne et al., 2008	Before-after study	Live videoconferencing with remote control capability compared to in-person trauma care	Trauma patients in rural areas initially treated at a local community hospital before transfer to trauma center	USA
Live videoconferencing	Ferrer-Roca et al., 2010	Randomized quality of life study	Live videoconferencing compared to in-person care	Rural patients living as far as 50km from the closest referral hospital referred for various conditions including dermatology, trauma, psychiatry, pain etc.	Spain
Live videoconferencing	Garcia-Lizana and Munoz-Mayorga, 2010	Systematic review	Providing psychiatric care by live videoconferencing compared to in-person psychiatry	Patients with various mental illnesses mostly from general psychiatric services. Both children and adults were included in these studies	Canada, Spain, USA

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
Telephone, e-mail	Goldzweig et al., 2012	Systematic review	Telephone and secure e-mail compared to in-person visits	Varies across studies included in the systematic review	USA
Live videoconferencing, store-and-forward	Hersh et al., 2006	Systematic review	Live videoconferencing and store-and-forward compared to in-person care	Patients ranged from children to elderly adults. Diseases and conditions included diabetes mellitus, coronary heart disease, and hypertension	Not stated
Store-and-forward	Hofstetter et al., 2010	Retrospective analysis	Store-and-forward compared to in-person care	New referrals (patients not previously seen by an ENT[3] within their medical center network) to ENT clinic	Alaska
Telephone, live videoconferencing	Johansson and Wild, 2010	Systematic review	Consultation with stroke experts via telephone or live videoconferencing compared to conventional in-person stroke care	Patients experiencing acute stroke. The mean age of those included was 66.2, and nearly half (45%) were female	Canada, China, Germany, USA

[3] ENT = ear, nose, and throat specialist

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
Live videoconferencing	Lamel et al., 2012a	Retrospective study	Live videoconferencing dermatology compared to in-person dermatology	Patients who were seen by a physician referred to see a dermatology consultant. Ages range from 3 months to 8 years	USA (California)
Store-and-forward using mobile technology	Lamel et al., 2012b	Comparison study	Store-and-forward teledermatology compared to in-person dermatology	Persons who participated in a free cancer screening event	USA (California)
Store-and-forward	Lasierra et al., 2012	Evaluation study	Store-and-forward teledermatology compared to in-person dermatology	Children ages 3 months to 14 years and adults 15 to 83 seen in primary care for a skin lesion	Spain
Telephone, e-mail	Lau et al., 2014	Retrospective observational study	Telephone and online patient portal (including secure messaging) users compared to nonusers	Newly referred diabetes patients seen in tertiary care by a diabetologist	Canada

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
Telephone, e-mail	Leichter et al., 2013	Randomized controlled trial	E-mail and telephone communication compared to quarterly in-person visits	Patients with type 1 and type 2 diabetes, aged 19–65, currently being treated at the recruitment site who were computer literate and competent in self-monitoring of blood glucose	USA
Live videoconferencing	Leimig et al., 2008	Longitudinal prospective study	Live videoconferencing visits compared to in-person visits	Transplant patients age 18 and older who were followed primarily by a nurse practitioner at the time of recruitment	USA
Store-and-forward	Lim et al., 2012	Prospective comparison study	Store-and-forward teledermoscopy compared to in-person visits for skin lesions	Children and adults referred to the dermatology service by their general practitioner with one or more skin lesions	New Zealand
Telephone, e-mail, live videoconferencing	McLean et al., 2010	Meta-analysis	Telephone communication or counseling, videoconferencing, Internet compared to usual care or an intervention that involved limited use of telephone or electronic communication	Asthma patients with a range of disease severity. Ages range from children to adults	UK, USA, Brazil, Portugal, Australia, Taiwan, Japan, Croatia, Denmark, Netherlands

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
Telephone, e-mail, live videoconferencing	McLean et al., 2011	Meta-analysis	Telephone (including modem transmission), web-based support (Internet), live videoconferencing, compared to in-person care	Adult COPD patients with a range of disease severity	Quebec, Spain, Belgium, USA, Hong Kong
Live videoconferencing	Modai et al., 2006	Observational case control	Live videoconference telepsychiatry compared to in-person psychiatry	Patients with major psychiatric disorders over the age of 18 seen at various locations, including ambulatory clinics and hostels	Israel
Live videoconferencing	Morland et al., 2010	Randomized controlled trial	Live videoconference telepsychiatry compared to in-person psychiatry	Male veterans with PTSD and anger difficulties seen at 3 VA outpatient clinics	USA
Live videoconferencing	Pedragosa et al., 2009	Before-after study	Live videoconferencing with stroke experts compared to conventional in-person stroke care	Remote patients experiencing acute ischemic stroke	Spain

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
E-mail, live videoconferencing	Smith et al., 2013	Systematic review	Screening and treatment of child obesity via e-mail or live videoconferencing compared to in-person care	Obese or overweight children and adolescents ages 2–18	USA, Canada, Australia
Telephone	Suksomboon et al., 2014	Meta-analysis	Telephone calls plus in-person care compared to in-person care only	Persons with diabetes	Not reported USA, UK
Live videoconferencing	Wallace et al., 2004	Randomized controlled trial	Live videoconferencing with specialists compared to in-person specialty care	All patients referred by participating general practitioners to specialists included in the trial were included except those requiring urgent care. Both children and adults were included	UK

Table C-1. Summary of Findings From Studies of the Effectiveness of Telemedicine (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention Versus Comparison Group	Population Studied	Location
Live videoconferencing, store-and-forward	Wallace et al., 2012	Systematic review	Store-and-forward or live videoconferencing compared to in-person burn care	Burn patients	Armenia, Australia, Bosnia, Canada Croatia, Germany, Iraq, Russia, Somalia, Spain, UK, USA
Live videoconferencing, store-and-forward	Warshaw et al., 2011	Systematic review	Live videoconferencing teledermatology and/or store-and-forward dermatology compared to in-person dermatology	Patients with a variety of skin conditions including rashes and lesions	Australia, Brazil, Germany, Italy, Netherlands, New Zealand, Pakistan, Spain, Switzerland, Turkey, UK, USA
Store-and-forward	Whited et al., 2013a,b	Randomized controlled trial	Store-and-forward teledermatology compared to in person dermatology	VA patients being referred to a dermatology clinic by primary care providers	USA (Virginia)
Live videoconferencing	Wilbright et al., 2004	Comparison study	Live videoconferencing compared to in-person care	Underserved diabetes patients from a rural, low-income population treated for neuropathic forefoot ulcerations	USA

Table C-2. Summary of Findings From Studies of the Effectiveness of Telemedicine

Table C-2a. Access to Care: Telehealth Versus Standard Care

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Access to specialist outpatient visits							
Percent obtaining a diagnosis in <1 month	Ferrer-Roca et al., 2010 — multiple diseases and conditions	Real-time videoconferencing	Observational study with comparison group	Statistically significant	Favors intervention	72% vs. 33%	
Percent obtaining a physical examinination in <1 month	Ferrer-Roca et al., 2010 — multiple diseases and conditions	Real-time videoconferencing	Observational study with comparison group	Statistically significant	Favors intervention	79% vs. 49%	
Percent obtaining treatment in <1 month	Ferrer-Roca et al., 2010 — multiple diseases and conditions	Real-time videoconferencing	Observational study with comparison group	Statistically significant	Favors intervention	69% vs. 36%	

Table C-2a. Access to Care: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance		Direction of Effect	Size of Effect	Conclusion
Access to specialist outpatient visits								
Average wait time for specialist appointment	Warshaw et al., 2011	Store-and-forward	Systematic review	Not reported	Favors intervention	Difference ranged from 21 to 86 days		
Average wait time for specialist appointment	Warshaw et al., 2010 -ENT	Real-time video and store-and-forward	Retrospective analysis	Not reported	Favors intervention	47% pre-telemedicine vs. 8% within first 3 years of telemedicine		
Percent making <5 trips to hospital for specialty consultation or procedures	Warshaw et al., 2011	Real-time/ store-and-forward	Systematic review	Statistically significant	Favors intervention	97% vs. 50%		

Table C-2a. Access to Care: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Access to specialist outpatient visits							
Time to treatment teledermatology referral compared to clinic dermatology referral (time to surgery or definitive intervention)	Warshaw et al., 2011	Real-time /store-and-forward	Systematic review	Statistically significant	Favors intervention	Difference ranged from 21 to 86 days	
Percent waiting 5+ months for specialist appointment	Hofstetter et al., 2010 — ENT	Store-and-forward	Retrospective analysis	Not reported	Favors intervention	47% pre-telemedicine vs. 8% within first 3 years of telemedicine	
Percent making <5 trips to hospital for specialty consultation or procedures	Ferrer-Roca et al., 2010 — multiple diseases and conditions	Real-time videoconferencing	Observational study with comparison group	Statistically significant	Favors intervention	97% vs. 50%	

Table C-2a. Access to Care: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Access to acute care							
Unnecessary transfers specialized unit at referral hospital	Johansson and Wild, 2010 (Wong et al., 2006 — neurosurgical conditions) Pedragosa et al., 2009 — stroke	Real-time video vs. telephone	Systematic review — RCT (Wong et al., 2006) Before after study (Pedragosa et al., 2009	Not statistically significant (1 study) Statistically significant (1 study)	No difference (1 study) Favors intervention (1 study)	Wong et al., 2006: No effect Pedragosa et al., 2009: 20% real-time video vs. 51% pre real-time video	
Percent transferred specialized unit at referral hospital	Johansson and Wild, 2010 (Wong et al., 2006 — neurosurgical conditions; Handschu et al., 2008 — stroke) Pedragosa et al., 2009 — stroke Duchesne et al., 2008 — trauma	Real-time video vs. telephone	RCT (Wong et al., 2006) Handschu et al., 2008 Controlled trial (Wong et al., 2006) Before after study (Pedragosa et al., 2009, and Duchesne et al., 2008)	Statistically significant (3 studies) Not statistically significant (1 study)	Favors intervention (3 studies) No difference (1 study)	Wong et al., 2006: no effect Handschu et al., 2008: 9.1% video exam vs. 14.9% phone consult Pedragosa et al., 2009: 6% real-time video vs. 17% pre real-time video Duchesne et al., 2008: 11% real-time video vs. 100% pre real-time video	

