



A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM: Integrated Care with Aligned Financial Incentives

Additional Appendix Materials

APRIL 2013

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**Appendix I can be found appended to the main report.*



A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM: Integrated Care with Aligned Financial Incentives

Appendix II. California's Delivery System Integration and Payment System (Methodology)

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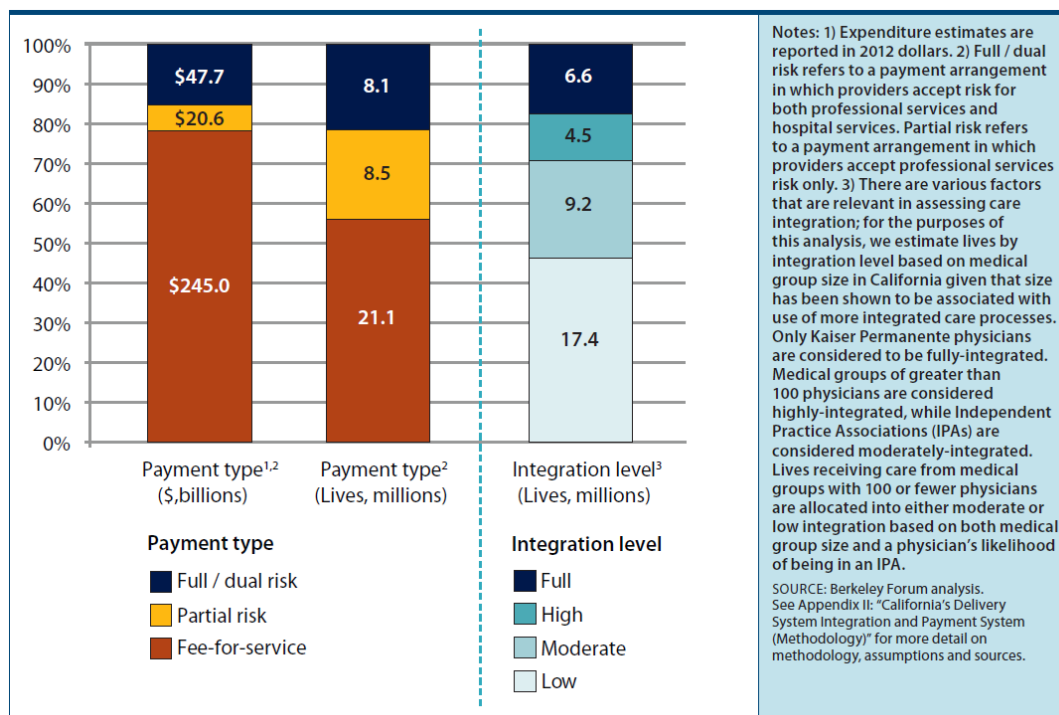
Appendix II. California's Delivery System Integration and Payment System (Methodology)

This memorandum provides additional detail on the methods used to estimate the prevalence of risk-based and fee-for-service payment and the level of delivery system integration in California.

Summary

Given the Forum's vision for increasing risk-based payment methods and the use of integrated delivery systems, multiple data sources were aggregated to create a snapshot of the current state of payment type and delivery system integration in California. This memorandum explains the approach and assumptions used to develop Figure 1 below, which was discussed in the main Berkeley Forum Report "A New Vision for California's Healthcare System: Integrated Care with Aligned Financial Incentives."

Figure 1: Breakdown of payment mechanisms and delivery system integration in California by lives and dollars, 2012



Objectives

- 1) To estimate the number of Californians receiving care from, and the healthcare spending paid under, full/dual risk, partial risk or fee-for-service payment in 2012.
- 2) To estimate the number of Californians who received care from fully-integrated, highly-integrated, moderately-integrated or low integrated delivery systems in 2012.



Definitions

- 1) Our definition of California healthcare spending is analogous to the Centers for Medicare & Medicaid Services (CMS) definition for national healthcare expenditures, and includes expenditures for personal healthcare services, government healthcare administration, net costs of private health insurance (profit, administration, etc.), government public health activities and investments. (For a more detailed explanation, see Appendix III "California Cost Curve, Healthcare Expenditures and Premiums Projections (Methodology).")
- 2) Delivery system integration levels are defined as follows:
 - a. Full integration – Care provided by a single, integrated entity whereby one organization is responsible for all services, including delivery of care, payment and risk management.
 - b. High integration – Care provided by physicians in medical groups with more than 100 physicians.
 - c. Moderate integration – Care provided primarily by physicians in mid to large medical groups or Independent Practice Associations (IPAs).
 - d. Low integration – Care provided primarily by physicians not affiliated with an IPA, or who are in small medical groups.
- 3) Payment type
 - a. Full risk – Contracts in which one entity has assumed both physician and hospital risk.
 - b. Dual risk – Contracts that cover professional services and hospital risk, but under separate agreements.
 - c. Partial risk – Contracts that cover professional services only.

Estimation of Spending and Enrollment by Payment Type

1) Full/Dual Risk

- a. For the purpose of estimating enrollment under both full risk and full integration, we have included only Kaiser Permanente. Cattaneo and Stroud Inc. reported 6.6 million Californians enrolled under Kaiser's commercial HMO, Medicare Advantage, Medi-Cal and Healthy Families plans.¹ We have estimated that another 1.5 million Californians receive care from providers with full or dual risk arrangements, mostly in Southern California where dual risk arrangements are more common in HMO plans. These enrollment numbers were calculated using 50% of the non-

¹ Cattaneo and Stroud Inc. (2012).



Kaiser Medicare Advantage enrollment (0.5 million) plus 25% of the commercial non-Kaiser HMO enrollment (1.0 million).² Total lives in full/dual capitation are thus approximately 8 million.

- b. Spending under full/dual risk is estimated at \$48 billion. This is based on an estimate of Kaiser's 2012 California revenue, derived from Kaiser's 2010 reported revenue of \$34.3 billion³ adjusted upwards by California's healthcare spending growth rates for 2011 and 2012 (See "Appendix III "California Cost Curve, Healthcare Expenditures and Premiums Projections (Methodology)" for a discussion of the growth rates), plus the costs for the 50% of the non-Kaiser Medicare Advantage enrollees, plus the estimated costs of the 1 million Californians covered under HMO contracts with full/dual risk. Based on expert opinion, these costs were estimated to be 30% lower than the average 2012 healthcare spending per capita due to the lower risk profile of the commercially insured⁴, the fact that they are cared for by highly integrated providers and the high proportion of these members residing in Southern California, which has lower healthcare costs than Northern California.⁵

2) Partial Risk

- a. The number of lives estimated under partial risk (9 million) was calculated from Cattaneo and Stroud Inc. HMO Enrollment reports⁶ by tabulating all HMO lives not covered under full/dual risk. This figure entails half of the non-Kaiser Medicare Advantage enrollment (0.5 million), 100% of the Medi-Cal managed care enrollment (5.8 million) and 75% of the non-Kaiser HMO commercial enrollment (3 million). The remaining half of Medicare Advantage enrollment and remaining 25% of non-Kaiser HMO enrollment was included above, under full/dual risk.
- b. The spending estimates under partial risk (\$21 billion) assumed that 50% of non-Kaiser Medicare Advantage (\$5 billion) and 50% of Medi-Cal payments (\$5 billion) were paid under partial risk contracts. Under partial risk, generally only professional services are capitated. Commercial partial risk includes estimated physician payments in non-Kaiser HMOs. The other \$10 billion figure was calculated starting with the \$86 billion in total payments to physicians in California multiplied by the percentage of physicians who were affiliated with a commercial HMO (except Kaiser) and estimating that 70% of their services were paid through partial risk arrangements. All numbers have been trended to 2012.

3) Fee-for-Service

² Ibid.

³ California HealthCare Foundation (2011).

⁴ Based on a Berkeley Forum analysis of CHS (2009) data.

⁵ Based on a Berkeley Forum analysis of data provided by Milliman Inc, using the Thompson Reuters MarketScan Commercial Claims and Encounters Database 2008-2010.

⁶ Cattaneo and Stroud Inc. (2012).



- a. Fee-for-service enrollment of 21 million lives was estimated using Medicare fee-for-service enrollment (3.3 million),⁷ Medi-Cal fee-for-service enrollment (2.7 million),⁸ commercial non-HMO enrollment (7.3 million)⁹ and 7.3 million uninsured.¹⁰
- b. The remainder of the \$313 billion in 2012 healthcare spending not attributable to full or partial risk, or \$245 billion, was assumed to be fee-for-service.

Estimation of Enrollment by Level of Delivery System Integration

1) Fully-integrated system

- a. Fully-integrated system projections for 2012 were derived from August 2012 Cattaneo and Stroud Inc. reports produced from March 2012 DMHC data.¹¹ This figure includes Kaiser's commercial HMO, Medicare, Medi-Cal, and Healthy Families enrollment, for a total of 6.6 million lives.
- b. All 6.6 million lives in fully-integrated care systems are shown under full risk.

2) Highly-integrated system

- a. Highly integrated system enrollment was derived from IMS data¹² showing that approximately 13% of non-Kaiser physicians in California belong to medical groups with 100 or more physicians. We then estimated that these physicians care for a disproportionate share (14.4% instead of 13%) of California's insured population of 30.4 million, due to efficiencies in highly integrated systems. We thus arrived at the estimate of 4.4 million Californians receiving care through highly integrated systems.
- b. In order to break down the 4.4 million lives in highly-integrated care systems by payment type, we estimated 1.5 million were covered under dual risk, and of the remaining 3 million, 80% were covered under partial risk (2.1 million) and 20% were covered under fee-for-service (0.9 million). This number was derived from several case studies of large medical groups¹³ that showed a similar proportion of enrolled lives in risk-based payment and fee-for-service, as well as from extensive discussions with experts on the current state of risk-based contracting in California.

3) Moderately-integrated system

⁷ Kaiser Family Foundation (2012).

⁸ California Department of Health Care Services (2012).

⁹ California HealthCare Foundation (2011).

¹⁰ Kaiser Family Foundation (2010-2011).

¹¹ Cattaneo & Stroud Inc. (2012).

¹² IMS Health Incorporated (2010).

¹³ See Gbemudu et al. (2012) on HealthCare Partners, Carluzzo et al. (2012) on Monarch HealthCare and Palo Alto Medical Foundation (2013).



- a. Moderately-integrated system enrollment was estimated based on IMS data¹⁴ grouping physician practice sizes and then adjusting for the likelihood of physicians being in a moderately-integrated system (e.g. an IPA or mid-sized medical group). We estimated that 25% of sole practitioners, 35% of medical groups with 2-4 physicians, 60% of medical groups with 5-24 physicians, 65% of medical groups with 25-49 physicians and 70% of medical groups with 50-99 physicians would be considered moderately integrated. The result was an estimate of 9.2 million lives in moderately integrated systems.
- b. In order to break down the lives in moderately integrated care systems by payment type, we estimated that the proportion of covered lives under partial risk in these mid-sized medical groups or in IPAs was 70%, with the remaining 30% covered under fee-for-service.

4) Low integrated System

- a. Low integrated system enrollment was estimated based on IMS data¹⁵ grouping physician practice sizes and applying a probability that they would not be affiliated with an IPA or in small medical groups. We estimated that 75% of sole practitioners, 65% of medical groups with 2-4 physicians, 40% of medical groups with 25-49 physicians and 35% of medical groups with 50-99 physicians would be considered low integrated. This resulted in 10.1 million insured and 7.3 million uninsured Californians who are cared for in low integrated systems, for a total of 17.4 million lives.
- b. All lives in low-integration systems were considered cared for under fee-for-service.

Limitations

In addition to the assumptions made in each of the scenarios described above, there are several major limitations in our analysis.

- 1) Only Kaiser Permanente is included under the estimates of enrollment and spending in fully-integrated delivery systems. We recognize, however, that there are other delivery systems in California that also may meet the criteria for fully integrated systems, including the Veteran's Administration and some other provider groups with full risk contracts. We did not have adequate data to include these systems, thus the total number of Californians receiving care in fully-integrated systems may be somewhat undercounted.
- 2) Hospitalization expenses for Californians covered under partial-risk HMOs are included in our estimates for fee-for-service expenses. Partial-risk physicians have various risk-sharing agreements whereby they may be compensated based on their patients' hospital utilization levels. Therefore, some expenses are included in the fee-for-service category have elements of risk-based payment.

¹⁴ IMS Health Incorporated (2010).

¹⁵ Ibid.



- 3) Many assumptions were used to estimate the healthcare spending paid under partial risk arrangements because contracting and spending under partial risk (capitation) agreements are considered proprietary and public data is unavailable. We performed sensitivity testing of the base-case assumption above, in which 50% of Medicare Advantage and Medi-Cal payments and 70% of physician payments for the commercially insured were paid under partial risk arrangements. Increasing assumed partial risk payments under Medicare Advantage and Medi-Cal to 75% and increasing commercial physician payments to 90% grew the amount of partial risk payment by approximately \$7 billion. This scenario only results in the overall fee-for-service payment share being reduced to 76%, vs. the 78% of our base-case assumptions. Decreasing Medicare Advantage and Medi-Cal payments to 25% and decreasing commercial physician payments to 45% decreased the amount of partial risk payment by approximately \$7 billion. This scenario only results in overall fee-for-service payment share being increased to 80% vs. the 78% of our base-case assumptions.
- 4) Physician group size was used as a proxy to indicate the integration level of the delivery system. This is an imperfect indicator, as integration is a function of the use of information technology, clinical integration, hospital/physician relationships, among other factors. It was selected as a proxy indicator because of evidence that practice size is associated with greater levels of evidence based care management practices reflecting clinical integration.¹⁶

Acknowledgements

We are very grateful for the comments we received on this methodology memorandum from Tom Williams, DrPH, President and CEO of the Integrated Healthcare Association and Grant Cattaneo, CEO and Founder of Cattaneo and Stroud, Inc. These individuals do not necessarily endorse the contents of this memorandum.

¹⁶ Shortell (2011).



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Appendix III. California Cost Curve, Healthcare Expenditures and Premiums Projections (Methodology)

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Appendix III. California Cost Curve, Healthcare Expenditures and Premiums Projections (Methodology)

Executive Summary

This memorandum provides additional details on our approach and assumptions used to forecast the Cost Curve (i.e. healthcare expenditures as a percent of Gross State Product) and premiums affordability (i.e. employer-sponsored health insurance premiums as a percent of median household income) in California. Our projections were based on historical trends and other forecasts, which we adjusted for the California context and the Affordable Care Act's 2014 coverage expansion. The principal data sources for modeling the Cost Curve included the Centers for Medicare & Medicaid Services' (CMS) *Health Expenditures by State of Residence* and *National Health Expenditures Projections*, the Bureau of Economic Analysis' state and national Gross Domestic Product (GDP) data, and the California Simulation of Insurance Markets (CalSIM) model of the Affordable Care Act. The principal data sources for projecting premiums affordability included the Berkeley Forum forecasts of healthcare expenditures, the Kaiser Family Foundation / California HealthCare Foundation's *Employer Health Benefits Survey* and the U.S. Census Bureau's *Current Population Survey*.

Between 2012 and 2022, we project healthcare expenditures per capita will grow from \$8,251 to \$13,755 in current-year dollars, an average annual growth rate of 5.2%. Healthcare expenditures would total \$4.4 trillion between 2013 and 2022. Between 2012 and 2022, we project that Gross State Product (GSP) per capita will grow from \$53,739 to \$80,380, an average annual growth rate of 4.1%. Because healthcare expenditures per capita are projected to grow 1.1 percentage points faster than GSP per capita, the Cost Curve is expected to increase from 15.4% in 2012 to 17.1% in 2022. By comparison, the 2009 U.S. Cost Curve was 17.9%. (For more background on California versus U.S. healthcare expenditures, see Appendix XII: "Assessing California's Healthcare Spending (Brief)").

In California, we project that total premiums for employer-sponsored insurance, including both employer and employee contributions, will increase an average 6.6% annually between 2011 and 2022. This results in an expected increase in total family-coverage premiums during this period, from 23.8% to 32.2% of the under-65 median household income. For single-coverage, total premiums as a percent of under-65 household income are expected to increase from 13.5% to 18.2% during this time period.

Overview

This memo has two objectives:

- 1) To project per capita California healthcare expenditures between 2013 and 2022 and use this information to project the California healthcare Cost Curve through 2022.*
- 2) To project California premiums as a percent of median household income through 2022.*



*Due to lags in available data, we begin projecting GSP figures in 2012 and state healthcare expenditures in 2010. However, for the purposes of the Berkeley Forum report, “A New Vision for California’s Healthcare System: Integrated Care with Aligned Financial Incentives,” we are interested in the decade between 2013 and 2022. As such, state healthcare expenditure projections are discussed for the 2013 – 2022 timeframe. We begin projecting both premiums and median household income in 2012, and discuss affordability of premiums for the 2012 – 2022 period.