Table C-2a. Access to Care: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Access to acute care							
Percent transferred to burn center by emergency air transport	Saffle et al., 2009	Real-time video	Before-after study	Statistically significant	Favors intervention	Decrease from 100% to 44%	
Percent treated in local emergency department and released vs. transferred to trauma center	Duchesne et al., 2008 — trauma	Real-time video	Before-after study	Statistically significant	Favors telemedicine	61.3% real-time video vs. 0% pre real-time video	
Percent admitted to local community hospital vs. transferred to trauma center	Duchesne et al., 2008 — trauma	Real-time video	Before-after study	Statistically significant	Favors telemedicine	13.6% real-time video vs. 0% pre real-time video	
Proportion of patients evaluated by specialized neurologist	Pedragosa et al., 2009 — stroke	Real-time video	Before-after study		Favors telemedicine	Increase from 17% to 38%	

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Resource use							
Aggregate use of multiple types of health care services[4]	Atherton et al., 2012 (Bergmo et al., 2009 — eczema)	Store-and-forward plus secure e-mail	Systematic Review/ Meta –analysis (1study)	Not statistically significant	No difference	No effect	
Hospitalizations							
One or more hospitalizations over 12 months	Bunn et al., 2004 (Darnell et al., 1985 — all diagnoses) Garcia-Lizana and Munoz-Mayorga, 2010 (O'Reilly et al., 2007 — psychiatric) McLean et al., 2010 (Kokubu et al., 2000 — asthma)	Telephone calls (Darmell and Kokubu et al., 2000) Real-time video (O'Reilly et al., 2007)	Systematic Review (3 studies)	Not statistically significant (2 studies) Statistically significant (1 study)	No difference (2 studies) Favors intervention (1 study)	Darnell et al., 1985: 25% (intervention) vs. 26% (control) O'Reilly et al., 2007 : 7% (intervention) vs. 7% (control) Kokubu et al., 2000: OR 0.14 (95% CI: 0.03 to 0.69)	

[4] Includes GP visits, outpatient consultations, emergency visits, hospital admissions, visits to complementary therapists and personal expenses (for moisturisers, special clothing, diets, etc.) The study enrolled children with eczema and their parents.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Hospitalizations (cont'd)							
Number of inpatient days at 12 months	McLean et al., 2010 (Ostojic et al., 2005 — asthma) McLean et al., 2011 (Wong et al., 2005 -COPD)	Text messages[5] (Ostojic et al., 2005) Telephone call[6] (Wong et al., 2005)	Systematic review	Not statistically significant	No difference	No effect	
Mean length of hospital stay	Bunn et al., 2004 (Darnell et al., 1985 — all diagnoses) Modai et al., 2006 — psychiatric	Telephone calls (Darnell et al., 1985) Real-time video (Modai et al., 2006)	Systematic review 1 of 1	Not statistically significant (2	No difference (2	No effect (2 studies)	

[5] Text messages from physicians to patients that were customized based on patients' report of symptoms. Depending on the patient's condition the text message would recommend no change in treatment, adjustment of medications, or an office visit.
[6] Two telephone calls from a nurse following hospital discharge.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance		Direction of Effect	Size of Effect	Conclusion
Hospitalizations (cont'd)								
Mean number of hospitalizations at 6 months	Bunn et al., 2004 — all diagnoses Leimig et al., 2008 — organ transplant	Real-time video	RCTs	Not statistically significant (2 studies)		No difference (2 studies)	No effect (2 studies)	
Number of inpatient days at 12 months	Goldzweig et al., 2012 (Ralston et al., 2009 -diabetes)	Secure e-mail plus care manager[7]	Systematic review	Not statistically significant	No difference	No effect		
Mean length of hospital stay	Craig et al., 2004 (neurology) Johansson and Wild, 2010 (Audebert et al., 2006)	Real-time video (Craig et al., 2004) Real-time video vs. phone consult (Audebert et al., 2006)	Observational study with comparison group[8] Systematic review 1 of 1	Statistically significant Not statistically significant 1 of 2	Favors intervention No difference 1 of 2	8.1 days (intervention) vs. 11.6 days (control) 10.3 (4.4) days intervention vs. 10.5 (6.3) days control		

[7] This study assessed patients with diabetes. Patients in the intervention group had access to secure e-mail through a web portal through which they also had access to their electronic health records an d upload blood glucose readings and data about diet and exercise. The intervention group also had access to a care manager (profession not specified) who responded to their e-mail messages.

[8] This study compared patients at two hospitals, one with capacity for live videoconferencing with a neurologist and one without. The symptoms of the patients with neurological complains admitted to the two hospitals differed, which may affect the results.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Hospitalizations (cont'd)							
Length of hospitalization (# of days)	Johansson and Wild, 2010 (Handschu et al., 2008)	Real-time video vs. phone consult	Controlled trial (alternating weeks)	Not statistically significant	Favors video	11.4 video exam vs. 12.3 telephone consult	
Emergency department visits							
One or more emergency department visits over 12 months	Bunn et al., 2004 (Darnell et al., 1985 — all diagnoses) McLean et al., 2010 (Kokubu et al., 2000 — asthma)	Telephone calls (2 studies)	Systematic Review/ Meta –analysis (2 studies)	Not statistically significant (2 studies)	No difference (2 studies)	No effect (2 studies)	

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance		Direction of Effect	Size of Effect	Conclusion
Emergency department visits (cont'd)								
One or more emergency department visits over 3 months	McLean et al., 2011 (Wong et al., 2005 — COPD)	Telephone call	Meta-analysis (1study)	Statistically significant	Favors intervention	OR for control group: 0.17 (95% CI: 0.04 to 0.67)[9]		
Mean number of emergency department visits over 15 months	Goldzweig et al., 2012 (Harris et al., 2013 — diabetes)	Secure e-mail	Systematic review	Statistically significant	Favors control	1.66 (1.23–2.26)		
Mean number of emergency department visits over 12 months	Goldzweig et al., 2012 (Chen et al., 2014 — all diagnoses)	Secure e-mail	Systematic review (1 study)	Statistically significant	Favors control	+11%		

[9] The authors calculated the odds ratio with the intervention group as the reference instead of the control group. Thus, the results indicate that patients in the control group had higher odds of having one or more ED visits over 3 months than patients in the control group.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Emergency department visits (cont'd)							
Mean number of emergency department visits over 12 months	Bunn et al., 2004 (Darnell et al., 1985 — all diagnoses)	Telephone calls (1 study)	Systematic review (1 study)	Not statistically significant	No difference	No effect	
Mean number of emergency department visits over 6 months	Wallace et al., 2004 — all diagnoses	Real-time video	RCT	Not statistically significant	No difference	No effect	
Mean number of emergency department visits over 1 month	Bunn et al., 2004 (McKinstry et al., 2002 — all diagnoses)	Telephone calls	Systematic review (1 study)	Not statistically significant	No difference	No effect	
Urgent care visits							
Mean number of urgent care visits per patient per year	Goldzweig et al., 2012 (Chen et al., 2014 — all diagnoses)	Secure e-mail	Systematic review (1 study)	Statistically significant	Favors control	+19%	

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Office visits							
Mean number of outpatient visits per patient at 15 months	Goldzweig et al., 2012 (Harris et al., 2013 — diabetes)	Secure e-mail	Systematic review (1 study)	Statistically significant	Favors control	1.39 (1.26 to 1.53) for frequent users vs. nonusers	
Mean number of office visits per patient per 12 months	Atherton et al., 2012 (Bergmo et al. 2005 — al diagnoses)[10] Goldzweig et al., 2012 (Chen et al., 2014[11] — all diagnoses and Ralston et al.,2009 — diabetes)	Secure e-mail	Systematic Review/ Meta –analysis	Statistically significant: 2 of 3 studies Not statistically significant: 1 of 3 studies	Favors intervention: 2 of 3 studies No difference: 1 of 3 studies	Bergmo et al., 2005: Mean difference −1.10 (95% CI: −1.87 to −0.33) Chen et al., 2014: −26% Ralston et al.,2009: no difference	

[10] This article is also included in Goldzweig et al., 2012.
[11] Assessed Kaiser Permanente's KP Health Connect, a web portal that provides patients access to their electronic health records in addition to secure e-maile-mail with physicians. This web portal also enables clinicians to e-maile-mail one another regarding patients.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Office visits (cont'd)							
Mean number of office visits per week	Bunn et al., 2004 (Jiwa et al., 2002 — all diagnoses)	Telephone calls	Systematic review	Statistically significant	Favors intervention	39% reduction in office visits[12]	
Primary care office visits							
Mean number of primary care visits per patient at 15 months	Goldzweig et al., 2012 (Harris et al., 2013 — diabetes)	Secure e-mail	Systematic review	Statistically significant	Favors control	1.32 (1.19–1.45) frequent users vs. nonusers	
Mean number of primary care visits per patient at 12 months	Goldzweig et al., 2012 (Chen et al., 2014, and Zhou et al., 2010 — all diagnoses, and Ralston et al., 2009 — diabetes)	Secure e-mail (Chen et al., 2014, and Zhou et al., 2010) Secure e-mail plus care manager (Ralston et al., 2009)	Systematic review	Statistically significant (2 studies) Not statistically significant (1 study)	Favors intervention (2 studies) No difference (1 study)	Chen et al., 2014: −25% Zhou et al., 2010: −10%[13] Ralston et al., 2009: No change	

[12] No comparison group because this study used an interrupted time series design.
[13] Zhou et al. (2007) conducted a before-after cohort study that included all adult enrollees as well as a matched case-control study that compared secure e-mail users to non-users. Primary care visits per year decreased in both groups, but the decrease was greater in the group that used secure -mail.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Specialty care office visits							
Mean number of specialty care visits per patient at 15 months	Goldzweig et al., 2012 (Harris et al., 2013 — diabetes)	Secure e-mail	Systematic review	Statistically significant	Favors control	1.43 (1.25–1.64) frequent users vs. nonusers	
Mean number of specialty care visits per patient at 12 months	Goldzweig et al., 2012 (Chen et al., 2014 — all diagnoses and Ralston et al., 2009 — diabetes)	Secure e-mail (Chen et al., 2014) Secure e-mail plus care manager (Ralston et al., 2009)	Systematic review	Statistically significant (1 study) Not statistically significant (1 study)	Favors intervention (1 study) No difference (1 study)	Chen et al., 2014: −22% No change	
Mean number of specialty care visits per patient at 6 months	Wallace et al., 2004 — all diagnoses	Real-time video	RCT	Not statistically significant	No difference	No effect	
Number of dermatology clinic visits during study period	Whited et al., 2013a — dermatology	Store-and-forward	Randomized controlled trial	Not stated	Favors teledermatology	Intervention 62% had at least one clinic visit vs. 88% conventional care	

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation (s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Telephone calls							
Mean number of telephone calls per patient per 12 months	Atherton et al., 2012 (Bergmo et al., 2005 — all diagnoses) Goldzweig et al., 2012 (Chen et al., 2014, and Zhou et al., 2010 — all diagnoses)	Secure e-mail	Systematic Review	Statistically significant (2 studies) Not statistically significant (1 study)	E-mail associated with more telephone visits (1 study) E-mail associated fewer telephone calls (1 study) No difference (1 study)	Chen et al., 2014: +869% Zhou: −0.2 calls[14] Bergmo et al., 2005: No effect	
Mean number of telephone calls per patient in 6 months	Atherton et al., 2012 (Lin et al., 2005 — all diagnoses)	Secure e-mail[15]	Systematic Review/ Meta –analysis (1study)	Not statistically significant	No difference	0.36 (SD = 1.25) in intervention group and 0.42 (SD = 1.06) in the control group	

[14] Zhou et al., (2007) found that the number of telephone calls increased among both users of secure e-mail and non-users but that the increase was less pronounced among users.