Background Notes

1) Many discussions of healthcare spending in the U.S. are based on CMS’ definition of national healthcare expenditures.¹ This includes *personal* healthcare expenditures, which is the total spending to treat “individuals with specific medical conditions,” and entails hospital care, professional services, home healthcare, nursing care, retail medical products and other health, residential and personal care expenses. CMS’ definition of national healthcare expenditures also includes *non-personal* spending: Government healthcare administration, net costs of private health insurance (profit, taxes, administration, etc.), government public health activities, and investments in healthcare research, structures and equipment. At the state level, CMS provides historical data only for personal healthcare expenditures. Thus, to compare California healthcare spending with that in the United States as a whole, we need to estimate *non-personal* healthcare expenditures in California. Several assumptions, noted in the “Healthcare Expenditures Modeling Methodology” section, were used to do so.

- + Personal healthcare expenditures
- + Government healthcare administration
- + Net costs of private health insurance
- + Government public health activities
- + Investments in healthcare research, structures and equipment
- = National / state healthcare expenditures

2) The sources used for historical and projected data are detailed in Table 1A in the “Additional Charts / Figures” section at the end of the memorandum.

3) All dollars are reported in nominal, or current-year, dollars.

I. Historical and Projected Healthcare Expenditures and Gross State Product

Healthcare Expenditures Modeling Methodology

We first obtained historical data on U.S. and California healthcare expenditures from the sources listed in Table 1A. As a first step in arriving at an estimate for total California healthcare spending, we assumed that between 1991 and 2009, Californians had the same per capita

¹ Centers for Medicare & Medicaid Services (2010).



amount of non-personal healthcare expenditures as the U.S. average.^{2,3} We then had consistent historical healthcare expenditures for both the United States and California from which to build the projections.

We next looked at U.S. national healthcare expenditure projections through 2021 from the sources noted in Table 1A. Because these sources only project through 2021, we used the five year average growth rate between 2016 and 2021 to arrive at the U.S. figure for 2022.

To project California's personal healthcare expenditures, we applied CMS' U.S. per capita personal healthcare expenditures growth rate projections to California, starting with California's 2009 per capita figure. We chose this approach because California personal healthcare expenditures per capita growth has tracked the comparable U.S. figure for nearly the last twenty years (see Figure 1A in "Additional Charts / Figures"). U.S. and California per capita Medicaid and Medicare expenditures growth rates have also tracked each other.

Then, to obtain our projected California per capita personal healthcare expenditures figure, we added the per capita non-personal healthcare expenditures estimate using CMS' national projections. This assumption allowed us to arrive at California projections for per capita state healthcare expenditures beginning in 2010. We followed the above approach to obtain California projections through 2022, with slight modifications for 2013.

For 2013, we used a different personal healthcare expenditures growth rate than the one projected by CMS nationally. CMS' 2013 projections included a 30.9% physician payment reduction required under the Sustainable Growth Rate Formula. This scenario was considered politically and economically unlikely, and ultimately did not come to pass, owing to the passage of the American Taxpayer Relief Act of 2012.⁴ We instead calculated a different U.S. personal healthcare expenditure 2013 growth rate based on an alternative CMS scenario in which physician payments grow at 1%.⁵ We applied this alternative growth rate to project California healthcare expenditures in 2013.

For 2014, due to the implementation of the Affordable Care Act, we use a different approach.

² We estimate that California non-personal healthcare expenditures represented between 16.9% and 18.4% of total state healthcare expenditures between 1999 and 2009.

³ It is important to note, however, that Californians are likely to have slightly different non-personal healthcare expenditures than the U.S. average, but we expect this has negligible impact on our results. For example, California is ranked 8th highest in state public health spending per capita (\$66.04 per capita in fiscal year 2010 - 2011), but is ranked below the national average in terms of federal Centers for Disease Control and Prevention as well as Health Resources and Services Administration per capita funding. (Trust for America's Health (2013)). All of these categories would be included in government public health expenditures.

⁴ U.S. Congress (2013).

⁵ Although our model was based on the CMS scenario of a 1% increase in physician reimbursement in 2013, the American Taxpayer Relief Act (ATRA) of 2012 froze Medicare Part B physician reimbursement rates through 2013. There were various other healthcare related provisions of ATRA, which we did not model specifically, but they are not expected to have a significant impact on our results. Piper (2013).



2014 Healthcare Expenditures Methodology Overview

The main coverage expansion provisions of the ACA are expected to go into effect in 2014. Due to the substantial difference between the number of newly insured in California and the number in the rest of the United States (due to factors such as the current uninsured rate, the number of undocumented individuals ineligible for ACA coverage, and state-specific implementation efforts), we do not apply national growth rate projections to California in 2014. Instead, we calculate a California-specific growth rate in 2014, because it is the key year for ACA coverage expansion. In subsequent years, we assume the growth rates for California and U.S. healthcare expenditures will once again converge.

We first estimated California's healthcare expenditures in the absence of ACA implementation by using historical trends. We then used this estimate to calculate healthcare expenditures per capita by coverage type -- Medicare, Medi-Cal, and private, as well as for the uninsured. Finally, we applied estimates on the shift in coverage among these four groups due to ACA implementation, to the projected per capita costs for each group, and obtained projected 2014 healthcare expenditures under the ACA.

2014 Healthcare Expenditures Methodology Details

We first used California's five-year (2008-2013) historical growth rate in aggregate personal healthcare expenditures to estimate 2014 personal healthcare in the state in the absence of the ACA. We then looked at California Simulation of Insurance Markets (CalSIM) model estimates of what 2014 insurance coverage sources would have been had the ACA not been implemented (See Table 1A for data sources). To project California's Medicare and Medi-Cal 2014 personal healthcare expenditures per capita under this scenario, we applied CMS' annual national growth rate projections for these populations' personal healthcare spending, beginning with California's 2009 figures. Modifications were made for 2013 to adjust for the Sustainable Growth Rate Formula alternative scenario (as described in the above "Healthcare Expenditures Modeling Methodology") and for 2014 in order to forecast a non-ACA scenario.

To estimate the total personal healthcare expenditures of the privately insured and uninsured, we subtract aggregate Medicare and Medi-Cal personal healthcare expenditures from the aggregate 2014 California personal healthcare expenditures in the non-ACA scenario.⁶ We then estimate personal healthcare expenditures per capita for the privately insured and the uninsured using the Hadley et al. simulation on coverage expansion, which estimates that an uninsured person has approximately 43% of the expenditures of a privately-insured person.^{7,8}

⁶ In our 2014 privately-insured enrollment figure, we also include approximately 600,000 Californians who are insured in non-Medi-Cal, non-Medicare and non-Healthy Family Programs (e.g. Tri-Care).

⁷ Hadley, et al. (2008).

⁸ In making our estimate of healthcare expenditures of a newly insured person who was previously uninsured, we examined preliminary evidence in Massachusetts following implementation of coverage expansion in the state (See "Additional Charts /



We used the CalSIM estimates on coverage changes due to the ACA, along with our estimated personal healthcare expenditures per capita for each group, to project 2014 personal expenditures for California with the ACA. CalSIM estimates 2014 insurance coverage source for Californians under the ACA to be 1.9 million newly insured via the combination of Medi-Cal and the California Health Benefit Exchange. CalSIM projections generally estimate a lower number of newly insured in 2014 versus other sources (see “Additional Charts / Figures” Table 2A).⁹ However, we selected this model because it was developed exclusively for California, with great attention to the state’s unique characteristics. We chose the CalSIM Enhanced Scenario instead of the CalSIM Base Scenario because the Enhanced Scenario figures, although still relatively conservative, were more in line with projections from other sources.

We used Hadley’s simulation on coverage expansion to estimate that the newly insured populations (both Medi-Cal and those in the Exchange) spend 118% *more* than they would have had they been uninsured.¹⁰ Finally, we converted California personal healthcare expenditures to total state healthcare expenditures as described in the “Healthcare Expenditures Modeling Methodology” section above.

Gross State Product Modeling Methodology

We obtained historical data on U.S. and California GDP/GSP, and projected data on U.S. GDP from the sources listed in Table 1A. Because the U.S. GDP data was only projected through 2021, we used the five year average growth rate between 2016 and 2021 to arrive at the U.S. figure for 2022. We then projected California GSP per capita through 2022. We assumed that California GSP per capita would grow at the same rate as U.S. GDP per capita; historically, the two figures have also tracked each other closely for the last nearly twenty years. (See “Additional Charts / Figures” Figure 2A).

Figures” Table 3A). The Pioneer Institute (Lischko, et al. (2010)) undertook an analysis of healthcare expenditures before and after the Massachusetts 2006 health reform law, which established Commonwealth Care (the state’s health insurance exchange) (Kaiser Family Foundation (2012)). The analysis showed that average healthcare expenditures per capita of someone insured via Commonwealth Care were \$4,000 in FY 2008. Those remaining uninsured and receiving care via Massachusetts’ safety net system, in comparison, had \$1,300 in per capita expenditures in 2008 (or 32.5% of a Commonwealth Care member’s costs of \$4,000). A further comparison can be done by examining the Commonwealth Care spending per capita of \$4,000 in 2008, versus the \$1,600 in spending per capita of the uninsured in the safety net in 2005 (which presumably includes many 2008 Commonwealth Care enrolled members). Growing the 2005 figure of \$1,600 by the average Massachusetts expenditures growth rate between 2005 and 2008 provides an estimate of about \$1,920 in per capita expenditures for this group, in 2008 dollars. This represents 48% of the \$4,000 expenditures of a Commonwealth Care member in 2008. Thus the range of 32% – 48% from the Massachusetts experience supports our assumption that an uninsured Californian has about 43% the healthcare expenditures of a privately insured Californian.

⁹ Under, the CalSIM Enhanced Scenario, we estimates that only 5.5% of California’s under-65 population will be newly insured in 2014 due to the ACA, a relatively conservative figure as compared to CMS’ estimate of 8% for the U.S. under-65 population (See Table A1 for data sources).

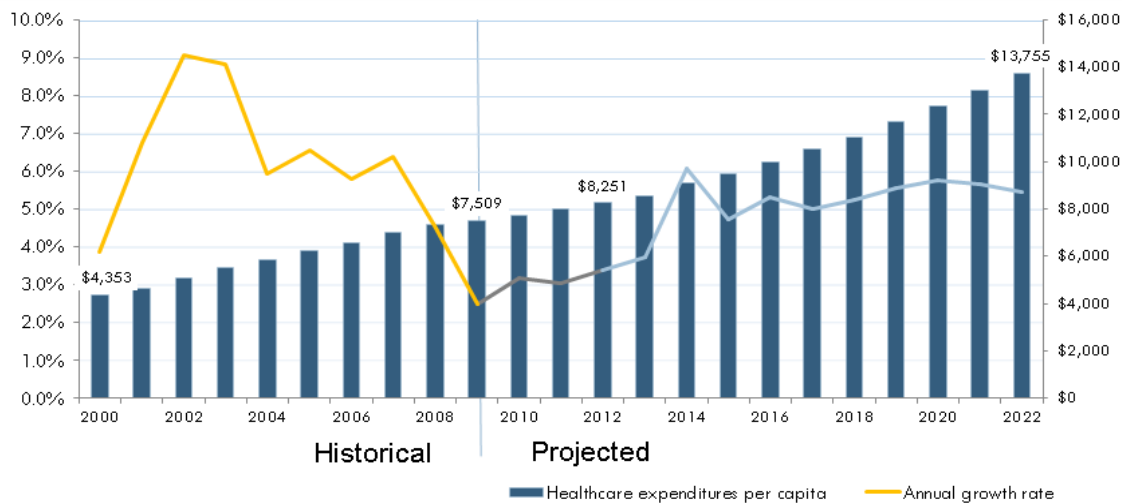
¹⁰ We recognize that the new Medi-Cal and privately insured populations will be different than the existing populations, and thus per capita costs for these groups may change as a result of the changing risk pool. Although the entering newly insured population is expected to be slightly younger and healthier than the existing population, those demographics may be counteracted by pent-up demand for healthcare from this population, at least in the early years of the ACA. For reference, we ran two parallel analyses assuming that the new Medi-Cal and privately-insured populations had +/-20% lower per capita expenditures than in our baseline projections. These scenarios show a relatively minor difference (+/- 0.8% of aggregate healthcare expenditures) versus our baseline projections.



Results

We first examine our estimates for historical California healthcare expenditures per capita. After growing at the relatively low average annual rate of 3.7% in nominal terms between 1991 and 2000, the growth rate spiked to 8.2% between 2000 and 2003 (See Figure 1). Between 2000 and 2009, healthcare expenditures per capita in the state grew at an average annual rate of 6.3%, from \$4,353 to \$7,509. The annual per capita growth rate began decreasing near the end of the decade, falling to 2.5% in 2009, largely due to the 2008-2009 recession.¹¹

Figure 1: Historical (2000 – 2009) and Projected (2010 – 2022) Healthcare Expenditures per Capita and Annual Growth Rate in California



Notes: Healthcare expenditures per capita are reported in current-year dollars.

Source: Berkeley Forum analysis; see Table 1A for data sources

Figure 1 also shows projected healthcare expenditures per capita in current-year dollars and growth rates through 2022. The figure shows that healthcare expenditures per capita in California are expected to grow to \$13,755 by 2022, representing an average annual growth rate of 5.2% between 2012 and 2022. Due to the ACA coverage expansion, we project a 6.1% increase in healthcare expenditures per capita in 2014, followed by annual growth rates between 4.7% and 5.8% through 2022. Aggregate healthcare expenditures in the state are expected to reach \$572 billion in 2022, and total \$4.4 trillion between 2013 and 2022.

To benchmark healthcare expenditures, we examined the Cost Curve (i.e., the share of GSP represented by healthcare expenditures), which grew from 11.2% to 15.1% between 2000 and 2009.¹² In the early and late part of the decade, the Cost Curve grew rapidly, with healthcare expenditures per capita growth outpacing GSP per capita growth by an annual average rate of almost six percentage points. In contrast, the Cost Curve was relatively flat in the middle of the

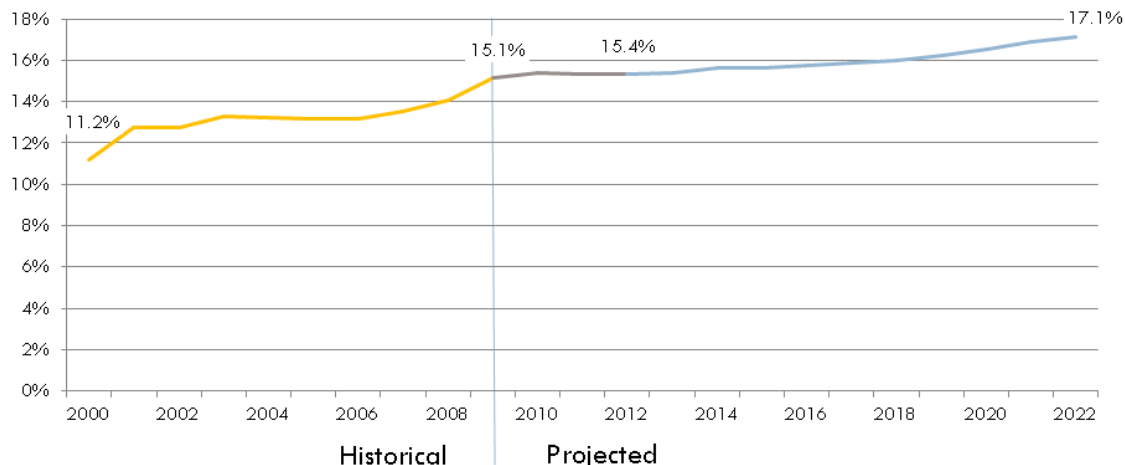
¹¹ Martin, et al. (2012).

¹² The share of California's 2009 GSP represented by healthcare expenditures is less than the 2009 U.S. share of 17.9% of GDP.



decade, a brief period during which economic growth stayed on pace with the rise in healthcare expenditures.

Figure 2: California's Cost Curve: Historical (2000 – 2009) and Projected (2010 – 2022) Healthcare Expenditures as a Percent of Gross State Product



Source: Berkeley Forum analysis, see Table 1A for data sources

Figure 2 also shows the projected change in the Cost Curve over the coming 10 years. Based on these estimates, healthcare expenditures per capita are projected to increase from 15.4% to 17.1% of GSP per capita between 2012 and 2022. During this period, aggregate healthcare expenditures are forecast to grow 6.2% annually, or about 1.1 percentage points more than the 5.1% annual aggregate GSP growth rate.¹³

II. Historical and projected health insurance premiums

Modeling Methodology

While aggregate expenditures and the Cost Curve are important measures of healthcare affordability, families and employers tend to be interested in a more tangible statistic: the cost of health insurance premiums. In the 2010-2011 period, approximately 45% of Californians received healthcare coverage via employer-sponsored insurance (ESI).¹⁴ The cost of premiums is important, but what determines affordability is the share of an individual's or a family's household income that is represented by those premiums.