[15] The intervention group had access to a secure web portal through which they could make appointments and refill prescriptions in addition to sending messages to their physicians. Physicians in the control group occasionally exchanged e-mails with patients, but the volume of messages was small.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation (s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Telephone calls (cont'd)							
Weekly telephone calls per 100 scheduled visits	Atherton et al., 2012 (Katz et al., 2003 — all diagnoses)	Secure e-mail with nurse triage[16]	Systematic Review/ Meta –analysis (1study)	Not statistically significant	Favors control group	67 vs. 55 phone calls per 100 scheduled visits	
Mean number of telephone calls per 1,000 patients per day	Goldzweig et al., 2012 (Liederman et al., 2005 — all diagnoses)	Secure e-mail	Systematic Review (1study)	Statistically significant	Favors intervention	22 calls per 1,000 patients vs. 26 calls per 1,000 patients	
All contacts with physician office							
Mean number of contacts with general practitioners	Wallace et al., 2004 — all diagnoses	Real-time video	RCT	Not statistically significant	No difference	No effect	

[16] The intervention group had access to a secure web portal through which they could send messages that were triages by nurses who determine which messages needed to be answered by physicians. The control group consisted of patients who had access to physician's personal e-mail addresses but had to take initiative to find the e-mail addresses and were not encouraged to do so.

Table C-2b. Utilization of Other Health Care Services: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation (s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
All contacts with physician office (cont'd)							
Mean number of contacts general practitioners or front office staff during study period	Atherton et al., 2012 (Bergmo et al., 2005 — all diagnoses)	Secure e-mail	Systematic review/meta-analysis (1 study)	Statistically significant	Favors intervention	Mean difference −1.26 (95% CI: −1.85 to −0.67)	

Table C-2c. Processes of Care

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Received at least one asthma consultation in 12 months	McLean et al., 2010 (Gruffydd-Jones et al., 2005 — asthma)	Telephone	Systematic review — RCT	Not reported	Favors intervention	35% more of patients in intervention group	
Received HbA1c[17] screening	Harris et al., 2013 — diabetes Goldzweig et al., 2012 (Zhou et al., 2010 — diabetes)	Secure e-mail[18]	Observational study with comparison group	Statistically significant: 2 of 2 studies	Favors intervention: 2 of 2 studies	Harris et al., 2013: RR: 1.20 (95% CI: 1.15 to 1.25) Zhou et al., 2010: +4.8 percentage points	
LDL-C[19] screeening	Zhou et al., 2010 — diabetes	Secure e-mail	Observational study with comparison group	Statistically significant	Favors intervention	+5.3 percentage points	
Nephropathy screening	Zhou et al., 2010 — diabetes	Secure e-mail	Observational study with comparison group	Statistically significant	Favors intervention	+2.4 percentage points	

[17] HbA1c = hemoglobin A1c
[18] Both studies analyzed Kaiser Permanente enrollees and physicians. Kaiser Permanente provides patients with access to secure e-mail as part of a web portal that also included reminders about appointments, ability to refill medications, and access to lab test results and instructions for self-care.
[19] LDL-C = low-density lipoprotein cholesterol

Table C-2c. Processes of Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Diabetes recognition program score on process measures[20]	Bredfeldt et al., 2011	Secure e-mail vs. telephone[21]	Observational study with comparison group	Statistically significant	Favors e-mail	Not reported	
Retinopathy screening	Zhou et al., 2010 — diabetes Conlin et al., 2006 — diabetes	Secure e-mail Store-and-forward	Observational study with comparison group RCT	Statistically significant	Favors intervention	Zhou et al., 2010: +2.8 percentage points Conlin: +10 percentage points	
Adherence to psychiatric treatment at 6 months	Garcia-Lizana and Munoz-Mayorga, 2010 (Ruskin et al., 2004 — depression)	Real-time video	Systematic review — RCT	Not statistically significant	No difference	Not reported	
Adherence to psychiatric treatment at 3 months	Garcia-Lizana and Munoz-Mayorga, 2010 (Frueh et al., 2007 — PTSD[22])	Real-time video	Systematic review — RCT	Statistically significant	Favors control	Not reported	

Table C-2c. Processes of Care (Cont'd)

[20] Composite measure of the percentage of a physician's patients who have had an annual eye exam, an annual foot exam, and annual nephropathy screening, and have been asked about smoking status and given smoking cessation advice or treatment if needed.
[21] Secure e-mail was provided as part of a web portal that also included reminders about appointments, ability to refill medications, and access to lab test results and instructions for self-care.
[22] Post-traumatic stress disorder

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Ratio of mean psychiatric visits to mean number of missed psychiatric visits	Modai et al., 2006 — mental illness	Real-time video	Observational case-control	Not reported	Favors intervention	4.63 intervention vs. 2.35 control during intervention period	
Time from admission to receipt of tPA[23] treatment	Johansson and Wild, 2010 (Audebert et al., 2005, and Meyer et al., 2008 - stroke)	Real-time video	Systematic review — RCT (Meyer) Observational study with comparison group (Audebert et al., 2005)	Statistically significant 1 of 2 Not statistically significant 1 of 2	Favors control	68 (23) intervention vs. 61 (23) minutes control 51.2 (17.8) video vs. 44.8 (21.4) telephone	

[23] tPA = tissue plasminogen activator, a protein administered to persons having an acute ischemic stroke to reduce the risk of a blood clot.

Table C-2c. Processes of Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Time to tPA treatment from onset of symptoms	Johansson and Wild, 2010 (Audebert et al., 2005, and Meyer et al., 2008 — stroke) Pedragosa et al., 2009 — stroke	Real-time video	Systematic review — RCT (Meyer et al., 2008) Observational study with comparison group (Audebert et al., 2005) Before-after study (Pedragosa et al., 2009)	Statistically significant1 of 3 Not statistically significant 2 of 3	Favors intervention 1 of 3 No difference 1 of 3 Favors control (telephone) group 1 of 3	162 vs. 201 minutes 134 (30) vs. 135 (38) minutes 157.2 (37.3) video vs. 143.0 (33.1) minutes telephone	
Receipt of tPA treatment within three hours of onset of symptoms	Pedragosa et al., 2009 — stroke	Real-time video	Before-after study	Statistically significant	Favors intervention	68% vs. 30%	
Received at least one dilated eye-exam in 12 months	Conlin et al., 2006 — diabetes	Store-and-forward	RCT	Statistically significant	Favors intervention	Adherence 87% intervention vs. 77% control	

Table C-2d. Diagnostic Accuracy and Concordance

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Accuracy							
Diagnostic accuracy	Warshaw et al., 2011 — dermatology	Real-time video and store-and-forward vs. in person[24]	Systematic review — observational study with comparison group	Not reported	Favors comparison	Clinic dermatology better than teledermatology (aggregated diagnostic accuracy absolute difference 19%; primary diagnostic accuracy absolute difference 5% and 11%)[25]	Probably the strongest evidence for dermatology because used histopathology as a gold standard and pooled findings from 12 studies
Diagnostic accuracy	Hersh et al., 2006 (Scalvini et al., 2002 — cardiology)	Real-time video vs. in-person[26]	Systematic review — Retrospective case series	Not applicable	Favors intervention	Diagnostic accuracy: 86.9% Sensitivity: 97.4% Specificity 89.5%	
Diagnostic accuracy	Hersh et al., 2006 (Dahl et al., 2002 — heart murmur)	Store-and-forward (audio)[27]	Systematic review — Retrospective case series	Not applicable	Favors intervention	Sensitivity: 89.7% Specificity 98.2%	

[24] Findings from store-and-forward teledermatology to in-person dermatology were compared to histopathology/laboratory test results as a gold standard.
[25] Pooled findings from studies that compared store-and-forward teledermatology to in-person dermatology.
[26] Real-time video diagnosis compared to diagnosis subsequently made in an emergency department or, if not treated in an emergency department, the course of illness.
[27] Findings from store-and-forward were compared to cases in which the presence or absence of heart murmur was known.

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Accuracy (cont'd)							
Diagnostic accuracy	Hersh et al., 2006 (Saari et al., 2004 — diabetic retinopathy)	Store-and-forward	Systematic review — Retrospective case series	Not applicable	Favors intervention	Sensitivity: 88.9% to 97.7%[28] Specificity 98.9% to 100%	
Diagnostic accuracy	Hersh et al., 2006 (Craig et al., 2000 — neurology)	Real-time video	Systematic review — Retrospective case series	Not calculated	Favors intervention	Live video diagnosis deemed correct in 23 of 25 cases[29]	
Change in diagnosis for dermatology — referring provider versus teledermatologist	Lamel et al., 2012a — dermatology	Real-time video	Retrospective case series	Not applicable	Favors intervention	Change in 69.9% of patient consultations	No definitive evidence that care improved, but diagnoses of dermatologists are probably more accurate than those of primary care physicians due to greater expertise

[28] Range reflects variations across three digital cameras studied.
[29] Assessed by treating neurologist.