We first projected ESI premiums between 2012 and 2022 for single and family coverage. Because economists generally consider the employer-paid portion of health insurance premiums

¹³ The approximate one percentage-point difference between aggregate and per capita healthcare expenditures growth during this period (6.2% aggregate vs. 5.2% per capita) is due to the expanding California population.

¹⁴ Kaiser Family Foundation (2011).



to be part of an employee's total compensation, our analysis considers the total cost of health insurance premiums, that is, it includes the portions from both the employer and employee. We examined projections for total state healthcare expenditures per capita from Section I above, as healthcare expenditures are the most significant factor affecting premiums. Our "baseline" scenario assumes that premiums will grow at 1.3 times the annual rate of projected healthcare expenditures per capita, since premium growth in recent years has far outpaced per capita state healthcare expenditures growth.¹⁵

We also projected median household income through 2022 for single and family households under age 65, since this population is often covered via ESI and generally does not qualify for Medicare. We did so by adjusting our projections of annual per capita income growth through 2022 (see Section I above) downward slightly, as mean GSP per capita has grown faster than median household income over the past decade.^{16,17}

Finally, we use these projections to estimate ESI premiums as a percent of median household income for single and family households through 2022.

Results

Historically, ESI premiums in California have increased quite rapidly. The 2000s saw average premiums increasing more than 9% annually for both single and family coverage, with highly variable fluctuations. Single coverage premiums grew from \$2,304 to \$5,976 between 2000 and 2011, while family coverage premiums grew from \$5,904 to \$15,720 (see Table 1A for sources).

We project that ESI premiums for both single and family coverage will grow at an average annual rate of 6.6% between 2011 and 2022. ESI premiums for single coverage are projected to rise from \$5,976 in 2011 to \$12,062 in 2022. For family coverage, premiums are projected to grow from \$15,720 to \$31,728.

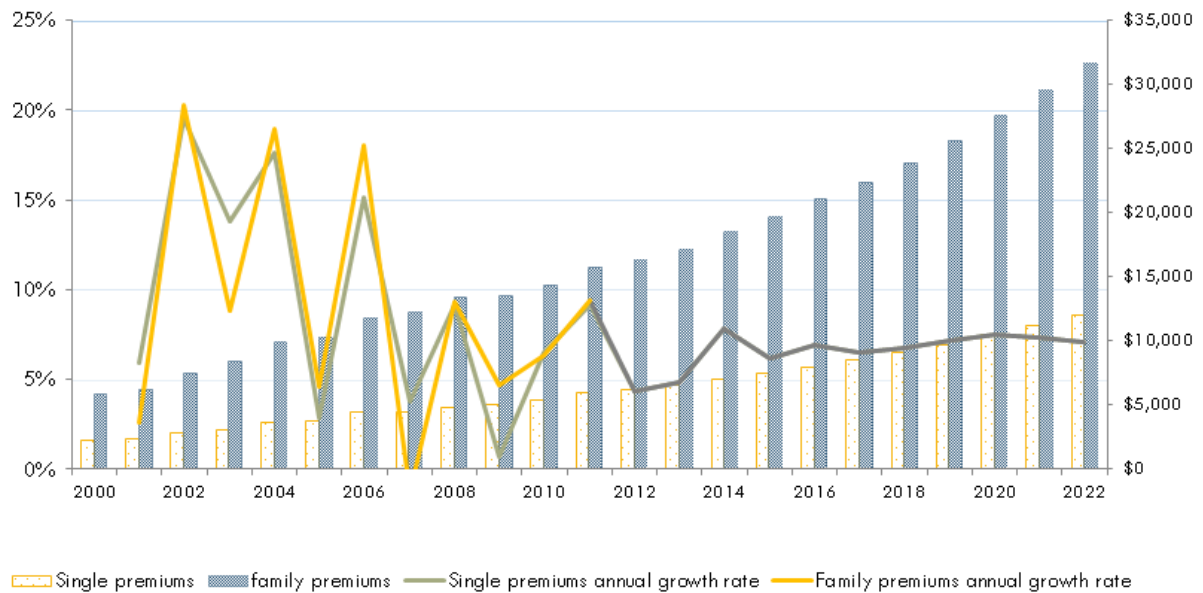
¹⁵ Between 1999 and 2009, ESI premiums grew at an average annual rate that was 1.6 times that of healthcare expenditures per capita. However, there are a few reasons to expect that ESI premium growth rates relative to per capita healthcare expenditure growth rates may temper. First, the Medical Loss Ratios (MLRs) imposed by the ACA require that individual/small group market plans and large group market plans spend at least 80% and 85% of premium dollars on medical care, respectively. (Centers for Medicare & Medicaid Services (2011a).) Second, premiums in the 2000s are considered to have increased exceptionally rapidly, coming as they did after the low growth managed care era of the 1990s. Thus, we believe that while premium growth rates will continue to outpace the growth of healthcare expenditures per capita, the difference will not be as dramatic as it has been in recent history.

¹⁶ While mean GSP per capita has grown at an average annual rate of 1.87% between 2000 and 2011, median household income has only grown at an average annual rate of only 1.72% during this period.

¹⁷ Because of data limitations, the historic growth rate analysis of median household income is based on all households in California, not just households under-65.



Figure 3: Historical (2000-2010) and Projected (2011-2022) Employer-Sponsored Health Insurance Premiums and Annual Growth Rates in California



Notes: Premiums include both employer and employee contributions. Our projected ESI premium growth rates for single and family coverage from 2012-2022 are the same, because their historical growth rates were similar.¹⁸ Dollars are reported in current-year dollars.

Source: Berkeley Forum analysis; see Table 1A for data sources.

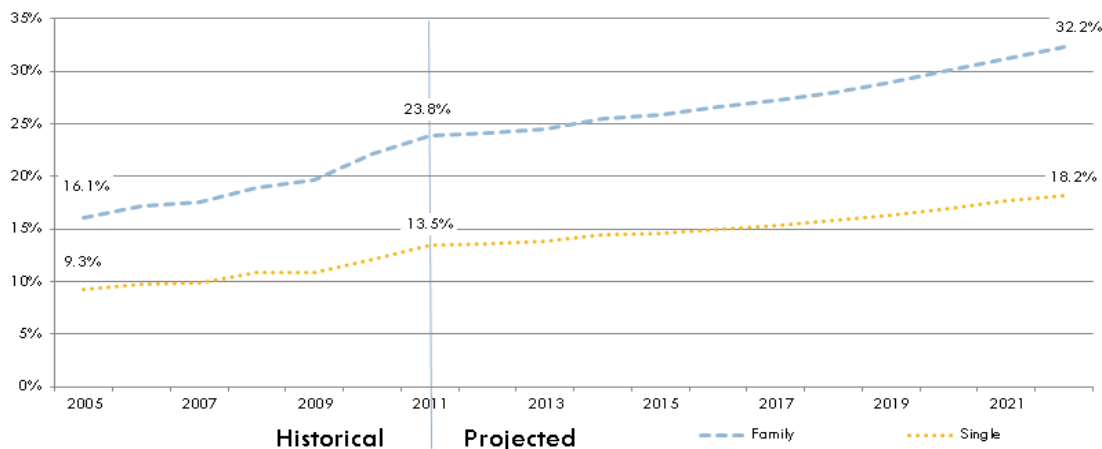
As a measure of affordability, we assess the percent of California's income that is spent on single and family ESI premiums by dividing the total premium by the median under-65 income for single and family households, respectively.

Figure 4 shows that the share of median single-person household income spent on ESI premiums for single coverage grew from 9.3% to 13.5% between 2005 and 2011, an increase of almost 50%. Similarly, premiums for ESI family coverage increased from 16.1% of median family household income in 2005 to 23.8% in 2011. These large increases are the result of premiums growing at an average annual rate of about 7.5%, but median household incomes growing at average annual rates of just 1.1% for single-person households and 0.5% for family households over this period.

¹⁸ U.S. Census Bureau (2012).



Figure 4: Historical (2005 – 2011) and Projected (2012 – 2022) Employer-Sponsored Health Insurance Premiums for Single and Family Coverage as a Percent of Median Household Income in California



Notes: Premiums include both employer and employee contributions. Median household income is for the under-65 population.

Source: Berkeley Forum analysis; see Table 1A for data sources

As in previous years, ESI premiums are projected to grow significantly faster than the median household income. As a result, the percent of median household income devoted to ESI premiums between 2011 and 2022 is projected to increase from 13.5% to 18.2% for single coverage and from 23.8% to 32.2% for family coverage, as shown in Figure 4. By substantially reducing the amount households have to spend on items other than healthcare, this anticipated decline in health insurance affordability over the next decade will have a significant negative impact on the standard of living for Californian households.

Discussion

This memorandum provides details on the approach and assumptions used by the Berkeley Forum in projecting healthcare expenditures and employer-sponsored health insurance premiums in California over the coming 10 years. We are not aware of any other studies that have attempted to do the same.

Our projections have several limitations. First, given the unprecedented nature of the Affordable Care Act, it is very difficult to project exactly how it will affect healthcare spending either in the aggregate, or for specific coverage groups. Our estimate for state healthcare expenditures per capita growth in 2014 is somewhat lower than CMS's national projection: 6.1% vs. 6.4%. There are several reasons why healthcare expenditures, in the U.S. or California, may not grow as much as one might expect in connection with ACA coverage expansion: 1) the uninsured already account for some healthcare expenditures, even prior to coverage expansion; 2) A Berkeley Forum analysis using CalSIM (2012) projections indicates that the newly insured are expected to represent approximately 5.5% of the state's under-65 population in 2014; 3) Many of the state's



newly insured will be covered by Medi-Cal, which has below-average healthcare expenditures per capita, partly due to relatively lower reimbursement rates.

Second, our estimates rely heavily on extrapolating national projections involving GDP and healthcare expenditures growth rates to California. While there is high correlation between U.S. and California growth rates, the linkage is not perfect. Furthermore, we have assumed these growth rates will continue to correlate closely. By relying heavily on CMS national forecasts, we are assuming that demographic and other factors affecting healthcare spending will not change significantly differently in the United States as a whole than in California specifically.

Third, our healthcare projections do not account for any major changes to the healthcare system other than those due to the ACA, namely the shift in coverage sources that will occur with the law's implementation. Other anticipated reforms, involving either policy or market changes, are not represented in the model. Much of the slower growth in healthcare expenditures over the last few years is thought to be attributable to the 2008 – 2009 recession. There is uncertainty, however, about whether there are other systematic changes that may have contributed to the slower spending.¹⁹ While the recession's effects are factored into California estimates for the several years following 2009, major structural changes to the system are not. Finally, our model does not account for the specific healthcare-related provisions of The American Taxpayer Relief Act of 2012 (agreed to in January 2013), aside from that of the Sustainable Growth Rate change.

Fourth, although the ACA's overall impact on healthcare expenditures is not expected to be dramatic, the government share of healthcare financing post-ACA is expected to increase significantly, relative to private financing. This reality, along with the continuous budget deficit debate in Washington D.C., makes it unclear if or how future Medicare and Medicaid spending might change. Nonetheless, our model does not attempt to predict healthcare spending by specific payers.

A final limitation involves the uncertainty of the future relationship between healthcare expenditures and ESI premium growth rates. Between 1999 through 2011, ESI premiums in California increased at an average annual rate of 1.6 times that of healthcare expenditures per capita growth rate. We project more convergence between these two indicators in the future, for some of the reasons described in footnote 15. However, the extent of any such convergence remains unclear.

Overall, the Berkeley Forum projections offer a comprehensive view of healthcare spending and affordability in California over the coming decade. We project that healthcare expenditures per capita in California will grow to \$13,755 by 2022 (in current-year dollars), representing an

¹⁹ Hartman (2013).



average annual growth rate of 5.2% between 2012 and 2022. At the aggregate level, healthcare expenditures in the state are expected to reach \$572 billion in 2022, and total \$4.4 trillion between 2013 and 2022. These figures result in an increase in the share of GSP devoted to healthcare expenditures from 15.4% in 2012 to 17.1% in 2022.

We project ESI premiums will grow at a 6.6% average annual rate between 2011 and 2022; similar to historical trends, this means they will continue to grow faster than healthcare expenditures. Family coverage premiums via ESI are projected to grow from \$15,720 in 2011 to \$31,728 in 2022. Single coverage premiums via ESI are projected to rise from \$5,976 in 2011 to \$12,062 in 2022. Most importantly for Californians, we also project that the percent of median household income devoted to premiums via ESI will increase between 2011 and 2022 from 13.5% to 18.2% for single coverage and from 23.8% to 32.2% for family coverage.

Our projections provide an important impetus for action. To help address the affordability crisis presented here, the Berkeley Forum leaders have articulated their vision and recommendations in the main report: “A New Vision for California’s Healthcare System: Integrated Care with Aligned Financial Incentives.”

Acknowledgements

We are very grateful for the comments we received on this memorandum from the national reviewers of the main Berkeley Forum Report, “A New Vision for California’s Healthcare System: Integrated Care with Aligned Financial Incentives,” including: Timothy T. Brown, Department of Health Policy and Management, School of Public Health, University of California, Berkeley; William H. Dow, Department of Health Policy and Management, School of Public Health, University of California, Berkeley; Deborah A. Freund, Claremont Graduate University; Elizabeth McGlynn, Kaiser Permanente Center for Effectiveness and Safety Research; Cathy Schoen, The Commonwealth Fund; Tom Williams, Integrated Healthcare Association (IHA). These individuals do not necessarily endorse the contents of this memorandum.



Additional Charts / Figures

Table 1A: Data Sources Utilized to Document Historical Trends and to Make Projections

Measure	Type	Geography	Year	Source	Notes
Healthcare expenditures	Historical	U.S	1991-2011	Centers for Medicare & Medicaid Services. (2013). <i>National Health Expenditures CY 1960 – 2011</i> . http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html . Accessed in January 2013.	
Healthcare expenditures	Projected	U.S	2012-2021	Centers for Medicare & Medicaid Services. (2012). <i>National Health Expenditure Projections</i> . http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/Proj2011PDF.pdf . Accessed in September 2012.	Some research suggest that CMS National Health Expenditure Projections tend to produce high estimates relative to other measures. However, this research was conducted primarily before CMS redesigned its methodology in 2010.
Personal healthcare expenditures (Aggregate, Medicare, Medicaid)	Historical	California	1991-2009	Centers for Medicare & Medicaid Services. (2011). <i>Health Expenditures by State of Residence, 1991-2009</i> . http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsStateHealthAccountsResidence.html . Accessed in April 2012.	
Population	Historical	U.S	1991-2005	Centers for Medicare & Medicaid Services. (2011). <i>National Health Expenditure by State of Residence</i> . http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareMedicaidStatSupp/2011.html . Accessed in September 2012.	
Population	Historical / Projected	U.S	2006-2010 / 2011-2021	Centers for Medicare & Medicaid Services. (2012). <i>National Health Expenditure Projections</i> . http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/Proj2011PDF.pdf . Accessed in September 2012.	
Population	Historical	California	1991-2009	Centers for Medicare & Medicaid Services. (2011). <i>Health Expenditures by State of Residence, 1991-2009</i> . http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsStateHealthAccountsResidence.html . Accessed in April 2012.	
Population	Projected	California	2010, 2015, 2020	California Department of Finance. (2012). <i>DOF Population projections, May 2012 release</i> . http://www.dof.ca.gov/research/demographic/reports/projections/ . Accessed in July 2012.	1) The California DOF data is benchmarked from the 2000 and 2010 Census Bureau data. DOF projects that the California population will grow from 37.3 million in 2010 to 40.8 million in 2020. 2) We assume straight-line population growth between 2010 and 2015 (0.84% per year) and straight-line growth between 2015 and 2020 (0.95% per year). We assume that the 2015-2020 growth rate continues into 2021 and 2022, leading to a 2022 California population of 41.6 million.

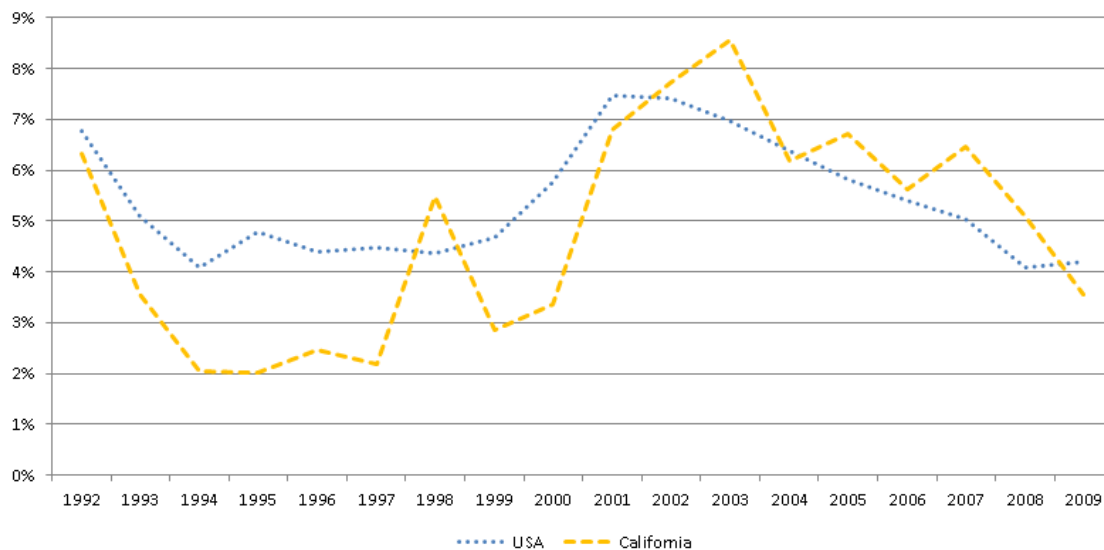


Table 1A: Data Sources Utilized to Document Historical Trends and to Make Projections (continued)

Measure	Type	Geography	Year	Source	Notes
Gross Domestic Product	Historical	U.S	1991-2011	U.S. Department of Commerce. (2012). Bureau of Economic Analysis. <i>National Income and Product Accounts Tables</i> . http://www.bea.gov/itable/ . Accessed in September 2012.	
Gross Domestic Product	Projected	U.S	2012-2021	Centers for Medicare & Medicaid Services. (2012). <i>National Health Expenditure Projections</i> . http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/Proj2011.pdf . Accessed in September 2012.	a) CMS macroeconomic projections are exogenous inputs produced annually by the Social Security Administration. b) We did not utilize the Congressional Budget Office's baseline GDP and budget projections available at the time because they included the impact of the "Fiscal Cliff," i.e., the expiration of Bush tax cuts and spending reductions under the Budget Control Act of 2011. This scenario was considered politically and economically unlikely, and ultimately did not come to pass because of the passage of the American Taxpayer Relief Act of 2012.
Gross State Product	Historical	California	1991-2011	U.S. Department of Commerce. (2010 & 2012). <i>Bureau of Economic Analysis. Gross Domestic Product by State</i> . http://www.bea.gov/itable/ . Accessed in September 2012.	
Premiums	Historical	California	1999-2011	Kaiser Family Foundation (1993-2003). <i>Employer Health Benefits Annual Survey Archives</i> . http://www.kff.org/insurance/ehbs-archives.cfm . Accessed in December 2012. <i>California Employer Health Benefits Survey, 2004-2011</i> . http://www.chcf.org/publications/2011/12/employer-health-benefits . Accessed in December 2012.	
Number of newly insured, 2014	Projected	California	2014	Kominski, G., Jacobs, K., Roby, D., Graham-Squire, D., Kinane, C., Gans, D., et al. (2012). California Simulation of Insurance Markets (CalSIM): UCLA Center for Health Policy Research & UC Berkeley Labor Center. October 2012, by special request to UC Berkeley.	Developed by the UC Berkeley Center for Labor Research and Education and the UCLA Center for Health Policy Research, and utilized by the California Health Benefit Exchange Board.
Median household income	Historical	California	2005-2011	U.S. Census Bureau. (2012). <i>Current Population Survey</i> . http://www.census.gov/hhes/www/income/ . Accessed in September 2012.	1) Includes households classified as under 65 years of age. 2) The median income for a non-family household, defined as individuals living alone or in a household with non-relatives, is used as a benchmark for single coverage. 3) Median family income is used as a benchmark for family coverage.

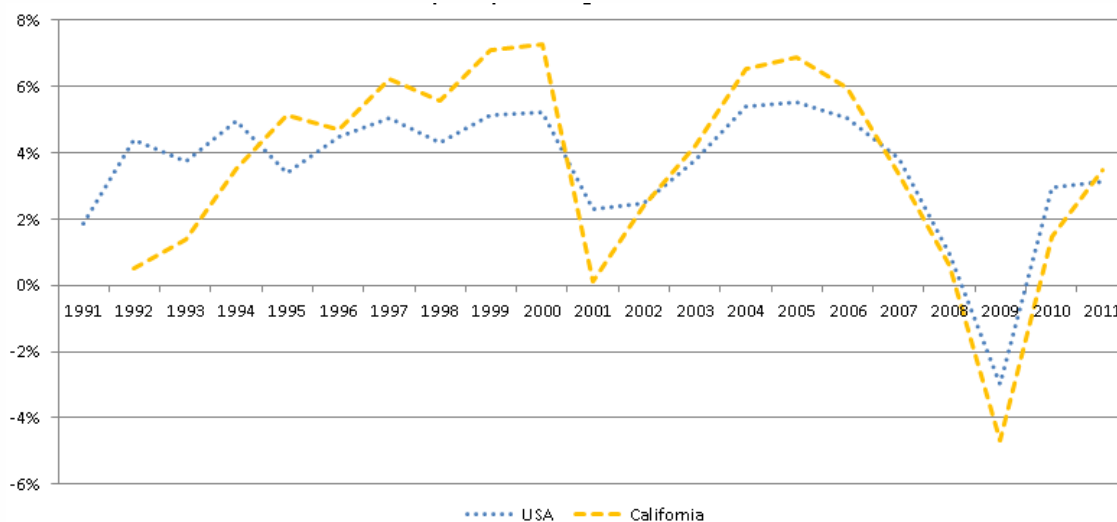


Figure 1A: Personal Healthcare Expenditures Per Capita Annual Growth Rate, California vs. the U.S., 1992-2009



Source: Berkeley Forum analysis using Centers for Medicare & Medicaid Services (2011b) data.

Figure 2A: Annual GDP Per Capita Annual Growth Rate, California vs. the U.S, 1991-2011



Source: Berkeley Forum analysis using U.S. Department of Commerce (2010 & 2012) data.



Table 2A: Projections for the Number of Newly Insured in California in 2014

Data source	ACA Newly Insured (Lives, in millions)		
	Medicaid	Exchange	Total
California Simulation of Insurance Markets (CalSIM): Base (1)	0.7	0.4	1.1
California Simulation of Insurance Markets (CalSIM): Enhanced (1)	1.2	0.7	1.9
Gruber / Long: "Comprehensive" (2)	1.7	1.0	2.7
Mercer consulting	NA	2.6	NA
RAND COMPARE model (1)	3.4	2.1	5.5
Extrapolation of CMS' national newly insured rate for under-65 population (3)	NA	NA	2.8

Notes: NA: Not available. (1) For these data sources, the Berkeley Forum calculated Exchange enrollment based on the *net* enrollment in California's employer-sponsored insurance market, the individual market, and the California Health Benefits Exchange (i.e. The Exchange figure for these data sources represents the net number of newly insured *not* covered by Medi-cal). (2) Because precise figures were not publicly available, these estimates are based on a Berkeley Forum extrapolation of 2014 figures from Exhibit 2 in Long (2011). (3) CMS U.S. data shows that an estimated 8% of the under-65 population will be being newly insured in 2014. The Berkeley Forum estimate shown here is based on extrapolating this figure to California.

Sources (In order above): Kominski et al. (2012) (October 2012, by special request from the Berkeley Forum); *ibid*; Long & Gruber (2011); Mercer Health & Benefits LLC (2011); Auerbach et al. (2011); Centers for Medicare & Medicaid Services (2012).

Table 3A: Spending on Uncompensated Care (Uninsured) and Commonwealth Care, 2005 and 2008

	FY 2005	FY 2008	% Change
UCP / HSNTF¹			
Number of Utilizers	451,000	309,000 ³	-31%
Total Costs	\$739,400,000	\$415,600,000	-44%
Per Capita Spend	\$1,600	\$1,300	-19%
Commonwealth Care²			
Number of Utilizers	NA	158,000 ⁴	NA
Total Costs	NA	\$628,000,000	NA
Per Capita Spend	NA	\$4,000	NA
Total			
Number of Utilizers	451,000	467,000	8%
Total Costs	\$739,400,000	\$1,043,600,000	41%
Per Capita Spend	\$1,600	\$2,200	38%

Notes: Commonwealth Care is the Massachusetts Exchange system established by the state's 2006 health reform law. (Kaiser Family Foundation (2012)). (1) Fiscal year for Massachusetts's safety net system, the "Uncompensated Care Pool" (UCP), now known as the Health Safety Net Trust Fund (HSNTF) runs from October 1 to September 30 of the following year. (2) Fiscal year for Commonwealth Care runs from July 1 to June 30 of the following year. (3) Annualized based on first 3 quarters of FY 2008. (4) As reported in December 2007. Includes premium and non-premium members.

Source: Lischko et al. (2010).



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(*See Table 1A for additional data sources referenced)

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A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM: Integrated Care with Aligned Financial Incentives

Appendix IV. Introduction to Appendices V - XI

APRIL 2013

<http://berkeleyhealthcareforum.berkeley.edu>





Appendix IV. Introduction to Appendices V - XI

The Berkeley Forum Report, “A New Vision for California’s Healthcare System: Integrated Care with Aligned Financial Incentives” includes estimates on the impact of seven initiatives to reduce healthcare expenditures in California over the coming ten years.

Appendices V-XI sequentially contain a full memorandum for the following seven initiatives examined in the Report: Global Budgets/Integrated Care Systems, Patient-Centered Medical Homes, Palliative Care, Physical Activity, Nurse Practitioners and Physician Assistants, Healthcare-Associated Infections, and Preterm Births. Each memorandum describes the underlying problem, discusses the proposed initiative, and reports the estimated healthcare expenditure reductions under the Current Developments and Forum Vision scenarios. Each memorandum explains the methods and assumptions used to generate the estimates.

For each initiative, healthcare expenditure reduction estimates were made for the Current Developments and the Forum Vision scenarios, relative to status quo healthcare expenditures. The status quo expenditures are discussed in Section V, “The Affordability Crisis: An Examination of California’s Healthcare Expenditures and Insurance Premiums” of the main Report.

The Current Developments scenario is based on an assessment of unfolding market forces, policies and events. For example, this scenario takes into account growing Medi-Cal primary care access challenges, private payers’ experimentation with new delivery and payment methods, and the growing awareness of the benefits of palliative care and physical activity. The Current Developments scenario is distinct from the status quo, which is based on historical trends along with key Affordable Care Act provisions such as health insurance coverage expansion.

In contrast, the Forum Vision is based on a scenario in which there is a much more pronounced shift towards risk-based payments and integrated care systems that better align clinical and financial incentives and that also prioritize population health. Thus, under the Forum Vision, adoption rates as well as the effectiveness of the various initiatives are assumed to be significantly higher than under the Current Developments scenario.



**A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM:
Integrated Care with Aligned Financial Incentives**

**Appendix V. Global Budgets/Integrated Care Systems
(Initiative Memorandum)**

APRIL 2013

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Appendix V. Global Budgets/Integrated Care Systems (Initiative Memorandum)

See “Appendix IV: Introduction to Appendices V-XI” for brief background on this Appendix.

Executive Summary

Numerous public and private payment reform initiatives are designed to encourage a transition from fee-for-service to new payment models based on risk-adjusted global budgets and integrated systems of care. These initiatives attempt to improve upon the capitated payment models used in the 1990s, which caused a consumer backlash against health maintenance organizations (HMOs) and resulted in many provider organizations declaring bankruptcy after taking on too much financial risk.¹ In some risk-adjusted global budget models, patients are not restricted to a particular provider network as they are under an HMO. However, in other cases, global budgets are overlaid on an HMO product. Quality measures are central to a risk-adjusted global budget. Most agreements require providers to meet specific quality of care measures before they become eligible for shared savings or related rewards. Compared to a global payment, the financial risk facing providers under a global budget is better mitigated through shared risk agreements between payers and providers, as well as through the use of better risk-adjustment models and reinsurance. Global budgets are an important component of Accountable Care Organizations (ACOs), which are increasingly being used by both public and private payers.²

To estimate the expenditure reductions and costs associated with expanding the use of risk-adjusted global budgets and integrated care systems, we utilized studies that estimated expenditure reductions and costs, and then applied these estimates to the projected number of insured individuals that would be enrolled in a plan using a global budget. To estimate expenditure reductions, we used estimates from recent studies of ACOs that included global per member budgets for commercially insured individuals and for Medicare beneficiaries. We recognize that ACOs are not the only model of risk-adjusted global budgets and integrated care. However, ACOs are currently the only model that has been adequately studied, and are a proxy for the expenditure reduction potential of integrated care systems based on global budgets.

Based on these studies, we assumed annual expenditure reductions would range from a low of 2.8% to a high of 7.3% in the commercially insured and Medi-Cal populations, while the annual expenditure reductions would range from 0.5% to 1.4% in the Medicare population. We estimated the administrative and information technology costs of implementing an ACO with a global budget using studies from the

¹ Frakt, et al. (2012).

² A global budget refers to a global healthcare budget for a defined population. Providers take upside (and potentially downside) risk on whether the budget is met, but often not 100% of the risk. Reimbursement for services may still be on a fee-for-service basis. In contrast, a global payment is akin to a risk-adjusted global per member per month capitated payment, wherein providers take both upside and downside risk at 100%, which can be mitigated through reinsurance.



Centers for Medicare and Medicaid Services (CMS), the Institute for Health Technology Transformation (IHTT), and the American Hospital Association (AHA). We assumed first-year start-up costs that ranged from \$1.8 million to \$3.6 million per ACO, assuming 20,000 members, with subsequent-year costs being 25% of first-year costs.

We estimate that approximately 23% of California's insured population received care in 2012 under a risk-adjusted global budget via Kaiser Permanente or an existing ACO.^{3,4} Under our Current Developments scenario, we assume this percentage will increase to 45% of California's insured population by 2022 as ACOs and other integrated care models expand.⁵ Under that scenario we estimate that healthcare expenditures would decrease between \$14.0 billion and \$37.9 billion in current-year dollars during the period 2013-2022, or 0.32%-0.86% of California's total projected expenditures under the status quo.

Under the more optimistic Forum Vision scenario, we assume 70% of California's insured population will receive care from an ACO or globally budgeted integrated care system by 2022. In this scenario we estimate that healthcare expenditures would decrease by \$30.9 billion to \$83.6 billion between 2013 and 2022, or 0.70%-1.91% of California's total projected healthcare expenditures under the status quo. In 2022, we estimate the percent expenditure reduction from this initiative will represent 2.6% of the status quo projections, because we assume the ACO/integrated care system penetration rate will be at its highest level (i.e., a full 70%) in that year.

The Underlying Situation

In 2012, 44% of the California population received insurance through an HMO.⁶ This share has remained relatively consistent over the last eight years and is more than double the rate for the United States as a whole.⁷ However, many Californians still receive care in a fragmented system that fails to emphasize coordination of care or take into account the costs incurred outside of the primary care setting. Many HMO beneficiaries still receive care through fee-for-service payments to non-physician providers, with very limited or no financial risk borne by these providers. Some organizations, such as Kaiser Permanente, have mitigated some of the challenges of fragmented care and misaligned incentives by having a salaried physician organization, coupled with global payments that encompass virtually all of their members' healthcare needs. This aligns incentives throughout the organization, encouraging the delivery of more cost-effective, coordinated care.

However, for much of California's population, there still exists a significant opportunity to incentivize reduced expenditures and higher quality of care through risk-adjusted global budgets and improved

³ Cattaneo & Stroud Inc. (2012a).

⁴ Cattaneo & Stroud Inc. (2012b).

⁵ For the purposes of this analysis, insured Californians include those covered by all forms of public and private insurance. Kaiser Permanente members and others are already receiving care from highly or fully integrated systems, some which use global payments

⁶ Cattaneo & Stroud Inc. (2012a).

⁷ Kaiser Family Foundation (1993-2003); California HealthCare Foundation. (2004-2011).



integration of care.⁸ Incentives must be created beyond existing HMO structures to cover more providers across the care continuum. In doing so, physicians and hospitals must have the freedom to reorganize and redesign care delivery specifically for their patient populations and their provider networks. To incentivize physicians and hospitals to invest in care redesign and take the risk of losing fee-for-service revenue, risk-adjusted global budget contracts allow them to share in any expenditure reductions they help bring about. This payment model can also support population health by creating incentives for individuals to stay healthy, such as subsidizing access to physical fitness, providing health and nutritional education, and encouraging immunizations.

Medicare and private insurers have attempted to align incentives with providers by encouraging the creation of ACOs. In an ACO, a group of primary care physicians, specialists and typically at least one hospital establish a contract to assume responsibility for the comprehensive care of a group of patients. These providers may be paid directly via fee-for-service or capitation, but all share a common goal of keeping total patient costs within a risk-adjusted global budget. ACO contracts with payers allow providers to share in potential savings in the form of bonuses. They also must meet established quality targets in order to qualify for shared savings. Global budgets with quality of care goals are not unique to ACOs, but could be linked to such other managed care product types as HMOs. We acknowledge that ACOs vary greatly in their size, structure, payment mechanisms and management approach. Therefore, when we discuss ACOs in this appendix, we do not refer to a specific model or insurance product, but instead to entities using an integrated care system that:

- Provides care for specified group of patients who can also generally receive care outside the ACO,
- Operates under a global budget or spending target,
- Reports and receives incentives related to quality of care, and
- Shares financial risk.