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Accuracy (cont'd)							
Change in diagnosis (percent of diagnosis corrected)	Johansson and Wild, 2010 (Handschu et al., 2008 — stroke)	Real-time video vs. telephone	Systematic review — Controlled clinical trial	Statistically significant	Favors remote video exam	7.1% vs. 17.6%	Suggests that using real-time video enables consulting neurologists to make more accurate diagnoses than they make via telephone
Management accuracy[30]	Warshaw et al., 2011 — dermatology	Store-and-forward vs. in-person	Systematic review — observational study with comparison group	Not statistically significant	Favors clinic dermatology for malignant and premalignant lesions	Overall rates of management accuracy were equivalent (± 10%) but inferior for malignant and premalignant lesions	Probably the strongest evidence for dermatology because used histopathology as a gold standard and samples were large
Percent of treatment decisions correct[31]	Johansson and Wild, 2010 (Meyer et al., 2008 — stroke)	Real-time video vs. telephone	Systematic review — RCT	Statistically significant	Favors video telemedicine	98% (video) vs. 82% (telephone) OR: 10.9 (95% CI: 2.7 to 44.6)	
Percent appropriately referred for specialty outpatient care	Wallace et al., 2012 (Wallace et al., 2007 — burns)	Store-and-forward vs. telephone	Systematic review — observational study with comparison group	Statistically significant	Favors intervention	Day surgery: 97% vs. 87% Outpatient burn clinic: 100% vs. 79%	

[30] Expert panel consensus regarding management based on histopathologic diagnosis as a gold standard.
[31] Based on expert panel's review of medical records.

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Accuracy (cont'd)							
Changes in disease management for dermatology — referring provider versus teledermatologist	Lamel et al., 2012a — dermatology	Real-time video	Retrospective case series	Not applicable	Favors intervention	Change in 97.7% of patient consultations	No definitive evidence that care improved but management plans of dermatologists are probably better than those of primary care physicians due to greater expertise
Concordance							
Diagnostic concordance	Warshaw et al., 2011	Real-time video and/or store-and-forward vs. in person	Systematic review — observational studies with comparison group	Not applicable	Favors real-time video	Weighted mean (aggregated) 64% in lesion studies and 65% in general studies for store-and-forward; 87% for real-time video Weighted mean (primary) 62% lesion studies and 67% general studies for store-and-forward; 71% for real-time video	Real-time video associated with higher rate of diagnostic concordance for aggregated diagnoses than store-and-forward

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Concordance (cont'd)							
Diagnostic concordance between teledermatologist and in person dermatologist	Lamel et al., 2012b — dermatology Barbieri et al., 2014 — dermatology	Store-and-forward vs. in-person[32]	Case series — all patients assessed by both store-and-forward and in-person	Not applicable	Moderate level of agreement	Lamel et al., 2012b: Aggregated diagnostic concordance 0.62 (95% CI: 0.51 to 0.71) Cohen kappa 0.60 Barbieri et al., 2005: Diagnostic agreement between in-person and teledermatologists 58% complete agreement, 30% partial agreement, 12% no agreement	Findings from the Lamel et al., 2012b study are likely to provide a more accurate assessment of potential for concordance because the physicians had high rates of diagnostic concordance for both store-and-forward and in-person

[32]In this study two different dermatologists conducted in-person visits and reviewed store-and-forward images. The authors also assessed concordance between the two dermatologists when using the same technology and found a high level of concordance between their diagnoses.

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Concordance (cont'd)							
Diagnostic concordance	Lasierra et al., 2012 — dermatology (pediatrics)	Store-and-forward vs. in person	Prospective case series[33]	Not reported	Varies by condition	*Inflammatory dermatoses* Total agreement 62% *Infections and infestations* Total agreement 83% *Tumors* Total agreement 80% *Other dermatoses* Total agreement 100%	

[33] In this study, a single group of patients were first evaluated via store-and-forward teledermatology and then had an in-person appointment with the same dermatologist within 1 week.

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Concordance (cont'd)							
Diagnostic concordance	Lasierra et al., 2012 — dermatology (pediatrics)	Store-and-forward vs. in-person	Prospective case series	Not reported	Varies by condition	*Inflammatory dermatoses* Total agreement 76% *Infections and infestations* Total agreement 75% *Tumors* No diagnosis Total agreement 79% *Other dermatoses* Total agreement 55%	
Diagnostic concordance	Hersh et al., 2006 (Gomez-Ulla et al., 2002 — diabetic retinopathy)	Store-and-forward	Systematic review — Retrospective case series	Not applicable	Favors intervention	100% concordance re cases of diabetic retinopathy, 94% agreement re gradation	

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Concordance (cont'd)							
Diagnostic concordance	Chen et al., 2014 — wound care	Store-and-forward vs. in-person	Observational study with comparison group	Not calculated	Not applicable	High level of agreement between remote and in-person surgeons as to which patients had gangrene, necrosis, erythema, or cellulitis/infection	
Management concordance	Warshaw et al., 2011	Real-time video and/or store-and-forward vs. in person	Systematic review — observational studies with comparison group	Not applicable	Moderate to very good concordance	Concordance rates were moderate to very good for both store-and-forward and live interactive teledermatology	

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Concordance (cont'd)							
Management concordance — general	Barbieri et al., 2014 Lamel — dermatology	Store-and-forward vs. in-person[34]	Case series — all patients assessed by both store-and-forward and in-person	Not applicable	Barbieri et al., 2005: moderate concordance [35] Lamel et al., 2012b: high concordance [36]	Barbieri et al., 2005: Cohen k 0.41 (95% CI: 0.18 to 0.60) between in-person and telederm. #1 0.48 (95% CI: 0.31 to 0.65) between in-person and telederm. #2 Lamel et al., 2012b: Concordance 0.81 (95% CI: 0.72 to 0.88) Cohen kappa 0.57	Findings from the Lamel et al., 2012b, study are likely to provide a more accurate assessment of potential for concordance because the physicians had high rates of diagnostic concordance for both store-and-forward and in-person

[34] In Lamel et al., 2012b, the images were taken and transmitted via mobile phone.

[35] In Barbieri et al., 2014, the level of management concordance between the two teledermatologists was also moderate (Kendall τ rank correlation coefficient of 0.41 [95% CI: 0.19 to 0.62]).

[36] In this study, two different dermatologists conducted in-person visits and reviewed store-and-forward images. The authors also assessed concordance between the two dermatologists when using the same technology and found a high level of concordance between their diagnoses.

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Concordance (cont'd)							
Management concordance — general	Chen et al., 2014 — wound care	Store-and-forward	Observational study with comparison group	Not calculated	Not applicable	High level of agreement between remote and in-person surgeons as to which patients did not need antibiotics or debridement	
Management concordance — decision to biopsy	Barbieri et al., 2014	Store-and-forward vs. in-person	Case series — all patients assessed by both store-and-forward and in-person	Not applicable	Moderate concordance [37]	Cohen k 0.35 (95% CI: 0.12 to 0.58) between in-person and teledermatologist 1 0.61 (95% CI: 0.39 to 0.82) between in-person and teledermatologist 2	

[37] In Barbieri et al., 2014, the level of management concordance between the two teledermatologists was good (Cohen κ coefficient of 0.63 [95% CI: 0.42 to 0.84]).

Table C-2d. Diagnostic Accuracy and Concordance (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Concordance (cont'd)							
Clinical concordance	Wallace et al., 2012 (Smith et al., 2004 — burns)	Real-time video vs. in person	Systematic review — case-control study	Not calculated	No difference	Rates of concordance between dermatologists were similar regardless of whether the comparisons were between two in-person visits or a video and an in-person visit	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Mortality							
Percent dead within 7 days of stroke	Johansson and Wild, 2010 (Audebert et al. 2005 — acute stroke)	Real-time video vs. in-person at referral hospital	Systematic review — Observational study with comparison group	Not statistically significant	No difference	3.5% (95% CI: 1.0 to 8.7) real-time video vs. 0.9% (95% CI: 0.0 to 5.0) referral hospital	
Odds of mortality — time frame not specified	Johansson and Wild, 2010 (Meyer et al., 2008 — acute stroke)	Real-time video vs. telephone	Systematic review — RCT[38]	Not statistically significant	No difference	OR 1.6 (95% CI: 0.8 to 3.4)	
Percent dead within 10 days of stroke	Johansson and Wild, 2010 (Handschu et al., 2008 — acute stroke)	Real-time video vs. telephone	Systematic review — controlled clinical trial	Statistically significant	Favors video intervention	1.3% real-time video vs. 6.8% telephone	

[38] RCT=randomized controlled trial.

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
General health status							
SF 12 general health score at 3 months — mean score	Harrison et al., 1999 — multiple diagnoses	Real-time video	RCT	Not statistically significant	No difference	No effect	
SF 12 general health score at 6 months — mean score	Wallace et al., 2004 — multiple diagnoses	Real-time video	RCT	Not statistically significant	No difference	No effect	
SF 12 general health scores at 6 months — % reporting good health	Ferrer-Roca, et al., 2010 — multiple diagnoses	Real-time video	Observational study with comparison group	Not statistically significant	No difference	No effect	
SF-12 general health score at 9 months	Whited et al., 2013b — dermatology	Store-and-forward	RCT	Not statistically significant	No difference	No effect	
SF-36 general health score at 12 months	Garcia-Lizana and Munoz-Mayorga, 2010 (Mitchell et al., 2008 — bulimia)	Real-time video	Systematic review — RCT	Not statistically significant	No difference	No change	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Asthma							
Score on the Asthma Control Questionnaire	McLean et al., 2010 (Gruffydd-Jones et al., 2005 — asthma)	Telephone calls	Meta-analysis — RCT	Not statistically significant	No difference	No effect	
Score on the Juniper Mini Asthma Quality of Live questionnaire	McLean et al., 2010 (Gruffydd-Jones et al., 2005 — asthma)	Telephone calls	Meta-analysis — RCT	Statistically significant	Favors intervention	+0.23 points intervention vs. +0.07 points control	
Dermatology							
Clinical course ratings	Whited et al., 2013a — dermatology	Store-and-forward	RCT	Not statistically significant	No difference	Resolved or improved 72% intervention vs. 72% control	
Skindex-16 score improvement at 9 months (composite)[39]	Whited et al., 2013b — dermatology	Store-and-forward	RCT	Not statistically significant	No difference	Intervention −2.0 vs. −13.2 for control	

[39] In addition, the authors found no statistically significant differences in subscales of the Skindex-16 that measure symptoms, emotions, and functioning.