The ACO model evolved partially out of the Medicare Physician Group Practice Demonstration (PGPD) and was formalized in the Affordable Care Act as the Medicare Shared Savings Program (MSSP). MSSP ACOs can utilize a “one-sided” shared savings model, in which providers may share in cost savings if they stay below a target budget for their population’s care, but face no financial risk if their costs exceed it. The alternative “two-sided” model shifts at least some of this downside risk to the provider, but allows for a higher shared savings rate in exchange for that risk. CMS’s Pioneer ACO program is based on a “two-sided” model.⁹ Although the ACO model was initially developed to lower costs for Medicare beneficiaries, ACOs caring for commercially insured patients are spreading rapidly.¹⁰ It is estimated that

⁸ In California’s dual regulatory structure, capitation arrangements are restricted to Department of Managed Health Care Health Maintenance Organization (HMO) products, and are not allowed in Department of Insurance Preferred Provider Organizations (PPOs). Therefore, this report primarily uses the broader terminology of “global budgeting” rather than “global payments.” Global budgeting refers to a global healthcare budget for a defined population, and providers take upside (and potentially downside) risk on whether the budget is met, but not necessarily 100% of the risk. Reimbursement for services may still be on a fee-for-service basis. In contrast, a global payment is akin to a risk adjusted global per-member per-month capitated payment system in which providers take both upside and downside risk at 100%, which can be mitigated through reinsurance.

⁹ Centers for Medicare and Medicaid Services (2012).

¹⁰ California HealthCare Foundation (2012).



623,700 Californians are currently served by one of 41 official, operational ACOs, as tracked by Cattaneo & Stroud Inc. As of January 2013, Los Angeles County's 16 ACOs covered approximately 213,000 patients, followed by Orange County's 11 ACOs covering 94,600. Enrollment in California ACOs varies from as few as 500 patients to as many as 68,000, the latter the number of enrollees in the Heritage Provider Network's Pioneer ACO.¹¹

Proposed Initiative

This initiative would expand the number of ACOs and other integrated care systems in California to better align clinical and financial incentives. While additional incentives may be required in the Medicare market to spur adequate ACO formation, commercial insurers and providers are already experimenting with ACOs to hold down costs and to compete with Kaiser Permanente's integrated model.

Previous Studies

Table 1 includes six studies that estimate expenditure reductions from ACOs using a risk-adjusted global budget. Studies 1, 2 and 4 are based on actual ACOs, while Studies 3, 5 and 6 are based on projections or simulations. Studies 1, 2 and 3 include enrollees in commercial ACOs, while Studies 4 and 5 include enrollees in Medicare's pilot ACO initiatives or its Shared Savings Program. Study 6 includes both public and privately insured populations.

¹¹ Cattaneo & Stroud Inc. (2012a).



Table 1: Expenditure Reduction Estimates from Accountable Care Organizations and Global Budgets

Study	Insurance Type	Population	Annual Expenditure Reduction ¹²
1. Blue Shield CalPERS ACO ¹³	Commercial	Blue Shield of California CalPERS commercial HMO enrollees	7.3%
2. Alternative Quality Contract ¹⁴		Blue Cross Blue Shield of Massachusetts HMO enrollees	2.8%
3. Physician Group Practice Demonstration (PGPD) ¹⁵	Medicare	Medicare fee-for-service beneficiaries who participated in the PGPD	1.4%
4. CMS Final Rule ¹⁶		Projected enrollees in Medicare Shared Savings ACOs	0.5%
5. Shared Savings Program Diabetes Simulation ¹⁷		Medicare Diabetes Patients	0%
6. Lewin Group ¹⁸	Commercial and Public	All non-HMO patients in New York State	4.5%

Next, we summarize the studies listed in Table 1 and discuss each in more detail. Two studies estimate expenditure reductions from commercial ACO pilot programs in California and Massachusetts, respectively. For commercial enrollees, Markovich estimated expenditure reductions of an ACO involving CalPERS beneficiaries in Sacramento over two years to be 7.3%¹⁹ per year.²⁰ Song and colleagues estimated the expenditure reductions of ACO participants in Massachusetts' Alternative Quality Contract (AQC) over two years to be 2.8% per year.²¹

For Medicare enrollees, estimated expenditure reductions were much lower. A study of the spending from the five-year Medicare Physician Group Practice Demonstration estimated savings to be 1.4% per year.²² In addition, we evaluated the CMS final ruling on the Medicare Shared Savings Program.²³ Their projected expenditure reductions for the first three years of the program were estimated to be 0.5% per

¹² Annual savings are relative to the study's projected per-capita healthcare costs for the control group or general population.

¹³ Markovich (2012).

¹⁴ Song, et al. (op. cit.).

¹⁵ Colla, et al. (2012).

¹⁶ Department of Health and Human Services (2011).

¹⁷ Eddy, et al. (2012).

¹⁸ Lewin Group (2010).

¹⁹ Expenditure reductions in studies of ACOs generally refer to health plan costs saved. We acknowledge these saving estimates do not account for portions of costs shared with the patient. Data was not available on total costs saved inclusive of patient costs.

²⁰ Markovich (2012).

²¹ Song, et al. (2012).

²² Colla, et al. (2012).

²³ Department of Health and Human Services (2011).



year. Eddy, et al. conducted a simulation of the Medicare Shared Savings Program for diabetes patients, but did not find any savings.²⁴

The final ACO expenditure reduction estimate is based on the potential expenditure reductions that would be generated if ACOs were expanded across New York State's non-HMO population, including both publicly and privately insured patients. The Lewin Group estimated the savings to be 4.5% per year against the baseline.²⁵

Commercial ACO Studies

Blue Shield of California CalPERS ACO (Sacramento, California)

In 2009, Blue Shield of California partnered with Hill Physicians and Dignity Health to create an ACO for 41,000 commercial HMO CalPERS beneficiaries in the Sacramento area. The three partners were looking to combat rising costs and competitive threats from Kaiser Permanente. CalPERS received a guaranteed premium credit of \$15.5 million in the first year that came from all three partners, establishing the impetus for them to collaborate to reduce expenditures.²⁶

The three partners created a global per-member per-month spending target. However, physicians at Hill Physicians continued to be paid via capitation, as they had always been, while Dignity Health continued to be paid on a fee-for-service basis for hospital services. Together, working within a target global budget for the CalPERS population, they shared the risks and rewards across the three entities, based on their relative ability to control certain elements of cost and quality. For example, Dignity Health took on more risk related to facility costs, while Hill Physicians took on more risk for professional services.²⁷ However, each of the three organizations had a stake in every component of healthcare costs.

For the years 2010 and 2011, the ACO delivered \$37 million in savings to CalPERS and an additional \$8 million shared among the partners.²⁸ This represented 7.3% lower annual expenditures versus the comparison group, which was comprised of all other CalPERS beneficiaries.²⁹ For the two-year period, the rate of expenditure increase for the ACO enrollees was approximately half that of the comparison group. Approximately half of the expenditure reductions were from decreased utilization, with the other half were from patients utilizing lower-cost facilities. The ACO facilitated the decrease in utilization primarily by lowering the total number of inpatient days, which decreased by about 15% (on a per thousand member basis) over two years. In addition, 30-day readmissions rate fell 15%.³⁰

²⁴ Eddy, et al. (2012).

²⁵ Lewin Group (2010).

²⁶ Markovich (2012).

²⁷ Ibid.

²⁸ Ibid.

²⁹ In his Health Affairs article, Markovich does not calculate the annualized percentage savings over the two-year period. However, using the dollar savings rates provided in the study alongside the annual percentage savings, we calculated the figure ourselves.

³⁰ Ibid.



This study of the CalPERS ACO has some limitations. The study cautions that ACOs and global budgets work best to achieve expenditure reductions when used on a relatively small, tightly integrated network of patients and providers. If there are fewer provider relationships to manage, care coordination can more effectively reduce utilization.³¹ It is possible that this particular ACO generated exceptional expenditure reductions because of the existing level of integration and partnership among the providers involved. In addition, the 10% first-year expenditure reduction versus the control group was not sustained, and was partially reversed during the program's second year. This raises the question of whether the 2010 expenditure reductions were caused by genuine sustainable gains in efficiency, or whether another factor temporarily lowered utilization, such as patients deferring expensive care. The study notes that an unexpected increase in catastrophic costs created the majority of the difference between 2011 and 2010. Without additional years of data, it is difficult to determine whether the program's annualized expenditure reduction rate of 7.3% is representative of the potential of this ACO model.

The Massachusetts Alternative Quality Contract

In 2009, Blue Cross Blue Shield of Massachusetts (BCBSMA) contracted with seven providers and established a global budget arrangement for each provider group known as the Alternative Quality Contract (AQC). In 2010, four additional providers joined. The providers include integrated systems, physician-hospital organizations, multi-specialty groups and independent practice associations. Eligibility for the AQC requires that a group include primary care physicians who collectively care for at least 5,000 members of BCBSMA HMO plans.

The AQC's model for ACOs is less integrated than the one employed by the Blue Shield of California CalPERS ACO. The provider groups and Blue Shield of California integrated their processes very tightly in order to recover guaranteed savings paid in advance to CalPERS. By comparison, the AQC model for physician group-based ACOs requires less integration and may be easier to expand to include many physician groups. Very few hospitals have been involved in the AQC thus far, and employers are not guaranteed upfront savings.

A 2012 study by Song and colleagues utilized a differences-in-differences approach to estimate the effect of the AQC on expenditures per enrollee.³² The study population was BCBSMA enrollees who were continuously enrolled for at least one calendar year. Participation in the contract over the two-year period studied (2009 and 2010) yielded an annual per-member expenditure reduction of 2.8% (1.9% during Year 1 and 3.3% in Year 2) compared to spending in non-participating groups.³³

The study also divided the enrollees into "prior-risk" and "no prior-risk" subgroups. The "prior-risk" group consisted of the four organizations (covering 88% of enrollees in the study) with previous

³¹ Ibid.

³² Song, et al. (2012).

³³ Ibid.



experience managing risk-based contracts with BCBSMA, and accounted for 88% of the enrollees. The remaining 12% were in the “no prior-risk” group, which included the other physician organizations that had previously managed only fee-for-service contracts with BCBSMA. The study found that expenditure reductions were substantially larger in the no-prior-risk subgroup. The no-prior-risk group showed a reduction of 6.3% in Year 1 and 9.9% in Year 2, for an 8.2% annualized expenditure reduction over the two years. By comparison, members of the prior-risk group did not significantly decrease their utilization, achieving reductions of only 1.1% for Year 1 and 1.9% for Year 2.³⁴

Song et al. stated that the AQC’s savings resulted from the lower unit costs achieved by the use of less expensive facilities for procedures, imaging and tests, and from the reduced utilization rates among some groups. Estimates from Year 1 revealed that reductions in utilization relative to the control group accounted for about 50% of the savings.³⁵ The study’s breakdown of prior-risk and no prior-risk provider organizations suggests that a large proportion of the utilization decrease was concentrated among the relatively small group of patients with the no-prior-risk providers.

The expenditure decrease for patients whose physicians had risk management experience with BSBCMA was modest, indicating they likely had already achieved higher levels of efficiency and could not significantly reduce utilization. However, the findings in the no-prior-risk group of providers are promising. These findings indicate that fee-for-service beneficiaries in California who enter an ACO model similar to the AQC could potentially achieve similar savings to those seen in the CalPERS ACO, in the 7-8% range.

Medicare ACO Studies

Physician Group Practice Demonstration

A recent study by Colla and colleagues estimates the expenditure reduction achieved by the five-year Physician Group Practice Demonstration (PGPD).³⁶ The PGPD was the predecessor to the Medicare Shared Savings Program (MSSP). Under the PGPD, participating physician groups received bonuses if they met quality targets and achieved savings beyond a 2% threshold for Medicare beneficiaries. Colla et al. use quasi-experimental analyses to compare pre- and post-intervention groups of Medicare beneficiaries who received care from a PGPD organization, compared to a control group of Medicare patients. They found a modest average annual expenditure reduction of 1.4% per beneficiary (\$114) as compared to the control group.³⁷

As the study notes, the mean expenditure reduction masks significant heterogeneity across geographies and demographic groups. For example, the results from different provider groups ranged from annual savings of \$866 per beneficiary at the University of Michigan to an expenditure increase of \$749 per

³⁴ Ibid.

³⁵ Ibid.

³⁶ Colla, et al. (2012).

³⁷ Ibid.



beneficiary at the Middlesex site. Furthermore, annual savings for Medicaid-Medicare “dual eligible” beneficiaries were \$532 per beneficiary.

Given this level of heterogeneity, we acknowledge that Medicare ACO expenditure reduction could be significantly higher or lower than 1.4% annually, depending on the population served and the care practices employed. As more providers care for increasing numbers of ACO patients, this could lead to spillover effects. Providers may redesign their practices if a greater proportion of their patients are part of ACO contracts with risk-adjusted global budgets. Finally, if disproportionate numbers of dual Medicaid-Medicare eligible individuals are included in successful ACOs, an increased rate of savings as shown in the PGPD may also reduce overall expenditures.

Center for Medicare and Medicaid Projections

In early 2011, CMS released its final ruling for the MSSP,³⁸ projecting MSSP ACOs would save Medicare \$510 million over the first three years. CMS released relatively little detail on its calculation process, but did show its range of estimates for savings (\$170 million to \$960 million), as well as for participation among Medicare recipients (1.5 million to 4 million). Assuming the midpoint of the estimates (i.e. 2.75 million Medicare beneficiaries were enrolled) and the midpoint of the savings estimate, this translates to only a 0.5% savings against status quo.

Medicare Shared Savings Program Diabetes Simulation

In a 2012 study, Eddy and Shah use a computer-based simulation to project the costs and savings associated with implementing the Medicare Shared Savings Program ACO model for diabetes patients.³⁹ The simulation found that a 10% increase in diabetes care quality measures under MSSP would yield no cost savings when accounting for new costs required by MSSP quality targets. Given that the study did not use observed cost data from ACOs and limited its focus to diabetes patients, we chose to not include its results in our expenditure reduction estimates.

Other ACO Studies

Lewin Group ACO Projections

The Lewin Group’s report, *Bending the Healthcare Cost Curve in New York State: Options for Saving Money and Improving Care*, estimates the potential cost savings that would be generated if ACOs based on the independent practice association (IPA) HMO model were expanded across all of New York State’s insured population. The study’s “mandatory ACO model” scenario assumes New York could simply require all public and private payers (apart from those already enrolled in capitated HMO plans) to immediately adopt an ACO model.⁴⁰

³⁸ Department of Health and Human Services (2011).

³⁹ Eddy, et al. (2012).

⁴⁰ Lewin Group (2010).



Using previous estimates of the utilization reductions observed in IPA HMOs, Lewin calculates the 10-year impact of moving all non-HMO beneficiaries to ACOs similar to IPA HMOs. Lewin models this by applying the utilization reductions observed in studies of IPA HMOs to the aforementioned beneficiaries over 10 years. Lewin estimates that during this period, New York's total healthcare expenditures would be 4.5% lower than total projected expenditures.⁴¹ These savings are somewhat lower than those observed under by the CalPERS ACO, but are higher than those in the Massachusetts AQC ACOs. Given that Lewin's analysis includes publicly and privately insured individuals and ACOs, their savings estimate provides us with a useful central anchor for the annual savings ranges we use in our model.

Modeling Approach and Assumptions

This section describes how we estimated the expenditure reductions that would result during the period 2013-2022 by more Californians belonging to an integrated care system using a risk-adjusted global budget. It first describes how we used the estimated healthcare expenditure reductions in the above studies. That is followed by penetration assumptions, and then by our cost estimates for starting and maintaining an ACO or similar integrated care system.

Commercial Beneficiaries' Healthcare Expenditure Reductions Assumptions

The two major studies on commercial ACOs with risk-adjusted global budgets^{42,43} found significantly different rates of expenditure reduction. The differences may be the partial result of the different approaches to ACO development taken by Blue Shield of California (BSCA) in its CalPERS ACO and BCBSMA in its AQC. BSCA included a hospital group in its ACO and guaranteed savings to CalPERS up front. However, BCBSMA's ACO was based primarily on physician groups with no guaranteed savings. In addition to these two approaches, many other ACO and shared-risk integrated care models exist, and all of them are still evolving.

We estimate expenditure reductions from global budgets to range from a low of 2.8% annually from the Massachusetts Alternative Quality Contract to a high of 7.3% annually from the CalPERS ACO. This range is large, mainly because of the uncertainty regarding the structure that California ACOs will follow during the next 10 years.

Medicare Beneficiaries' Healthcare Expenditure Reductions Assumptions

We rely on two estimates of expenditure reduction generated by Medicare ACO programs. We estimate that savings to California's Medicare beneficiaries will range from those projected by CMS for the Medicare Shared Savings Program's first three years (0.5% per year) for the lower-bound estimate,⁴⁴ to

⁴¹ Ibid.

⁴² Markovich (2012).

⁴³ Song, et al. (2012).

⁴⁴ Department of Health and Human Services (2011).



those estimated by Colla and colleagues study of the Physician Group Practice Demonstration (1.4% reduction per year) for the upper-bound estimate.⁴⁵

Because of existing federal law and incentives, California Medicare beneficiaries will likely enter into ACOs similar to those established via the MSSP. When it released the final rules on the MSSP, CMS offered low, median and high estimates for savings generated by the initial three-year MSSP. We used CMS' median estimate of \$510 million savings over three years for a predicted 2.75 million participants, to compute a \$61.82 per capita annual savings. The savings taken from a three-year average projected per capita expenditure of \$12,973 for Medicare enrollees is a modest 0.5%. Given that Colla et al. found savings of 1.4% annually, we model using an expenditure reduction range of 0.5% to 1.4% for Medicare ACOs. We acknowledge that these savings assumptions may be conservative, given the heterogeneity in the Colla et al. study of the PGPD, and the potential for higher expenditure reductions if dual Medicare-Medicaid beneficiaries are targeted by ACOs.

While this expenditure reduction rate for Medicare ACOs may seem low, the limited evidence thus far suggests that commercial ACOs have fared better at decreasing healthcare costs. This could be for a number of reasons. First, ACOs based on HMO insurance plans can limit the providers that patients visit, while Medicare ACOs cannot. In addition, the current MSSP shared savings mechanisms put providers at less risk for financial loss than the commercial ACOs studied here. In addition, insurers generally manage commercial ACOs, while hospitals and physician groups generally manage Medicare ACOs. In certain cases, there may be advantages to having commercial insurers serve as the arbiter among the different parties. Further study is needed to understand the expenditure reduction gap between commercial and Medicare ACOs.

Medi-Cal Beneficiaries' Healthcare Expenditure Reductions Assumptions

California's Medi-Cal beneficiaries are increasingly enrolling in managed care. Partially because of relatively low provider reimbursement levels, Medi-Cal beneficiaries already have low per-capita expenditures as compared to participants in Medicaid programs in other states.⁴⁶ We did not find any studies of pilot programs or initiatives that place Medicaid beneficiaries in ACOs. Given the high rates of emergency department utilization and the care management complexity of many dual-eligible enrollees, there might be a significant opportunity for savings under ACO structures. These patients often face challenges to provider and specialty care access. These challenges could be better managed by ACOs.

We assume the expenditure reduction achieved in Medi-Cal ACOs will be the same as the commercial expenditure reduction rate, from a low of 2.8% to a high of 7.3%. We acknowledge that greater reductions may be achievable among the Medi-Cal population; however, no studies exist on potential ACO impacts for them.

⁴⁵ Colla, et al. (2012).

⁴⁶ Medi-Cal had per-capita expenditures of \$3,527, as compared to Medicaid's national average of \$5,527. Source: Kaiser Family Foundation (2012).



ACO/Integrated Care System Penetration Rate Assumptions

According to Cattaneo & Stroud Inc., as of January 2013, there were 41 ACOs operating in California, providing care to about 623,700 residents, or approximately 2% of the insured population.⁴⁷ This results in about 15,000 Californians per ACO. Combining these Californians with the 6.6 million enrolled in Kaiser Permanente plans,⁴⁸ we calculate that about 23% of insured residents receive their care via a risk-adjusted global budget from an organization similar to an ACO today. Under our Current Developments and Forum Vision scenarios, we assume 45% or 70% of insured Californians, respectively, will receive care under a global budget in an integrated care system such as an ACO.⁴⁹

We assume ACO penetration will increase according to the typical S-curve of technology adoption, in which an initially low adoption rate is followed by a period of exponential growth, and then by slower growth. Our S-curve model assumes that California has already experienced most of the initial period of slow growth, and that ACO penetration will increase rapidly through 2017. We expect the years 2018-2022 to represent the flatter portion of the S curve, with ACOs seeing fewer new enrollees, reaching 45% and 70% penetration under each scenario, respectively.

Start-Up and Ongoing Maintenance ACO Cost Assumptions

Estimates of the start-up and ongoing maintenance costs of operating an ACO vary substantially. Based on its own observations from the 2008 PGPD, CMS in 2011 estimated that average start-up and first-year costs for an ACO would be about \$1.76 million. Based on conversations with key opinion leaders, we assume an average ACO size of 20,000 members. This equates to \$7.50 per-member per-month. CMS acknowledged that costs varied substantially among their observed PGPD ACOs, up to a high of \$3.7 million, and that those organizations that already had well-established infrastructure, such as electronic medical record systems, may have been “uniquely suited” to ACO management.⁵⁰

In 2011, the American Hospital Association (AHA) published its own study in response to the CMS estimates. It projected start-up and first-year costs ranging from \$5.3 million to \$12 million.⁵¹ A report issued by the Institute for Health Technology Transformation (IHTT) estimated that the start-up and first-year costs would be \$7.5 million to \$11.3 million for a 200-bed hospital, and \$1 million to \$11.7 million for a 200-physician practice.⁵² The significant variation in estimated costs across the studies is due largely to different assumptions about provider readiness to implement ACOs and integrated care systems, notably with regard to healthcare information technology. The AHA argues the CMS projections underestimate the information technology and information systems investments required to make a successful ACO and overstate a typical organization’s readiness and existing technology. The

⁴⁷ Cattaneo & Stroud Inc. (2012b).

⁴⁸ Cattaneo & Stroud Inc. (2012a).

⁴⁹ Kaiser Permanente members and others are already receiving care from fully or highly integrated systems, some of which use global payments. The 45% and 70% goals target the population receiving care outside of fully or highly integrated systems using risk-based payments.

⁵⁰ Department of Health and Human Services (2011).

⁵¹ Moore, et al. (2011).

⁵² Barrett, et al. (2011).



AHA and IHTT studies estimate that on-going maintenance costs will be 15%-20% and 24%-28% of upfront costs, respectively.

The Blue Shield of California CalPERS ACO and Blue Cross Blue Shield of Massachusetts Alternative Quality Contract demonstrate that the definition of an ACO is quite broad, especially in the commercial market. As we have discussed, some ACOs may be highly integrated partnerships involving a single large multispecialty group, hospital and insurer, as was the BSCA CalPERS ACO. Alternatively, a hospital may not be involved, and the ACO may be a looser affiliation between IPAs and insurers, like in the BCBSMA AQC. Across this spectrum, upfront investments and ongoing maintenance costs may vary significantly. For our low-cost scenario, we estimate first-year (including start-up) costs of \$1.8 million, which aligns with CMS's low estimate, for each group of 20,000 individuals enrolled in an ACO, with expenses for each additional year of 25% of that amount. For our high-cost estimate, we double the low-cost estimate to \$3.6 million, consistent with the highest observed costs in the PGPD, and again figure 25% further costs in each subsequent year. We apply the low-cost estimate to our low-expenditure reduction estimate because achieving these reductions will likely involve less investment and on-going maintenance. We apply the high-cost estimate to our high-expenditure reduction estimate because achieving these reductions will likely involve more investment and ongoing maintenance.

Estimated Impacts

Tables 2-3 show our healthcare expenditure reduction estimates.

Table 2: Healthcare Expenditure Reduction Estimates Under the Current Developments Scenario, 2013-2022

	2013		2022		2013-2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status quo expenditures (\$billion)	\$327.6		\$572.2		\$4,387.1		
Expenditure reduction (\$billion)	\$0.2	\$0.5	\$2.6	\$6.9	\$14.0	\$25.9	\$37.9
Expenditure reduction (%)	0.05%	0.15%	0.45%	1.21%	0.32%	0.59%	0.86%

Table 3: Healthcare Expenditure Reduction Estimates Under the Forum Vision Scenario, 2013-2022

	2013		2022		2013-2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status quo expenditures (\$billion)	\$327.6		\$572.2		\$4,387.1		
Expenditure reduction (\$billion)	\$0.4	\$1.3	\$5.5	\$14.8	\$30.9	\$57.2	\$83.6
Expenditure reduction (%)	0.12%	0.38%	0.97%	2.59%	0.70%	1.30%	1.91%

Table 2 shows that if ACOs were expanded to care for 45% of California's commercially insured, Medi-Cal and Medicare populations by 2022, healthcare expenditures are estimated to be between \$14.0 billion and \$37.9 billion lower in current-year dollars during 2013-2022, or 0.32%-0.86% of total projected expenditures under the status quo. Table 3 shows that under the more optimistic Forum Vision scenario, in which 70% of insured Californians receive care from ACOs by 2022, California healthcare expenditures are estimated to be from \$30.9 billion to \$83.6 billion lower through 2022, or



0.70%-1.91% of total projected expenditures under the status quo. At 2.59%, expenditure reductions are significantly higher in 2022 than in 2013, as many more Californians are projected to be receiving care from ACOs by then.

Discussion

If ACOs were expanded to provide care to 45% of California's commercially insured, Medicare, and Medi-Cal populations by 2022, California healthcare expenditures are estimated to be between \$14.0 billion and \$37.9 billion in current-year dollars (or 0.32%-0.86% of projected expenditures) lower during 2013-2022. Under the more optimistic Forum Vision scenario, in which this share increases to 70%, the estimated expenditure reductions are between \$30.9 billion and \$83.6 billion, or 0.70%-1.91% of projected expenditures.

Our healthcare expenditure reduction estimates have three key limitations. First, our assumptions regarding the penetration levels of ACOs for the commercial, Medicare and Medi-Cal insurance populations are based on conversations with acknowledged experts from academia and industry who have insights into payment reform and the potential momentum for ACO development in California. We also considered the sustained level of penetration that HMO insurance products have achieved in California. However, there is little historical basis upon which to predict their future penetration levels.

Our second limitation involves the annual expenditure reductions percentages we use for ACOs. The Blue Shield of California CalPERS ACO and Blue Cross Blue Shield of Massachusetts Alternative Quality Contract, which are the two sources for our commercial ACO expenditure reduction estimates, cover only two years. Both BSCA and BCBSMA are currently developing strategies to achieve new expenditure reductions for their ACOs. Organizations not accustomed to collaborating with each other may need additional time to implement changes in their practices and cultures. This may be particularly true for the Medicare population, where the expenditure reduction estimates are much lower than they are for the commercial population. On the other hand, our expenditure reduction estimates could be overstated if the savings were the result of one-time rather than systemic effects. As the CalPERS ACO demonstrated, unforeseen expenditure increases occurred in the second year following expenditure reductions in the first year. These same issues apply to the Medicare studies. Finally, we were not able to de-couple the possible expenditure reductions inherent in risk-adjusted global budgets from the possible expenditure reductions that are inherent in the incentives provided by the structure of an ACO. The two are intertwined.

Our third limitation involves estimating the start-up and ongoing costs of an ACO with a risk-adjusted global budget. The existing estimates vary widely, because of uncertainties involving provider readiness to implement ACOs. Further research is needed to refine these estimates using real data from actual, operating ACOs.



Acknowledgements

We are very grateful for the comments we received on this memorandum from Dana Gelb Safran, Sc.D., Senior Vice President, Performance Measurement and Improvement, Blue Cross Blue Shield of Massachusetts; Carrie Colla, Ph.D., Assistant Professor of the Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine at Dartmouth; and Kristen Miranda, Vice President, Strategic Partnerships and Innovation, Blue Shield of California. These individuals do not necessarily endorse the contents of this memorandum.



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A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM: Integrated Care with Aligned Financial Incentives

Appendix VI. Patient-Centered Medical Homes (Initiative Memorandum)

APRIL 2013

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Appendix VI. Patient-Centered Medical Homes (Initiative Memorandum)

See "Appendix IV: Introduction to Appendices V-XI" for brief background on this Appendix.

Executive Summary

Individuals suffering from multiple or severe chronic conditions often receive healthcare that is disjointed and fragmented. Patient-Centered Medical Homes are a care delivery model targeted at individuals with chronic conditions that is designed to better manage their treatment by increasing the care appropriate for their conditions while reducing such common but usually unnecessary services as emergency department visits and hospitalizations. The purpose of a Medical Home is to improve primary care and provide better care prevention and management.

The Patient-Centered Medical Home intervention would provide payments on a per member basis to primary care practices that meet the criteria for a Medical Home. Our model estimates that Medicaid, Medicare and private payers would offer financial incentives to establish and maintain Medical Homes serving adult patients with the following common chronic conditions: coronary artery disease, congestive heart failure, hypertension, chronic obstructive pulmonary disease (COPD), asthma and diabetes. We model two policy options: The "Current Developments" scenario, which assumes that 50% of the California population with at least one chronic condition will participate in Medical Homes, and the "Forum Vision" scenario, which assumes an 80% enrollment. The enrollment will be phased in over four years (2013-2016), with the expectation that the enrollment will further increase between 2017 and 2022. We estimate that the annual cost per enrolled member will be between \$200 and \$300. We assume that both public and private payers are committed to financing the care for such patients, and that any net savings would result in a reduction in overall healthcare spending.

Under the Current Developments scenario, we estimate that the reduction in healthcare spending in current-year dollars will range from \$6 billion to \$17 billion from 2013 and 2022, depending on the cost of the intervention. This assumes a 1% to 4% reduction in hospitalizations, emergency department visits and pharmaceutical costs. Under the Forum Vision scenario, in which it is expected that 80% of Californians with at least one chronic condition will be enrolled in a Medical Home, the projected result is a reduction by 2022 of between 0.2% and 0.6% of total healthcare spending. The net expenditures reduction for 2013 to 2022 under the Forum Vision is between \$7.9 billion and \$25.2 billion.

The Underlying Situation

Many individuals suffering from multiple or severe chronic conditions often receive healthcare in a system that is fragmented and episodic. These individuals may have common chronic conditions, such as coronary artery disease, congestive heart failure, hypertension, COPD, asthma or diabetes, which can



require more than a dozen medications and/or specialists.¹ A Medical Home brings a team-based approach to these patients designed to increase appropriate use of medical care while reducing unnecessary services, especially emergency department visits, hospital readmissions and avoidable, non-urgent inpatient visits.² The goals of Medical Homes are to enhance wellness, prevention and chronic care management, and to increase coordination of care across the provider continuum (i.e., hospitals, specialists, nursing homes and community health centers).

Patient-Centered Medical Homes are designed to facilitate access to and coordination of the full array of primary and acute physical health services, behavioral healthcare and long-term community-based services and support.³ As outlined in the Affordable Care Act (ACA) in its initiative to provide a “health home” to Medicaid recipients, these health home services can come in three distinct types: A designated provider; a team of healthcare professionals that links to a designated provider; or a health team.⁴ We can use this definition in implementing the Patient-Centered Medical Home model in California for the Medicaid, Medicare and privately insured populations. We assume that designated providers will include physicians or physician practices, group practices, rural health clinics, Federally Qualified Health Centers, other community health centers, community mental health centers and home health agencies.

Previous Studies

Previous studies of Medical Home programs have shown that they can lead to a wide range of reduction in spending for hospitalization, emergency department visits and pharmaceutical costs. For example, a study focusing on Medical Homes in the “safety net” in California found that in a group of patients with complex needs and a history of high utilization, there was a 60% reduction in emergency department visits and a 40% reduction in inpatient hospital days.⁵ There are also models outside California that show that Integrated Delivery System PCMH Models are associated with 16% to 39% reduction in hospitalizations.⁶ Other PCMH programs have found 15% to 18% reductions in hospital inpatient days, 15% to 25% fewer hospital readmissions and 15% to 50% reductions in emergency department visits.⁷ A Medicaid-sponsored PCMH initiative found a 40% decrease in asthma-related inpatient admission rates and 17% fewer emergency department visits.⁸ It should be noted that studies examining prescription costs show mixed results. Although one study showed that a PCMH group had a smaller increase in

¹ Eibner, et al. (2009).

² Bohmer (2010).

³ Reinhard, et al. (2011).

⁴ Kaiser Family Foundation (2012).

⁵ California Association of Public Hospitals and Health Systems (2010).

⁶ Eibner, et al. (2009); Grumbach, et al. (2010); Nielsen, et al. (2012).

⁷ Nielsen, et al. (2012); Reid, et al. (2010).

⁸ Grumbach, et al. (2010); Kaiser Family Foundation (2009).



pharmacy expenses (6.5%) than the control group (14.5%), prescription costs were higher for individuals with chronic condition such as diabetes (an 11.3% increase).⁹

Proposed Initiative

We estimated the reduction in healthcare expenditures from a policy option to create Medical Homes for patients with chronic conditions in California.¹⁰ The option would provide payments on a per-member basis to the primary care practices that meet the criteria for a Medical Home. Medicaid, Medicare and private payers would offer financial incentives to establish and maintain Medical Homes serving adult patients with the following common chronic conditions: coronary artery disease, congestive heart failure, hypertension, COPD, asthma and diabetes. Evidence suggests that Medical Homes may reduce healthcare expenditures, owing to an increase in coordinated care and a resulting decrease in avoidable inpatient and emergency services.