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Diabetes							
Mean difference in change of HbA1c[40] from baseline	Lau et al., 2014 — diabetes	Secure e-mail	Observational study with comparison group	Statistically significant	Favors intervention	−0.61	
Mean HbA1c at follow-up (6 months to 2 years)	Lau et al., 2014 — diabetes	Secure e-mail	Observational study with comparison group	Statistically significant	Favors intervention	7.05 intervention vs. 7.66 comparison	
Better glycemic control at follow-up (HbA1c <7.0%)	Goldzweig et al., 2012 (Harris et al., 2009, and Ralston et al., 2009 — diabetes) Harris et al., 2013 — diabetes Lau et al., 2014 — diabetes	Secure e-mail	Systematic review — RCT (Ralston et al., 2009) and observational study with comparison group (Harris et al., 2009) Observational study with comparison group — Lau et al., 2014 Cross-sectional observational study (Harris et al., 2013)	Statistically significant 4 of 4 studies	Favors intervention 4 of 4 studies	Harris et al., 2009: RR 1.36 (1.16 to 1.58) Ralston et al., 2009: 33% intervention vs. 11% control Lau et al., 2014: 28% intervention vs. 16% control Harris et al., 2013: RR[41]: 1.14 (95% CI: 1.08 to 1.20) for 12+ e-mails in 12 months vs. 1 to 4 e-mails in 12	

[40] HbA1c=hemoglobin A1c, an important measure of blood sugar control among persons with diabetes.
[41] RR=relative risk.

						months	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Diabetes (cont'd)							
Better glycemic control at follow-up (HbA1c <9.0%)	Goldzweig et al., 2012 (Zhou et al., 2010 — diabetes)	Secure e-mail	Observational study with comparison group	Statistically significant	Favors intervention	+4.9 percentage points	
Mean difference in changes of HbA1c from baseline	Suksomboon et al., 2014 (Bogner et al., 2012-- diabetes)	Telephone calls	Meta-analysis — RCT	Statistically significant	Favors intervention	Mean difference −1.20 (95% CI: −1.56 to -1.84)	
HbA1c at 12 months	Leichter et al., 2013 –diabetes	Telephone calls	RCT	Not statistically significant	No difference	Mean difference study group 7.4 vs. 7.1 control group	
Foot ulceration healing time	Hersh et al., 2006 (Wilbright et al., 2004 — diabetes)	Real-time video	Systematic Review — Observational study with comparison group	Not statistically significant	No difference	Intervention 43.2 ± 29.3 vs. control 45.5 ± 43.4	
Percent of forefoot ulcers healed in 12 weeks	Hersh et al., 2006 (Wilbright et al., 2004 —	Real-time video	Systematic Review — Observational study with	Not statistically significant	No difference	Intervention 75% vs. control 81%	

	diabetes)		comparison group				

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Diabetes (cont'd)							
Adjusted healing time ratio	Hersh et al., 2006 (Wilbright et al., 2004 — diabetes)	Real-time video	Systematic Review — Observational study with comparison group	Not statistically significant	No difference	1.40 vs. 1.00	
Hyperlipidemia							
LDL cholesterol at six months to two years	Lau et al., 2014 — diabetes	Secure e-mail	Observational study with comparison group	Not statistically significant	No difference	No effect	
LDL cholesterol less than 100 mg/dl	Goldzweig et al., 2012 (Harris et al., 2009, and Zhou et al., 2010 — diabetes)	Secure e-mail	Systematic review — Observational study with comparison group	Statistically significant	Favors intervention	Harris et al., 2009: RR 0.94 (95% CI: 0.90 to 0.98) nonusers Zhou et al., 2010: +6.5 percentage points users	
Total cholesterol at 12 months	Goldzweig et al., 2012 (Ralston et al., 2009 —	Secure e-mail	Systematic review — RCT	Not statistically significant	No difference	No change	

diabetes)

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Hyperlipidemia (cont'd)							
LDL cholesterol at 12 months	Leichter et al., 2013 — diabetes	Telephone calls	RCT	Not statistically significant	No difference	Mean intervention 79.7 (4.8) vs. 90.7 (4.5) control	
HDL cholesterol at 12 months	Leichter et al., 2013 — diabetes	Telephone calls	RCT	Not statistically significant	No difference	Mean intervention 47.8 (1.4) vs. 48.5 (1.3) control	
Triglycerides at 12 months	Leichter et al., 2013 — diabetes	Telephone calls	RCT	Not statistically significant	No difference	Mean intervention 129.8 (18.8) vs. 147.4 (17.3) control	
Hypertension							
Blood pressure change at 12 months (systolic)	Goldzweig et al., 2012 (Ralston et al., 2009 — diabetes)	Secure e-mail	Systematic review — RCT	Not statistically significant	No difference	No effect	
Blood pressure change at six months to two years (systolic)	Lau et al., 2014	Secure e-mail	Observational study with comparison group	Not statistically significant	No difference	No effect	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Hypertension (cont'd)							
Blood pressure change at 12 months (diastolic)	Goldzweig et al., 2012 (Ralston et al., 2009 — diabetes)	Secure e-mail	Systematic review — RCT	Not statistically significant	No difference	No effect	
Blood pressure less than 140/90	Goldzweig et al., 2012 (Zhou et al., 2010 — separate estimates for persons with hypertension alone and persons with diabetes)	Secure e-mail	Systematic review — Observational study with comparison group	Statistically significant for both persons with hypertension alone and persons with diabetes	Favors intervention for both persons with hypertension alone and persons with diabetes	Hypertension alone: +2.0 percentage points Diabetes: +3.2 percentage points	
Blood pressure less than 130/80	Goldzweig et al., 2012 (Harris et al., 2009)	Secure e-mail	Systematic review — Observational study with comparison group	Not statistically significant	No difference	No effect	
Blood pressure change at 12 months (systolic)	Leichter et al., 2013 — diabetes	Telephone calls	RCT	Not statistically significant	No difference	No effect	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Hypertension (cont'd)							
Blood pressure change at 12 months (diastolic)	Leichter et al., 2013 — diabetes	Telephone calls	RCT	Not statistically significant	No difference	No effect	
Organ transplants							
Rate of infections	Leimig et al., 2008 — transplant recipients[42]	Real-time video[43]	RCT	Not statistically significant	No difference	No change	
Transplant rejection	Leimig et al., 2008 — transplant recipients	Real-time video	RCT	Not statistically significant	No difference	No change	
Body mass index or weight							
Change in mean body weight at 12 months	Leichter et al., 2013 — diabetes	Telephone calls	RCT	Statistically significant	Favors intervention	Mean body weight loss −5.2 lbs intervention vs. −0.7 lbs in control	
BMI at 12 months	Leichter et al., 2013 — diabetes	Telephone calls	RCT	Not statistically significant (but approaches significance 0.06)	Favors intervention	Mean 31.3 (0.3) intervention vs. 32.0 (0.3) control	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

[42] Most patients enrolled in this study had undergone kidney transplants.
[43] Videoconferences were conducted by a nurse practitioner who obtained input from physicians as needed.

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Body mass index or weight (cont'd)							
Percent with decreased BMI percentile at 1 year	Smith et al., 2013 (Davis et al., 2011, and Irby et al., 2012 — child obesity)	Real-time video	Systematic review — Observational study with comparison group	Not statistically significant 2 of 2	Davis et al., 2011: No difference Irby et al., 2012: Favors control	Davis et al., 2011: No effect Irby et al., 2012: 64% real-time video vs. 69% in person	
Physical activity behavior at 1 year	Smith et al., 2013 (Davis et al., 2011 — child obesity)	Real-time video	Systematic review	Not statistically significant	No difference	No difference	
Nutrition at 1 year	Smith et al., 2013 (Davis et al., 2011 — child obesity)	Real-time video	Systematic review	Not statistically significant	No difference	No effect	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Mental Health							
Symptoms improvement at 24 weeks	Garcia-Lizana and Munoz-Mayorga, 2010 (De Las Cuevas et al., 2003 — multiple mental health diagnoses) (Ruskin et al., 2004 — depression) (Bouchard et al., 2004 — panic with agoraphobia)	Real-time video	Systematic review — RCT	Not statistically significant 3 of 3	No difference 3 of 3	No difference 3 of 3	
Symptom improvement at 3 months	Garcia-Lizana and Munoz-Mayorga, 2010 (Frueh et al., 2007 — PTSD)	Real-time video	Systematic review — RCT	Not statistically significant	No difference	No difference	
Symptoms improvement at 8 weeks	Garcia-Lizana and Munoz-Mayorga, 2010 (Nelson et al., 2003 — depression)	Real-time video	Systematic review — RCT	Statistically significant	Favors intervention	Not reported	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Mental Health (cont'd)							
Return to functional score on the brief symptom inventory (BSI) scores by four months	Garcia-Lizana and Munoz-Mayorga, 2010 (O'Reilly et al., 2007 — multiple mental health diagnoses)	Real-time video	Systematic review — RCT	Not statistically significant	No difference	No difference	
Global severity index of the BSI	(O'Reilly et al., 2007 — multiple mental health diagnoses)	Real-time video	Systematic review — RCT	Not statistically significant	No difference	No difference	
Mental health subscale of the SF 36	(O'Reilly et al., 2007 — multiple mental health diagnoses)	Real-time video	Systematic review — RCT	Not statistically significant	No difference	No difference	
SF-36 mental health score at 12 months	Garcia-Lizana and Munoz-Mayorga, 2010 (Mitchell et al., 2008 — bulimia)	Real-time video	Systematic review — RCT	Not statistically significant	No difference	Not statistically significant	
Abstinence from binging and purging	Garcia-Lizana and Munoz-Mayorga, 2010 (Mitchell et al., 2008 — bulimia)	Real-time video	Systematic review — RCT	Not statistically significant	Favors control	22.6% intervention vs. 28.8% control	

Table C-2e. Health Outcomes: Telehealth Versus Standard Care (Cont'd)

Outcome	Citation(s)	Intervention	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Mental Health (cont'd)							
Panic attack frequency at 6 months	Garcia-Lizana and Munoz-Mayorga, 2010 (Bouchard et al., 2004 — panic with agoraphobia)	Real-time video	Systematic review — RCT	Statistically significant	Favors intervention	Not reported	
Mean STAXI-2[44] scores at 6 months (anger expression)	Morland et al., 2010 — PTSD	Real-time video	RCT	Not statistically significant	No difference	No difference	
Mean STAXI-2 scores at 6 months (trait anger)	Morland et al., 2010 — PTSD	Real-time video	RCT	Not statistically significant	No difference	No difference	
Mean NAS-T[45] scores at 6 weeks (post-treatment)	Morland et al., 2010 — PTSD	Real-time video	RCT	Not statistically significant	No difference	No difference	
Mean PCL-M[46] scores at 6 weeks (post-treatment)	Morland et al., 2010 — PTSD	Real-time video	RCT	Not statistically significant	No difference	No difference	This measure was not administered at 3 or 6 months

[44] STAX=State-Trait Anger Expression Inventory.
[45] NAS-T=Novaco Anger Scale.
[46]PCL-M=Postraumatic Stress Disorder Checklist – Military Version.

Appendix D: Cost Impact Analysis: Data Sources, Estimation Methodology, Caveats, and Assumptions

This appendix describes data sources, estimation methodology, as well as general and mandate-specific caveats and assumptions used in conducting the cost impact analysis. For additional information on the cost model and underlying methodology, please refer to the CHBRP website at: www.chbrp.org/analysis_methodology/cost_impact_analysis.php.

The cost analysis in this report was prepared by the members of the cost team, which consists of CHBRP task force members and contributors from the University of California, Los Angeles, and the University of California, Davis, as well as the contracted actuarial firm, Milliman, Inc. (Milliman).[47]

Data Sources

In preparing cost estimates, the cost team relies on a variety of data sources as described below.

Baseline model

1. The California Simulation of Insurance Markets (CalSIM) is used to project health insurance status of Californians aged 64 and under in 2014. CalSIM is a microsimulation model that projects the effects of the Affordable Care Act on firms and individuals.[48] CalSIM relies on national Medical Expenditure Panel Survey (MEPS) Household Component and Person Round Plan, California Health Interview Survey (CHIS) 2011–2012, and 2012 California Employer Health Benefits Survey data.
2. California Health Interview Survey (2011–2012) data is used to estimate the number of Californians aged 65 and older, and the number of Californians dually eligible for both Medi-Cal and Medicare coverage. CHIS 2011–2012 is also used to determine the number of Californians with incomes below 400% of the federal poverty level. CHIS is a continuous survey that provides detailed information on demographics, health insurance coverage, health status, and access to care. CHIS 2011–2012 surveyed approximately 55,000 households and is conducted in multiple languages by the UCLA Center for Health Policy Research. More information on CHIS is available at www.chis.ucla.edu.
3. The latest (2012) California Employer Health Benefits Survey is used to estimate:
    a. Size of firm; and
    b. Percentage of firms that are purchased/underwritten (versus self-insured).
    c. Premiums for health care service plans regulated by the Department of Managed Health Care (DMHC) (primarily health maintenance organizations [HMOs] and point of service [POS] plans)

[47] CHBRP's authorizing legislation requires that CHBRP use a certified actuary or "other person with relevant knowledge and expertise" to determine financial impact (www.chbrp.org/docs/authorizing_statute.pdf).
[48] UC Berkeley Center for Labor Research and Education and UC Los Angeles Center for Health Policy Research. *Methodology & Assumptions, California Simulation of Insurance Markets (CalSIM) Version 1.9*, April 2014. Available at www.calsim.org. Accessed April 1, 2014.

d. Premiums for health insurance policies regulated by the California Department of Insurance (CDI) (primarily preferred provider organizations [PPOs] and fee-for-service [FFS] plans)

This annual survey is currently released by the California Health Care Foundation/National Opinion Research Center (CHCF/NORC) and is similar to the national employer survey released annually by the Kaiser Family Foundation and the Health Research and Educational Trust. Information on the CHCF/NORC data is available at: www.chcf.org/publications/2010/12/california-employer-health-benefits-survey.

4. Milliman data sources are relied on to estimate the premium impact of mandates. Milliman's projections derive from the Milliman Health Cost Guidelines (HCGs). The HCGs are a health care pricing tool used by many of the major health plans in the United States. See www.milliman.com/expertise/healthcare/products-tools/milliman-care-guidelines/index.php. Most of the data sources underlying the HCGs are claims databases from commercial health insurance plans. The data are supplied by health insurance companies, HMOs, self-funded employers, and private data vendors. The data are mostly from loosely managed health care plans, generally those characterized as preferred provider organization (PPO) plans. The HCGs currently include claims drawn from plans covering 37 million members. In addition to the Milliman HCGs, CHBRP's utilization and cost estimates draw on other data, including the following:

   a. The MarketScan databases, which reflects the health care claims experience of employees and dependents covered by the health benefit programs of large employers. These claims data are collected from approximately 100 different insurance companies, Blue Cross Blue Shield plans, and third party administrators. These data represent the medical experience of insured employees and their dependents for active employees, early retirees, individuals with COBRA continuation coverage, and Medicare-eligible retirees with employer-provided Medicare Supplemental plans. No Medicaid or Workers Compensation data are included.

   b. An annual survey of HMO and PPO pricing and claim experience. The most recent survey (2010 Group Health Insurance Survey) contains data from seven major California health plans regarding their 2010 experience.

   c. Ingenix MDR Charge Payment System, which includes information about professional fees paid for health care services, based upon approximately 800 million claims from commercial insurance companies, HMOs, and self-insured health plans.

   d. These data are reviewed for applicability by an extended group of experts within Milliman but are not audited internally.

5. Premiums and enrollment in DMHC-regulated health plans and CDI-regulated policies by self-insured status and firm size are obtained annually from CalPERS for active state and local government public employees and their dependents who receive their benefits through CalPERS. Enrollment information is provided for DMHC-regulated health care service plans covering non-Medicare beneficiaries — about 74% of CalPERS total enrollment. CalPERS self-funded plans — approximately 26% of enrollment — are not

subject to state mandates. In addition, CHBRP obtains information on current scope of benefits from evidence of coverage (EOC) documents publicly available at www.calpers.ca.gov. For the 2013 model, CHBRP assumes CalPERS's enrollment in 2014 will not be affected by the ACA.

6. Enrollment in Medi-Cal Managed Care (beneficiaries enrolled in Two-Plan Model, Geographic Managed Care, and County Operated Health System plans) is estimated based on data maintained by the Department of Health Care Services (DHCS). CHBRP assesses enrollment information online at: www.dhcs.ca.gov/dataandstats/statistics/Pages/RASB_Medi-Cal_Enrollment_Trends.aspx. Starting with the 2013 model, the most recent Medi-Cal enrollment data from DHCS is projected to 2014 based on CalSIM's estimate of the impact of the Medi-Cal expansion in 2014.

Estimate of premium impact of mandates

7. CHBRP's Annual Enrollment and Premium Survey collects information from the seven largest providers of health insurance in California (Aetna, Anthem Blue Cross of California, Blue Shield of California, CIGNA, Health Net, Kaiser Foundation Health Plan, and United Healthcare/PacifiCare) to obtain estimates of baseline enrollment by purchaser (i.e., large and small group and individual), type of plan (i.e., DMHC-regulated or CDI-regulated), grandfathered and nongrandfathered status, and average premiums. Enrollment in plans or policies offered by these seven insurers represent an estimated 97.5% of the persons with health insurance subject to state mandates. This figure represents an estimated 97.9% of enrollees in full-service (nonspecialty) DMHC-regulated health plans and an estimated 96.1% of enrollees in full-service (nonspecialty) CDI-regulated policies.

   For CHBRP reports analyzing specific benefit mandates, CHBRP surveys the seven major carriers on current coverage relevant to the benefit mandate. CHBRP reports the share of enrollees—statewide and by market segment—reflected in CHBRP's bill-specific coverage survey responses. The proportions are derived from data provided by CDI and DMHC. CDI provides data by market segment (large, small, and individual) based on "CDI Licenses With HMSR Covered Lives Greater Than 100,000" as part of the Accident and Health Covered Lives Data Call September 30, 2011, by the California Department of Insurance, Statistical Analysis Division. The Department of Managed Health Care's interactive website "Health Plan Financial Summary Report," July–September 2012, provides data on DMHC-regulated plans by segment.[49]

The following table describes the data sources mentioned above, and the data items that they inform.

[49] CHBRP assumes DMHC-regulated PPO group enrollees and POS enrollees are in the large-group segment. http://wpso.dmhc.ca.gov/flash/.

Table D-1. Population and Cost Model Data Sources and Data Items

Data Source	Items
California Simulation of Insurance Markets (CalSIM) (projections for 2015)	Uninsured, age: 0–17; 18–64 yrs. Medi-Cal (non-Medicare) (a), age: 0–17; 18–64 Other public (b), age: 0–64 Individual market, age: 0–17; 18–64 Small group, age: 0–17; 18–64 Large group, age: 0–17; 18–64
California Health Interview Survey, 2011 (CHIS, 2011)	Uninsured, age: 65+ yrs. Medi-Cal (non-Medicare), age: 65+ Other public, age: 65+ Employer-sponsored insurance, age: 65+
CalPERS data, annually, enrollment as of September 30	CalPERS HMO and PPO enrollment • Age: 0–17; 18–64; 65+ yrs. HMO premiums
California Employer Survey, conducted annually by NORC and funded by CHCF	Enrollment by HMO/POS, PPO/indemnity self-insured, fully insured, Premiums (not self-insured) by: • Size of firm (3–25 as small group and 25+ as large group) • Family vs. single • HMO/POS vs. PPO/indemnity vs. HDHP employer vs. employer premium share
DHCS administrative data for the Medi-Cal program, annually, 11-month lag from the end of November	Distribution of enrollees by managed care or FFS distribution by age: 0–17; 18–64; 65+ yrs. Medi-Cal Managed Care premiums
CMS administrative data for the Medicare program, annually (if available) as of end of September	HMO vs. FFS distribution for those 65+ (noninstitutionalized)
CHBRP enrollment survey of the seven largest health plans in California, annually as of end of September	Enrollment by: • Size of firm (2–50 as small group and 51+ as large group), • DHMC vs. CDI regulated • Grandfathered vs. nongrandfathered Premiums for individual policies by: • DMHC vs. CDI regulated • Grandfathered vs. nongrandfathered
Department of Finance population projections, for intermediate CHIS years	Projected civilian, noninstitutionalized CA population by age: 0–17; 18–64; 65+ yrs.
Medical trend influencing annual premium increases	Milliman estimate

Notes: (a) Includes children previously enrolled in Healthy Families, California's CHIP. As of January 1, 2014, children enrolled in Healthy Families were transitioned into Medi-Cal as required in the 2012–2013 state budget agreement.

(b) Includes individuals dually eligible for Medi-Cal and Medicare.
Key: CDI=California Department of Insurance; CHCF=California HealthCare Foundation; CHIS= California Health Interview Survey; CMS=Centers for Medicare & Medicaid Services; DHCS=Department of Health Care Services; DMHC=Department of Managed Health Care; FFS=fee-for-service; HMO=health maintenance organization; NORC=National Opinion Research Center; PPO=preferred provider organization.

Projecting the Effects of the Affordable Care Act in 2015

This subsection discusses adjustments made to CHBRP's Cost and Coverage Model to account for the continuing impacts of the ACA in January 2015. It is important to emphasize that CHBRP's analysis of specific mandate bills typically addresses the incremental effects of the mandate bill — specifically, how the proposed mandate would impact benefit coverage, utilization, costs, and public health, *holding all other factors constant*. CHBRP's estimates of these incremental effects are presented in the *Benefit Coverage, Utilization, and Cost Impacts* section of this report.