Modeling Approach and Assumptions

We model two policy options. Under the “Current Developments” scenario, we estimate that 50% of the California population with at least one chronic condition will participate in Medical Homes. Under the Forum Vision scenario, an 80% enrollment is estimated. The enrollment will be phased in over four years, through 2016, with the expectation that enrollment will further increase from 2017 to 2022.

Number of Affected Patients

About 45% of the population in California has at least one chronic condition,¹¹ a figure we assume will not change by 2022. Individuals in both public and private plans are included.

Intervention Penetration Rates

We estimate that about 25% of individuals with chronic conditions are currently being treated in a Medical Home setting, and that the figure will increase incrementally through 2022. Under the Current Developments scenario, the Medical Home enrollment numbers are expected to increase to 50% by 2016. We estimate that there will be a 30% enrollment this year, a 35% enrollment in 2014, a 40% enrollment in 2015 and a 50% enrollment in 2016 and beyond.

Under the Forum Vision scenario, it is expected that 80% of Californians with at least one chronic condition will be enrolled in a Medical Home. It is assumed that the adoption rate will be higher under this scenario, reaching 80% in 2016 and remaining at that level to 2022. We estimate that there will be a 40% enrollment this year, a 50% enrollment next year, a 65% enrollment in 2015 and 80% enrollment after that.

⁹ Eibner, et al. (2009).

¹⁰ Our intervention was designed based on existing Medical Home programs in California and in other states. California Primary Care Association (2012); National Academy for Health Policy (2012); New York State Department of Health (2012).

¹¹ California Healthcare Foundation (2006).



Targeted Healthcare Expenditures

Based on a California Healthcare Foundation report on chronic disease in California, we estimate that the chronically ill population accounts for 75% of total state healthcare spending.¹²

We estimate that the intervention will have an impact on 52% of healthcare spending, with 36% from hospitalization, 3% from emergency care and 13% from prescription medicine. The estimates are based on data from Kaiser Family Foundation, Centers for Medicare and Medicaid Services (CMS) and the Medical Expenditure Panel Survey (MEPS).¹³

We assume different rates of reduction in spending for HMO and non-HMO enrollees. Since individuals covered under an HMO would have some degree of patient management already in place, we estimate that they would achieve one-quarter of the reduction in spending of the population not enrolled in HMO. We estimate 45% of the insured population are enrolled in an HMO this year and 47% will be from 2014 to 2022.¹⁴

Under the Current Developments scenario, we estimate that there will be a 4% reduction in healthcare spending from hospitalization, emergency department utilization and pharmaceuticals for non-HMO enrollees, and a 1% reduction for HMO enrollees.¹⁵ The reduction in healthcare spending will be gradual. For non-HMO enrollees, the reduction will be 1% this year, 2% next year, 3% in 2015 and 4% in 2016 and beyond. For the HMO enrollees, it will be 0.25% in this year, 0.5% in 2014, 0.75% in 2015 and 1% in 2016 and after.

Under the Forum Vision scenario, we estimate that non-HMO enrollees in Medical Homes will experience a 7% reduction in spending from hospitalizations, emergency rooms and pharmaceuticals. We estimate a 1.75% reduction in spending for HMO enrollees, occurring gradually.^{16,17} For the non-HMO enrollees, the reduction in expenditure will also be gradual, increasing 1% per year and reaching 7% by 2019.

We estimate that the cost of the intervention will be \$297 per enrollee per year for the lower bound estimate and \$198 per enrollee per year for the higher bound estimate. We estimate that about 50% of the target population has one chronic condition, 25% have two, 15% have three or four and 10% have more than four.¹⁸

¹² Ibid.

¹³ Berkeley Forum analysis using MEPS-Household Component, 2009; Centers for Medicare & Medicaid Services (2012); Kaiser Family Foundation (2009).

¹⁴ Cattaneo & Stroud Inc (2012).

¹⁵ Eibner, et al. (2009); Lewin Group (2010).

¹⁶ Paulus, et al. (2008).

¹⁷ The 7% estimate is based on an expected 20% reduction for hospital expenditures, a 20% reduction in emergency care expenditures and a 5% increase in prescription medication expenditures. The combination of these reductions in spending results in an average 7% reduction in total healthcare expenditures. That 7% reduction is similar to results in the Geisinger Health Systems study (Paulus et al. 2008)

¹⁸ California Healthcare Foundation (2006).



- For the lower bound estimate, we estimate an average yearly cost of \$297 by assuming that the cost will be \$180 per year for individuals with one condition, \$300 for those with two conditions, \$480 for three to four conditions and \$600 per year for individuals with more than four chronic conditions.
- For the upper bound estimate, we estimate an average yearly cost of \$198 by assuming that the cost will be \$120 per year for individuals with one condition, \$180 for those with two conditions, \$300 per year for three to four conditions and \$480 per year for individuals with more than four.

Estimated Impact

Tables 1 and 2 show the estimated reductions in spending for hospitalizations, emergency room and pharmaceuticals under the Current Developments and Forum Vision scenarios. Under the Current Developments scenario, the cost this year exceeds the reduction in spending. However, there will be a cumulative reduction in spending from 2013 to 2022. If we estimate that the cost of the intervention is \$297 per enrollee (the lower bound assumption), there will be a cumulative reduction in spending of about \$6.1 billion in current-year dollars over 10 years. If the cost of the intervention is \$198 per enrollee (the upper bound estimate), there will be a cumulative reduction in spending of about \$17.1 billion in current-year dollars, or 0.4% of projected healthcare spending from 2013 to 2022.

Under the Forum Vision scenario, the cost in 2013 exceeds the reduction in spending for the lower and upper bound estimates, resulting in expenditures of over \$400 million to \$1.1 billion. (Table 2) However, there is a reduction in spending for both lower and upper bound scenarios by 2022. The reduction in spending in 2022 is about \$2.7 billion for the lower bound and \$5.2 billion for the upper bound estimates. For the cumulative reduction in spending through 2022, the reduction is about \$7.9 billion for the lower bound estimate and \$25.2 billion for the upper bound estimate. Considering both the upper and lower bound, the mid-level reduction in spending estimate is \$16.5 billion.

Estimated Healthcare Expenditures (2013-2022)

Table 1: Healthcare Expenditure Reduction Estimates Under the Current Developments Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	-\$0.7	-\$0.2	\$1.1	\$2.7	\$6.1	\$11.6	\$17.1
Expenditure Reduction (%)	-0.2%	-0.1%	0.2%	0.5%	0.1%	0.3%	0.4%

Note: Lower penetration rate: 50% of the California population with ≥ 1 chronic condition enrolled in a PCMH



Table 2: Healthcare Expenditure Reduction Estimates Under the Forum Vision Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	-\$1.1	-\$0.4	\$2.7	\$5.2	\$7.9	\$16.5	\$25.2
Expenditure Reduction (%)	-0.3%	-0.1%	0.5%	0.9%	0.2%	0.4%	0.6%

Note: Higher penetration rate: 80% of the California population with ≥ 1 chronic condition enrolled in a PCMH

Discussion

As expected, the greatest reduction in spending is observed for the upper bound Forum Vision scenario. These estimates indicate that the cost of the intervention is the single biggest determinant of whether reductions in spending occur. As the intervention becomes more costly, the cost can exceed whatever savings are achieved. It is important to note that we observe greater reduction in spending under the Forum Vision because in addition to having more people participating in Medical Homes, this vision assumes there will be greater spending reductions (7% for the non-HMO enrollees and 1.75% for HMO enrollees). Our estimates indicate that the reduction in spending will vary when different assumptions are made. For example, if we estimate that Medical Homes will affect more than 52% of the healthcare spending, or that the PCMH enrollment will occur at a faster rate, the intervention could lead to an even greater reduction in spending. On the other hand, if we assume that the intervention cost will be higher, the reduction in spending may disappear. It is important to note that these are all preliminary estimates and to keep our assumptions in mind when contemplating them.

Estimates made by the RAND Corporation for Massachusetts and the Lewin Group for New York State also show that PCMHs can result in either a reduction or an increase in healthcare spending.¹⁹ Because our own estimations were not based on the same set of assumptions made in those studies, nor did they target the same population, direct comparisons are difficult. However, it is interesting to note that results can vary widely depending on a study's initial assumptions. For example, in RAND's Massachusetts analysis, which excluded the Medicare population, if the cost of intervention was estimated to be \$6 per member per month, a cost savings of 0.85% from 2010 to 2020 was predicted. However, when the estimated monthly cost per member doubled to \$12, total health expenditures during the same period actually increased, by 0.43%.

There are several limitations in modeling the intervention. First, the reduction in expenditure is based on the assumption that 80% of patients with at least one chronic condition will enroll in PCMH, which is more than three times today's enrollment. Second, the cost of the intervention is difficult to estimate, but the reduction in expenditure will decrease if the cost of the intervention is higher. Third, for the intervention to be effective, the PCMH model needs to be comprehensive in coordinating health and social services, which requires careful planning and implementation from individual organizations.

¹⁹ Eibner, et al. (2009); Lewin Group (2010).



Acknowledgements

We are very grateful for the comments we received on this memorandum from Paul A. Fishman, Ph.D, Scientific Investigator, Group Health Research Institute and Michelle Shaljian, Director of Communications at the Patient-Centered Primary Care Collaborative. These individuals do not necessarily endorse the contents of this memorandum.



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A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM: Integrated Care with Aligned Financial Incentives

Appendix VII. Palliative Care (Initiative Memorandum)

APRIL 2013

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Appendix VII. Palliative Care (Initiative Memorandum)

See “Appendix IV: Introduction to Appendices V-XI” for brief background on this Appendix.

Executive Summary

In 2007, the average California patient cost Medicare more than \$65,000 during the last two years of life, significantly more than the U.S. average. Total healthcare spending for California patients in their last couple of years of life is likely to be well over \$100,000 when including non-Medicare payment sources. The intense care provided to seriously ill patients is often at odds with patient or family preferences involving quality of life, including pain and symptom relief, practical, spiritual and emotional support, and the ability to die in a natural, peaceful setting.

Palliative care is specialized care that involves shared decision-making and advanced care planning as well as physical, emotional and social support for patients with a serious illness. It has been demonstrated to improve patient satisfaction, reduce healthcare expenditures and improve quality of life, symptoms and survival outcomes. Reduced healthcare expenditures due to palliative care interventions are generally a result of fewer and/or shorter hospitalizations with fewer ICU days, as well as reduced Emergency Room visits and increased selection of hospice care. Only 36% of California Medicare patients died in hospice in 2007, compared to the national average of 42%. Furthermore, the Medicare regulations that limit hospice to patients with a prognosis of six months or less and require that patients forgo life-prolonging care, often lead to very short stays or delayed hospice selection for those who do select hospice.

Based on several previous studies and existing programs, we modeled an intervention that would provide concurrent curative and outpatient, community-based palliative care (CPC) to patients with serious illnesses considered to be in their last year of life. We estimate that a CPC intervention under the “Current Developments” scenario would reduce healthcare expenditures by about \$4.9 billion in current-year dollars between 2013 and 2022, or 0.11% of total healthcare spending during this period. By 2022, when the intervention could be considered mature, the estimated annual reduction in healthcare expenditures is \$0.9 billion, or 0.16% of total spending in that year under the “Current Developments” scenario. Under the higher adoption rate and higher savings rate assumed under the “Forum Vision” scenario, CPC would reduce healthcare expenditures by about \$11.4 billion 2022, or 0.26% of total healthcare spending during this period. In the highest adoption year of 2022, at which point the intervention could be considered mature, CPC would reduce healthcare expenditures by an estimated \$2.3 billion, or 0.41%, under the “Forum Vision” scenario. Based on previous studies, we also expect better psychological health and quality of life for both patients and caregivers, as well as potential survival benefits to patients who are able to spend more time in the comfort of home, away from the stressful environment of a hospital or ICU.

Higher adoption rates for CPC would be facilitated by a reduction in fee-for-service reimbursement and a movement to more value-driven reimbursement methods, such as global budgets, shared-savings and



other risk-based payments. Uptake would also increase if there was greater public awareness of the many advantages of palliative care. Perhaps most importantly, California needs a significant investment in workforce capacity to effectively manage the growing demand for palliative care services. There is a great need for both general and specialized palliative care training for doctors, nurses, social workers and other healthcare providers.

The Underlying Situation

Over the last 10 years, healthcare providers and organizations have undertaken major efforts to better align the needs and wishes of seriously ill patients with the care they actually receive. California has experienced increased hospice uptake rates¹, a major expansion of inpatient palliative care services² and legal and implementation support for advanced care planning via Physician Orders for Life Sustaining Treatment (POLST).³ Nonetheless, California still has a significant opportunity to further improve the quality of care and the patient experience for the seriously ill. A California HealthCare Foundation study showed that a majority of Californians say they want lower intensity sites of care during the last stage of life; they also want that care to emphasize pain and symptom management, spiritual support and shared-decision making.⁴ In contrast to those clearly expressed public wishes, however, about 42% of California deaths⁵ still occur in the hospital, and only 36% of California Medicare deaths are served by hospice.⁶

Medicare spends approximately 25% of its budget on the 5% of U.S. beneficiaries who die during a given year, a ratio that did not change significantly between the late 1970s and the mid-90s.⁷ In 2007, the average adjusted Medicare reimbursement for patients with one of nine common chronic conditions in the last two years of life was \$73,032 in California and \$60,694 in the entire country.⁸ Total healthcare expenditures at the end of life are significantly greater when considering other payers, such as Medicaid, supplemental insurance payments and out-of-pocket spending. California fares worse than the rest of the country with regards to high intensity end of life care. For example, in 2007, California's fee-for-service Medicare population in the last six months of life had a higher number of inpatient days (10.6 vs. 10.3)⁹ and more patients with seven or more ICU days (20.3% vs. 15.2%) than the country as a whole.¹⁰ Medicare's hospice benefit, which provides comprehensive palliative care services, has generally been shown to result in expenditure reductions. A 2007 study of slightly under 2,000 Medicare beneficiaries suggested average cost-savings of 25%, or \$2,309 per hospice user, compared to a control

¹ Dartmouth Atlas of Healthcare (2012a).

² California HealthCare Foundation (2012).

³ Wenger, et al. (2012).

⁴ O'Malley, et al. (2012).

⁵ California HealthCare Foundation (2012).

⁶ Dartmouth Atlas of Healthcare (2012a).

⁷ Hogan, et al. (2001).

⁸ Dartmouth Atlas of Healthcare (2012d). Dartmouth Atlas data adjusts for age, sex, race, primary chronic condition and presence of more than one chronic condition.

⁹ Dartmouth Atlas of Healthcare (2012b).

¹⁰ Dartmouth Atlas of Healthcare (2012c).



group.¹¹ Nonetheless, Medicare's hospice benefit is limited to patients prognosticated to be in the last six months of life who agree to forgo curative care; pre-conditions which result in both relatively low and relatively late selection of hospice care. The median length of stay in hospice is only about three weeks, and one-third of Medicare patients are enrolled for less than a week prior to death.¹² At the other extreme, because hospice is a somewhat costly benefit with an average per diem rate of about \$160, having a patient receive hospice for longer than three or four months may actually lead to increased expenditures.¹³

The existing U.S. healthcare payment and delivery system discourages the widespread expansion of palliative care, which is defined as "patient and family-centered care that optimizes quality of life...[and] involves addressing physical, intellectual emotional, social and spiritual needs and facilitates patient autonomy, access to information, and choice."¹⁴ Palliative care has been demonstrated to improve patient satisfaction, reduce healthcare expenditures and improve quality of life and survival outcomes.¹⁵ A rough Forum assessment suggests that fewer than 20% of California patients with serious illness have access to sufficient palliative care services, including outpatient and community-based palliative care.¹⁶

Previous Studies

Palliative care has been demonstrated to improve patient satisfaction, reduce healthcare expenditures and improve quality of life, symptoms and survival outcomes.¹⁷ Reduced healthcare expenditures due to palliative care interventions are generally the result of lower and/or shorter hospitalizations and ICU stays, as well as reduced ER visits and increased selection of hospice care. Additionally, it is believed that embracing palliative care principles could reduce pressure to expand hospital capacity, thereby freeing up resources from capital-intensive building projects.

Kaiser has conducted several randomized controlled trials on care for seriously ill patients, involving inpatient and home-based palliative care as well as advanced illness care coordination. All showed improved outcomes for those in the study groups. In the home-based study, seriously ill patients with a prognosis of one year or less who had been in the hospital or ER during the previous twelve months received in-home palliative care in addition to standard care, for an average 196 days of intervention, versus 242 days for the control group. The patients who received palliative care showed significantly higher rates of patient satisfaction, were less likely to be hospitalized or have an ER visit and were much more likely to die at home. Overall adjusted cost per day of care was over 50% less for the study group

¹¹ Taylor, et al. (2007).

¹² Meier, et al. (2004).

¹³ Interview with Diane Meier, Director of the Center to Advance Palliative Care at the Mount Sinai Medical Center, December 2012.

¹⁴ Center to Advance Palliative Care.