Baseline premium rate development methodology — 2015

The key components of the baseline model for utilization and expenditures are estimates of the per member per month (PMPM) values for each of the following:

- Insurance premiums PMPM;
- Gross claims costs PMPM;
- Member cost sharing PMPM; and
- Health care costs paid by the health plan.

For each plan type, we first obtained an estimate of the insurance premium PMPM by taking the 2013 reported premium from the above-mentioned data sources and trending that value to 2015. CHBRP uses trend rates published in the Milliman Health Cost Guidelines to estimate the health care costs for each plan segment in 2015.

The individual segments (CDI-regulated and DMHC-regulated) are split into: grandfathered non-exchange; nongrandfathered non-exchange; and exchange groups in order to separately calculate the impact of ACA and specific mandates that may apply differently to these three subgroups. The premium rate information received from NORC did not split the premiums based on grandfathered or exchange status. The 2013 CHBRP Annual Enrollment and Premium Survey asked the seven largest insurance carriers in California to provide their average premium rates separately for grandfathered and nongrandfathered plans. The ratios from the carrier survey data are then applied to the NORC aggregate premium rates for large and small group, to estimate premium rates for grandfathered and nongrandfathered plans that were consistent with the NORC results. For the individual market, the 2013 premium rates received from the 2013 CHBRP Annual Enrollment and Premium Survey were used directly.

The marginal impact of ACA on 2015 premiums was established as follows:

- For nongrandfathered small-group and individual market segments, a 3% increase in medical costs is applied to reflect the total cost of requiring each plan to cover the essential health benefits.
- For nongrandfathered small-group plans, a 5% increase in medical costs is applied to reflect the other additional costs of ACA (e.g., age rating, health status, increased premium taxes and fees, change in actuarial value, etc.).
- For DMHC-regulated individual plans and CDI-regulated individual policies, an increase of 20% and 31%, respectively, in medical costs is applied to reflect the other additional costs of ACA.

The remaining three values were then estimated by the following formulas:

- Health care costs paid by the health plan = insurance premiums PMPM × (1 − profit/administration load).
- Gross claims costs PMPM = health care costs paid by the health plan ÷ percentage paid by health plan
- Member cost sharing PMPM = gross claims costs × (1 − percentage paid by health plan)

In the above formulas, the quantity "profit/administration load" is the assumed percentage of a typical premium that is allocated to the health plan's administration and profit. These values vary by insurance category, and under the ACA, are limited by the minimum medical loss ratio requirement. CHBRP estimated these values based on actuarial expertise at Milliman, and their associated expertise in health care.

In the above formulas, the quantity "percentage paid by health plan" is the assumed percentage of gross health care costs that are paid by the health plan, as opposed to the amount paid by member cost sharing (deductibles, copays, etc.). In ACA terminology, this quantity is known as the plan's "actuarial value." These values vary by insurance category. For each insurance category, Milliman estimated the member cost sharing for the average or typical plan in that category. Milliman then priced these plans using the Milliman Health Cost Guidelines to estimate the percentage of gross health care costs that are paid by the carrier.

Medi-Cal Managed Care

CHBRP has estimated that the PMPM cost for Medi-Cal's newly eligible population will equal the projected cost of Medi-Cal's currently eligible family population, excluding maternity costs.

General Caveats and Assumptions

The projected cost estimates are estimates of the costs that would result if a certain set of assumptions were exactly realized. Actual costs will differ from these estimates for a wide variety of reasons, including:

- Prevalence of mandated benefits before and after the mandate may be different from CHBRP assumptions.

- Utilization of mandated benefits (and, therefore, the services covered by the benefit) before and after the mandate may be different from CHBRP assumptions.
- Random fluctuations in the utilization and cost of health care services may occur.
- The impact of ACA on the mandated benefit cost may be different from CHBRP assumptions.

Additional assumptions that underlie the cost estimates presented in this report are:

- Cost impacts are shown only for plans and policies subject to state benefit mandate laws.
- Cost impacts are only for the first year after enactment of the proposed mandate.
- Employers and employees will share proportionately (on a percentage basis) in premium rate increases resulting from the mandate. In other words, the distribution of the premium paid by the subscriber (or employee) and the employer will be unaffected by the mandate.
- For state-sponsored programs for the uninsured, the state share will continue to be equal to the absolute dollar amount of funds dedicated to the program.
- When cost savings are estimated, they reflect savings realized for 1 year. Potential long-term cost savings or impacts are estimated if existing data and literature sources are available and provide adequate detail for estimating long-term impacts. For more information on CHBRP's criteria for estimating long-term impacts, please see: www.chbrp.org/analysis_methodology/docs/longterm_impacts08.pdf.
- Several studies have examined the effect of private insurance premium increases on the number of uninsured (Chernew et al., 2005; Glied and Jack, 2003; Hadley, 2006). Chernew et al. (2005) estimate that a 10% increase in private premiums results in a 0.74 to 0.92 percentage point decrease in the number of insured, whereas Hadley (2006) and Glied and Jack (2003) estimate that a 10% increase in private premiums produces a 0.88 and a 0.84 percentage point decrease in the number of insured, respectively. Because each of these studies reported results for the large-group, small-group, and individual insurance markets combined, CHBRP employs the simplifying assumption that the elasticity is the same across different types of markets. For more information on CHBRP's criteria for estimating impacts on the uninsured, please see: www.chbrp.org/analysis_methodology/docs/Uninsured_paper_Final_01012009.pdf.

There are other variables that may affect costs, but which CHBRP did not consider in the cost projections presented in this report. Such variables include, but are not limited to:

- Population shifts by type of health insurance: If a mandate increases health insurance costs, some employer groups and individuals may elect to drop their health insurance. Employers may also switch to self-funding to avoid having to comply with the mandate.
- Changes in benefit plans: To help offset the premium increase resulting from a mandate, subscribers/policyholders may elect to increase their overall plan deductibles or copayments. Such changes would have a direct impact on the distribution of costs

between the health plan and policies and enrollees, and may also result in utilization reductions (i.e., high levels of patient cost sharing result in lower utilization of health care services). CHBRP did not include the effects of such potential benefit changes in its analysis.

- Adverse selection: Theoretically, individuals or employer groups who had previously foregone health insurance may now elect to enroll in a health plan or policy, postmandate, because they perceive that it is to their economic benefit to do so.
- Medical management: Health plans and insurers may react to the mandate by tightening medical management of the mandated benefit. This would tend to dampen the CHBRP cost estimates. The dampening would be more pronounced on the plan types that previously had the least effective medical management (i.e., PPO plans).
- Geographic and delivery systems variation: Variation in existing utilization and costs, and in the impact of the mandate, by geographic area and delivery system models: Even within the health insurance types CHBRP modeled (HMO, including HMO and POS plans, and non-HMO, including PPO and FFS policies), there are likely variations in utilization and costs by type. Utilization also differs within California due to differences in the health status of the local population, provider practice patterns, and the level of managed care available in each community. The average cost per service would also vary due to different underlying cost levels experienced by providers throughout California and the market dynamic in negotiations between providers and health plans or insurers. Both the baseline costs prior to the mandate and the estimated cost impact of the mandate could vary within the state due to geographic and delivery system differences. For purposes of this analysis, however, CHBRP has estimated the impact on a statewide level.
- Compliance with the mandate: For estimating the postmandate coverage levels, CHBRP typically assumes that plans and policies subject to the mandate will be in compliance with the coverage requirements of the bill. Therefore, the typical postmandate coverage rates for populations subject to the mandate are assumed to be 100%.

AB 1771-Specific Caveats and Assumptions

- CHBRP limits analysis of AB 1771 to only services provided by a physician for existing patients where an existing patient first contacted the physician. From the Milliman HCG Database, we find that 86.3% of all physician office visits are for existing patients, with the remainder for new patients.[50] We did not do an analysis to determine the number of (1) members that have one or more new patient visits in a year or (2) members that have one or more existing patient visits in a year. We also do not determine what proportion of visits are "patient-initiated."
- Due to the lack of existing data on telehealth service use because of limited billing by providers for telehealth, CHBRP assumed that there was no premandate reimbursement for telehealth services, meaning that even if they are already occurring in the delivery of care,

[50] CPT codes 99211–99215 are face-to-face visits for existing patients and CPT codes 99201–99205 are face-to-face visits for new patients. The proportion of total visits for existing patients compared to total visits is 86.3%.

the addition of reimbursement for the service already being delivered will result in a significant cost increase de facto. In addition, we also assumed an increase in the use of telehealth due to the new reimbursement available. These are acknowledged as the critical caveats at the beginning of the Cost Section as well.

Table D-2. List of telehealth-related CPT codes used in the analysis of AB 1771

CPT Codes for telephone and e-mail evaluation and management		Modifier
Telephone	99441, 99442, 99443	As Applicable
E-mail	99444	As Applicable

CPT Codes to Evaluate and Manage for patient evaluation and management				
99211	99335	90836	90961(a)	G0408
99212	99336	90837	90962(a)	G0420
99213	99347	90838	97802	G0421
99214	99348	90863	97803	G0425
99215	99349	99406	97804	G0426
99231	90791	99407	99495	G0247
99232	90792	90951(a)	99496	G0436
99233	96150	90952(a)	M0064	G0437
0188T	96151	90954(a)	G0108	G0442
0189T	96152	90955(a)	G0109	G0443
99307	96153	90956(a)	G0406	G0444
99308	96154	90957(a)	G0270	G0445
99309	90832	90958(a)	G0396	G0446
99310	90833	90959(a)	G0397	G0447
99334	90834	90960(a)	G0407	G0459

Source: American Medical Association, 2014
Notes: GT modifier for live videoconferencing and GQ modifier for store-and-forward, as applicable.
(a) Codes billed monthly and have monthly minimum requirements for in-person visits, ranging from one to four.

Alternative estimates

CHBRP modeled four separate estimates to provide a range of the variety of reactions anticipated from health plans and providers in terms of technology adoption and cost-sharing. The models are based on different rates of adoption of telehealth and use of cost-sharing by insurers and/or providers during 2015. Two of these scenarios (A and B) assume cost-sharing and the two other two assume no cost sharing (C and D): thus, postmandate, all Non-Kaiser members are assumed to use office visits and telehealth services based on parameters for the 4 scenarios (cost sharing with 100% phase-in of adoptions, cost sharing with 25% phase-in of adoption, no cost sharing with 100% phase-in of adoption, and no cost sharing with 25% phase-in of adoption). CHBRP believes cost sharing scenarios are more likely than no cost sharing once telehealth becomes reimbursable. CHBRP assumes that in the cost-sharing scenarios, "supplemental" telehealth visits – those visits that would have otherwise not occurred, or were previously occurring, but not billed – would be dampened by 16% when enrollees are required to pay $20 copayments.

Cost sharing scenarios are presented in the body of the bill analysis and the no cost sharing scenarios are presented here in Appendix D. These no cost sharing scenarios offer perspective on the lower and upper bounds of expenditures. Results are shown in Table D-3 and D-4 below.

Table D-3. AB 1771 Impacts on Benefit Coverage, Utilization, and Cost, 2015
Scenario C – $0 Cost Sharing & 25% Phase-in

	Premandate	Postmandate	Increase/ Decrease	Change Postmandate
Benefit Coverage				
Total enrollees with health insurance subject to state-level benefit mandates (a)	23,389,000	23,389,000	0%	0%
Total enrollees with health insurance subject to AB 1771	23,389,000	23,389,000	0%	0%
Number of enrollees with coverage for telephone-based evaluation and management	11,381,927	23,389,000	12,007,073	105%
Number of enrollees with coverage for e-mail-based evaluation and management	11,381,927	23,389,000	12,007,073	105%
Number of enrollees with coverage for live videoconferencing	18,571,927	23,389,000	4,817,073	26%
Number of enrollees with coverage for store-and-forward	18,571,927	23,389,000	4,817,073	26%
Percentage of enrollees with coverage for telephone-based evaluation and management	49%	100%	51%	105%
Percentage of enrollees with coverage for e-mail-based evaluation and management	49%	100%	51%	105%
Percentage of enrollees with coverage for live videoconferencing	79%	100%	21%	26%
Percentage of enrollees with coverage for store-and-forward	79%	100%	21%	26%
Utilization and Cost				
Number of telephone-based evaluation and management services used	3,675,411	4,537,065	861,655	23%
Number of e-mail-based evaluation and management services used	1,225,137	1,512,355	287,218	23%
Number of live videoconferencing services used	306,284	378,089	71,805	23%
Number of store-and-forward services used	918,853	1,134,266	215,414	23%
Average per-unit cost of telephone-based evaluation and management	$90.38	$90.38	$0.00	0%
Average per-unit cost of e-mail-based evaluation and management	$62.76	$62.76	$0.00	0%
Average per-unit cost of live videoconferencing	$189.93	$189.93	$0.00	0%

Table D-3. AB 1771 Impacts on Benefit Coverage, Utilization, and Cost, 2015
Scenario C – $0 Cost Sharing & 25% Phase-in

	Premandate	Postmandate	Increase/ Decrease	Change Postmandate
Average per-unit cost of store-and-forward	$157.64	$157.64	$0.00	0%
Expenditures				
Premium Expenditures by Payer				
Private Employers for group insurance	$54,590,722,000	$54,636,184,000	$45,462,000	0.0833%
CalPERS HMO employer expenditures (c)	$4,297,494,000	$4,300,752,000	$3,258,000	0.0758%
Medi-Cal Managed Care Plan expenditures	$17,504,711,000	$17,504,711,000	$0	0.0000%
Enrollees for individually purchased insurance	$16,930,080,000	$16,950,754,000	$20,674,000	0.1221%
Enrollees with group insurance, CalPERS HMOs, Covered California, and Medi-Cal Managed Care (a) (b)	$22,232,708,000	$22,251,856,000	$19,148,000	0.0861%
Enrollee Expenses				
Enrollee out-of-pocket expenses for covered benefits (deductibles, copayments, etc.)	$12,867,143,000	$12,850,122,000	-$17,021,000	-0.1323%
Enrollee expenses for noncovered benefits (d)	$0	$0	$0	0.000%
Total Expenditures	$128,422,858,000	$128,494,379,000	$71,521,000	0.0557%

Source: California Health Benefits Review Program, 2014.
Notes: (a) This population includes persons with privately funded and publicly funded (e.g., CalPERS HMOs, Medi-Cal Managed care Plans, Healthy Families Program) health insurance products regulated by DMHC or CDI. Population includes enrollees aged 0 to 64 years and enrollees 65 years or older covered by employment sponsored insurance.
(b)Premium expenditures by enrollees include employee contributions to employer-sponsored health insurance and enrollee contributions for publicly purchased insurance.
(c) Of the increase in CalPERS employer expenditures, about 57% or $1,857,000 would be state expenditures for CalPERS members who are state employees or their dependents.
(d) Includes only those expenses that are paid directly by enrollees to providers for services related to the mandated benefit that are not currently covered by insurance. In addition this only includes those expenses that will be newly covered, post-mandate. Other components of expenditures in this table include all health care services covered by insurance
Key: CalPERS HMOs=California Public Employees' Retirement System Health Maintenance Organizations; CDI=California Department of Insurance; DMHC=Department of Managed Health Care

Table D-4. AB 1771 Impacts on Benefit Coverage, Utilization, and Cost, 2015
Scenario D – $0 Cost Sharing & 100% Phase-in

	Premandate	Postmandate	Increase/ Decrease	Change Postmandate
Benefit Coverage				
Total enrollees with health insurance subject to state-level benefit mandates (a)	23,389,000	23,389,000	0%	0%
Total enrollees with health insurance subject to AB 1771	23,389,000	23,389,000	0%	0%
Number of enrollees with coverage for telephone-based evaluation and management	11,381,927	23,389,000	12,007,073	105%
Number of enrollees with coverage for e-mail-based evaluation and management	11,381,927	23,389,000	12,007,073	105%
Number of enrollees with coverage for live videoconferencing	18,571,927	23,389,000	4,817,073	26%
Number of enrollees with coverage for store-and-forward	18,571,927	23,389,000	4,817,073	26%
Percentage of enrollees with coverage for telephone-based evaluation and management	49%	100%	51%	105%
Percentage of enrollees with coverage for e-mail-based evaluation and management	49%	100%	51%	105%
Percentage of enrollees with coverage for live videoconferencing	79%	100%	21%	26%
Percentage of enrollees with coverage for store-and-forward	79%	100%	21%	26%
Utilization and Cost				
Number of telephone-based evaluation and management services used	3,675,411	7,427,133	3,751,723	102%
Number of e-mail-based evaluation and management services used	1,225,137	2,475,711	1,250,574	102%
Number of live videoconferencing services used	306,284	618,928	312,644	102%
Number of store-and-forward services used	918,853	1,856,783	937,931	102%
Average per-unit cost of telephone-based evaluation and management	$90.38	$90.38	$0.00	0%
Average per-unit cost of e-mail-based evaluation and management	$62.76	$62.76	$0.00	0%

Table D-4. AB 1771 Impacts on Benefit Coverage, Utilization, and Cost, 2015
Scenario D – $0 Cost Sharing & 100% Phase-in

	Premandate	Postmandate	Increase/ Decrease	Change Postmandate
Average per-unit cost of live videoconferencing	$189.93	$189.93	$0.00	0%
Average per-unit cost of store-and-forward	$157.64	$157.64	$0.00	0%
Expenditures				
Premium Expenditures by Payer				
Private Employers for group insurance	$54,590,722,000	$54,788,667,000	$197,945,000	0.3626%
CalPERS HMO employer expenditures (c)	$4,297,494,000	$4,311,678,000	$14,184,000	0.3301%
Medi-Cal Managed Care Plan expenditures	$17,504,711,000	$17,504,711,000	$0	0.0000%
Enrollees for individually purchased insurance	$16,930,080,000	$17,020,095,000	$90,015,000	0.5317%
Enrollees with group insurance, CalPERS HMOs, Covered California, and Medi-Cal Managed Care (a) (b)	$22,232,708,000	$22,316,078,000	$83,370,000	0.3750%
Enrollee Expenses				
Enrollee out-of-pocket expenses for covered benefits (deductibles, copayments, etc.)	$12,867,143,000	$12,793,032,000	-$74,111,000	-0.5760%
Enrollee expenses for noncovered benefits (d)	$0	$0	$0	0.000%
Total Expenditures	$128,422,858,000	$128,734,261,000	$311,403,000	0.2425%

Source: California Health Benefits Review Program, 2014.
Notes: (a) This population includes persons with privately funded and publicly funded (e.g., CalPERS HMOs, Medi-Cal Managed care Plans, Healthy Families Program) health insurance products regulated by DMHC or CDI. Population includes enrollees aged 0 to 64 years and enrollees 65 years or older covered by employment sponsored insurance.
(b)Premium expenditures by enrollees include employee contributions to employer-sponsored health insurance and enrollee contributions for publicly purchased insurance.
(c) Of the increase in CalPERS employer expenditures, about 57%, or $8,085,000, would be state expenditures for CalPERS members who are state employees or their dependents.
(d) Includes only those expenses that are paid directly by enrollees to providers for services related to the mandated benefit that are not currently covered by insurance. In addition this only includes those expenses that will be newly covered, postmandate. Other components of expenditures in this table include all health care services covered by insurance.
Key: CalPERS HMOs=California Public Employees' Retirement System Health Maintenance Organizations; CDI=California Department of Insurance; DMHC=Department of Managed Health Care.

Source: California Health Benefits Review Program, 2014.
Notes: (a) This population includes persons with privately funded and publicly funded (e.g., CalPERS HMOs, Medi-Cal Managed care Plans, Healthy Families Program) health insurance products regulated by DMHC or CDI. Population includes enrollees aged 0 to 64 years and enrollees 65 years or older covered by employment sponsored insurance.
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Key: CalPERS HMOs=California Public Employees' Retirement System Health Maintenance Organizations; CDI=California Department of Insurance; DMHC=Department of Managed Health Care.

A group of faculty, researchers, and staff complete the analysis that informs California Health Benefits Review Program (CHBRP) reports. The CHBRP **Faculty Task Force** comprises rotating senior faculty from University of California (UC) campuses. In addition to these representatives, there are other ongoing contributors to CHBRP from UC that conduct much of the analysis. The **CHBRP staff** coordinates the efforts of the Faculty Task Force, works with Task Force members in preparing parts of the analysis, and manages all external communications, including those with the California Legislature. As required by CHBRP's authorizing legislation, UC contracts with a certified actuary, Milliman Inc., to assist in assessing the financial impact of each legislative proposal mandating or repealing a health insurance benefit.

The **National Advisory Council** provides expert reviews of draft analyses and offers general guidance on the program to CHBRP staff and the Faculty Task Force. CHBRP is grateful for the valuable assistance of its National Advisory Council. CHBRP assumes full responsibility for the report and the accuracy of its contents.

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