¹⁵ Meier (2011).

¹⁶ See "Intervention penetration rates" section below for background on how we obtained this figure.

¹⁷ Meier (2011).



(\$95.30) than the control group (\$212.80).¹⁸ The patients in the intervention group cost \$7,552 on average less than the control group (CI=-\$12,411 to -\$780, p=0.03).

The Franklin Health Care Management project began in 1998 via a grant from the Robert Wood Johnson Foundation. A randomized control trial by the foundation tested the impact of palliative care services being provided in addition to the standard care management program for HMO patients with serious illness.¹⁹ Results included a 38% reduction in hospitalizations, a 22% increase in home care, a 62% increase in hospice services and an overall 26% reduction in costs over the four months the average patient stayed in the program.²⁰ Average care time per patient per month was 10 hours, including an average 14 calls and 1.8 in-person visits.

Sutter Health's Advanced Illness Management program provides home-based palliative care for patients with serious illness. Unpublished data for 96 patients who survived for at least 90 days after program enrollment showed that these patients incurred 63% fewer hospitalizations compared to the 90 day period before enrollment. Preliminary data suggests monthly direct care cost savings of \$2,000 per patient, not including savings from increased hospice enrollment.²¹ Unpublished data from Sharp Health's Transitions program for seriously ill patients showed reduction in average ER and hospital charges per enrolled patient of \$7,269 in fiscal 2009 and \$7,566 in fiscal 2008, based on comparing pre- and post-intervention spending.²²

The results from the above programs are summarized below. We give the Kaiser in-home palliative care study the most weight in our analysis, as it was a randomized controlled trial with published results. Because its data relies on proxy costs estimates for Kaiser-provided services that are thought to have a downward bias, the results may underestimate the program's true savings. From the studies listed below, only the Kaiser study contains detailed information on how its cost-savings were calculated. The others use such terminology as "charges," "direct medical costs" and "net costs," but are less clear about how such measures are defined. Finally, both the Sharp and Sutter data are based on comparison of pre- and post-intervention costs. Considering that healthcare spending is expected to increase as a patient progresses in a disease, these results may underestimate the impact of the intervention.

¹⁸ Brumley, et al. (2007).

¹⁹ Meier, et al. (2004).

²⁰ Meier (2012).

²¹ Meyer (2011).

²² Hoefer, et al. (2010).



Table 1: Estimated Expenditure Reductions from Selected CPC Programs

Program & Year	Results and intervention length	Per patient savings (\$)
Kaiser in-home PC (2002) ²³	<ul style="list-style-type: none"> • Approx. \$118 per day in savings (55% net reduction) • 196 day average intervention 	\$7,552 in medical care costs ¹
Franklin Home Health (1998 onwards) ²⁴	<ul style="list-style-type: none"> • 26% net reduction in costs • 4 months 	NA
Sharp Transitions (2009) ²⁵	<ul style="list-style-type: none"> • \$7,269 charges reduction per patient • NA 	\$7,269 in hospital/ER charges
Sutter AIM (2009/2010) ²⁶	<ul style="list-style-type: none"> • \$2,000 per month • Total of 185 patients: <ul style="list-style-type: none"> ○ 64 patients between 30 and 60 days; ○ 25 patients between 60 and 90; ○ 96 patients > 90 days. 	\$5,400 in direct medical costs ²

Notes: (1) Includes reimbursement to contracted non-Kaiser providers plus proxy costs for services delivered within the Kaiser HMO. Proxy costs calculated are significantly lower than for similar services contracted to non-Kaiser providers. (2) Berkeley Forum estimate based on weighted-average length of stay, with the assumption that patients enrolled for greater than 90 days averaged 105 days in the program.

In March 2012, the American Society of Clinical Oncologists issued an important Provisional Clinical Opinion that palliative care alongside standard care “should be considered early in the course of illness for any patient with metastatic cancer and/or high symptom burden.”²⁷ This opinion was based on the results of seven published randomized control trials. Perhaps the most significant of these trials, by Temel, et al., (N=151) was a randomized study that showed that patients who received community-based palliative care at the same time as intensive cancer care survived 2.7 months longer than those who received standard cancer care alone.²⁸ The increased survival was demonstrated even though the intervention group experienced significantly less aggressive end-of-life treatment, which was measured by chemotherapy provided within 14 days of death, lack of hospice selection and a hospice stay of fewer than four days. The intervention group also enjoyed significantly higher quality of life scores, such as a 75% reduction in major depression.

²³ Brumley, et al. (2007).

²⁴ Meier (2012).

²⁵ Hoefer, et al. (2010).

²⁶ Meyer (2011).

²⁷ Smith, et al. (2012).

²⁸ Ibid.



Proposed Intervention

The proposed intervention would provide CPC access to all patients with certain conditions with an approximate prognosis of one year or less of life. Conditions that would be covered include cancer, chronic obstructive pulmonary disease, congestive heart failure, dementia, ALS, cirrhosis and HIV. CPC would include advanced care planning based on patient and family goals, pain and symptom management, medication reconciliation and management, coordination of medical and non-medical care and 24/7 care team accessibility.

CPC would be provided via an interdisciplinary team, with staffing and teams varying by site. One sample program proposed by the Center to Advance Palliative Care included teams of palliative-care trained Community Health Workers (CHW), Registered Nurses, social workers, chaplains, Advanced Practice Nurses (APN) and physicians. The program would have an overall 20:1 ratio of patients to CHW staff, including a 40:1 ratio for RNs and a 60:1 ratio for social workers, along with one or two APNs and 0.1 to 0.2 MD full-time equivalents overseeing each main site of care.²⁹ The CPC intervention builds on Sharp Healthcare's Transitions, Sutter Health's Advanced Illness Management and the combined Kaiser in-home palliative care/advanced illness care coordination initiatives described above. The intervention focuses on the subset of the most fragile, highest-cost patients, and provides an intensive outpatient intervention.

While prognostication about a patient's health is invariably challenging for physicians, there are specific clinical and functional indicators can help identify not only the patients who would be best-served by palliative care, but also what that care should entail. CPC would help provide care in lower-cost settings such as the home. In many cases, it would also reduce the intensity of care, to match it with achievable medical goals and patient wishes. The intervention would be expected to result in fewer ICU days, hospitalizations and ER visits near the end of life, along with increased hospice selection. To facilitate implementation and achieve the highest return on investment, the intervention roll-out should focus on areas that have higher concentration of appropriate populations, particularly high care costs for seriously ill patients and a significant number of existing inpatient palliative care programs.

Modeling Approach and Assumptions

We modeled a scenario in which seriously ill patients in their last year of life, for cancer, COPD, congestive heart failure, dementia, ALS, cirrhosis and HIV -- in other words, "potentially appropriate patients" -- would receive community-based palliative care. We assumed that both public and private payers would be committed to financing concurrent care for such patients, and that any net savings would accrue as a reduction to overall healthcare spending. In practice, this expenditure reduction would likely be shared by various constituents, including Medicare, private payers, patients and providers. Below is a table of key assumptions used in modeling, followed by the methodology for arriving at the assumptions.

²⁹ Meier (2012).



Table 2: Key Assumptions for Modeling Expenditure Reductions Due to Community-Based Palliative Care Intervention

Key assumptions	2012	2017	2022
Deaths from considered medical conditions, 2009	129,258		
% of additional potentially appropriate patients	25%		
Total potentially appropriate patients, 2009	161,573		
Population growth rate	0.84%	0.84%	0.95%
Death rate growth rate	1.5%		
<i>Penetration rate among potentially appropriate patients</i>			
Baseline	10%		
Current Developments	10%	26%	30%
Forum Vision	10%	37%	50%
<i>Number of patients served annually</i>			
Baseline	17,362	19,567	22,125
Current Developments	17,362	50,873	66,375
Forum Vision	17,362	72,396	110,624
Average length of intervention	6 months		
Average healthcare spending in last six months	\$62,761	\$80,193	\$104,939
<i>Intervention net savings</i>			
Current Developments	15%		
Forum Vision	25%		
<i>Per patient savings</i>			
Current Developments	\$9,414	\$12,029	\$15,741
Forum Vision	\$15,690	\$20,048	\$26,235

Number of affected patients

“Deaths from considered medical conditions” is based on the number of deaths with the listed conditions in California (approximately 129,258 deaths, or about 56% of all 2009 California deaths).³⁰ Considering well-known challenges involving the recording of the accurate cause of death on death certificates, this figure may underestimate the number of patients with these conditions.³¹

There are many other patients with serious illness who could benefit from a similar intervention, including patients with the above conditions who are not in the last year of life, or patients with rarer conditions than those listed.³² Based on professional judgment, we thus add an additional 25% more patients each year (e.g. 32,315 patients in 2009) to the “Deaths from considered medical conditions” figure, to arrive at the “Total potentially appropriate patients” figure.

³⁰ California Department of Public Health (2012).

³¹ Interview with Diane Meier, Director of the Center to Advance Palliative Care at the Mount Sinai Medical Center, December 2012.

³² Interview with Lynn Spragens, Spragens & Associates, December 3, 2012. .



To project the number of potentially appropriate patients for each year, we adjusted the previous year's figure by the estimated change in the death rate due to an aging population. We assume that age-specific death rates will remain similar between 2010 and 2022. We also accounted for population growth as detailed in Appendix III: "California Cost Curve, Healthcare Expenditures, and Premium Projections (Methodology)".

Intervention penetration rates

We roughly estimate that about 20% of potentially appropriate patients currently have access to CPC. This figure is primarily based on Kaiser's market share among the Medicare and non-Medicare California population,³³ and assumes that all of Kaiser's "potentially appropriate" patients have access to CPC. It also includes an additional couple of percentage points to take into account the currently small number of Californians served by other CPC programs, such as Sutter's Advanced Illness Management, Sharp's Transitions and VA programs. Since there is minimal data on what percentage of potentially appropriate patients with CPC access are actually receiving the intervention, we assumed that about half of such patients do so. This figure is higher than the 36% hospice uptake rate among Medicare patients in California, since we expect that patients in these other programs more readily elect CPC because doing so does not require them forgo curative care, as is the case with hospice. Overall, we arrive at a 10% figure that represents the "baseline" penetration rate for comprehensive palliative care.

Under the "Current Development" scenario, growth is assumed to increase from the current 10% penetration to 30% by 2020. The adoption trajectory is such that there is slower growth in the first three years, but rapid growth in years four through six, leveling off in the last few years. This pattern is believed to be a similar trajectory to that experienced by inpatient palliative care programs in California.

Under the "Forum Vision" scenario, in which there is great proliferation of risk-based payments such as ACOs and global payments, we assume that CPC reaches 50% of potentially appropriate patients by 2020. The adoption occurs in a similar fashion to that in the "Current Developments" scenario, with uptake slow in the first three years, rapid in the next three years, and then leveling off. Achieving much more than a 50% penetration rate is expected to be difficult due to such challenges as the difficulty involved in accessing patients in rural communities, as well as unstable living environments (e.g. homeless patients), poor patient-provider communication or lack of patient education.

Targeted healthcare spending

Based on existing programs and professional judgment, we assume that the average patient spends six months in the program. Their healthcare spending during this period is known as the "target spending."

³³ Cattaneo & Stroud Inc. (2012b).



Based on Dartmouth Atlas data, average fee-for-service Medicare reimbursements for the last six months of life for a California patient were \$39,578 in 2007.³⁴ We estimate that Medicare paid for 74% of that figure, with the remaining contributed primarily from Medicaid, out of pocket spending and supplemental insurance. A 2001 study calculated that Medicare financed 61% of healthcare spending for those in the final year of life.³⁵ This estimate was done before the implementation of the Medicare Part D prescription drug benefit, which shifted financing for healthcare expenditures away from patients and towards Medicare. We arrive at the 74% figure by adjusting the 61% estimate upwards by 22%³⁶ to account for the larger share of spending financed by Medicare since the 2001 study.³⁷

These estimates lead to a 2007 total expenditures of \$53,343 in the last six months of life. We increase this figure at the annual rate of per capita increase in healthcare expenditures calculated in the Cost Curve Methodology, to arrive at \$62,761 in 2012 target spending. For each year through 2022, we arrive at the target spending by applying the projected per capita healthcare spending growth rate to the previous year's target spending.³⁸

Estimated expenditure reduction rate

The net expenditure reduction rate assumed was 15% for the lower bound and 25% for the upper bound. This translates to a \$9,800 - \$16,300 range in per patient savings this year.

The low-end assumption is based on Kaiser's 2002 cost-savings of almost \$8,000, extrapolated to 2013. The high end is based on the 26% net cost reduction from the Franklin Health study and the 25% cost reduction estimated for hospice patients.³⁹

These expenditure reduction rates are net of the cost of the palliative care intervention. The savings are expected to be shared among various constituents, including patients, providers and payers.

Estimated Impact

As described in the above assumptions, we examined the potential reduction in total healthcare spending under two scenarios. The first considers anticipated market trends and developments ("Current Developments"). The second, the "Forum Vision," assumes a California healthcare system with

³⁴ Dartmouth Healthcare Atlas (2012d). Dartmouth Atlas data is adjusted for age, sex, race, primary chronic condition and presence of more than one chronic condition.

³⁵ Hogan, et al. (2001).

³⁶ The original 2001 study calculated that Medicare financed 61% of healthcare spending for patients in their last year of life. The 1994 Medicare Current Beneficiaries Survey Data referenced in the study showed that Medicare financed 52.7% of healthcare for all Medicare beneficiaries. The share covered by Medicare is slightly higher for those in the last year of life compared to the average beneficiary, as care for the seriously ill shifts to more acute settings with lower cost-sharing. Following implementation of the Medicare Part D prescription drug benefit, the 2009 Medicare Current Beneficiaries Survey Data showed an increase in Medicare financing across all beneficiaries, to 64.1% of all spending. We thus estimate that on average, Medicare's share of spending increased by 22% (64.1% / 52.7%) across all beneficiaries after implementation of Part D. We apply this 22% increase to the original 61% estimated Medicare financing for patients in the last year of life, to arrive at the updated 74% estimate.

³⁷ Medicare Payment Advisory Commission (2009).

³⁸ As detailed in Appendix III: "California Cost Curve, Healthcare Expenditures, and Premium Projections (Methodology)".

³⁹ Taylor, et al. (2007).



a greatly increased role for integrated care systems that receive mostly risk-based payments (e.g. shared savings/loss or global payments.)

The “Current Developments” scenario estimates that 2,666 additional patients receive CPC this year, versus the estimated baseline figure of 17,774, and that the figure grows to 44,250 more patients than the baseline projection by 2022. This expansion of CPC leads to a reduction of between \$3.7 billion and \$6.1 billion in current-year dollars, or 0.08% to 0.14%, of total healthcare spending in California during the 2013 – 2022 period. By 2022, the midpoint expenditure reductions due to CPC under Current Developments is 0.16% of total healthcare expenditures. The increase is due to the growing adoption of CPC over the ten-year period, resulting in significantly more access to CPC than occurs today.

In the “Forum Vision” scenario, 3,555 additional patients would receive CPC this year versus the estimated baseline of 17,774. This figure would grow to 88,500 more patients in 2022 than in baseline projections. This higher adoption of CPC is estimated to reduce expenditures between \$6.9 billion and \$11.4 billion, or 0.16% - 0.26% of total healthcare spending during the 2013 – 2022 period. By 2022, the upper rate expenditure reductions due to CPC under the Forum Vision is 0.41% of total healthcare expenditures. This larger increase through the ten-year period is due to the more complete adoption of CPC, leading to a significant increase in the number of patients affected by the interventions by 2022.

Table 3: Healthcare Expenditure Reduction Estimates Under the Current Developments Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	\$0.0	\$0.0	\$0.7	\$1.2	\$3.7	\$4.9	\$6.1
Expenditure Reduction (%)	0.01%	0.01%	0.12%	0.20%	0.08%	0.11%	0.14%

Table 4: Healthcare Expenditure Reduction Estimates Under the Forum Vision Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	\$0.0	\$0.1	\$1.4	\$2.3	\$6.9	\$9.2	\$11.4
Expenditure reduction (%)	0.01%	0.02%	0.24%	0.41%	0.16%	0.21%	0.26%

Given the expected per capita healthcare spending growth, the lower bound savings rate translates to a spending reduction of about \$9,800 per patient this year and \$15,700 in 2022. At the upper bound savings rate, the estimated reduction in healthcare spending per patient would be about \$15,700 this year, growing to approximately \$26,200 in 2022. Overall, we estimate a reduction of \$4.9 billion, or 0.11% of total healthcare spending, under the “Current Development” scenario based on CPC adoption rates and midpoint savings estimates. We estimate a reduction of \$11.4 billion, or 0.26% of total



expenditures, if California experienced even greater CPC adoption and the upper savings estimates as assumed under the “Forum Vision” scenario.

Discussion

Since seriously ill patients incur significant medical expenses as their conditions progress, community-based palliative care has the potential to significantly reduce healthcare expenditures in California. We estimate that a CPC Intervention under the “Current Developments” scenario would reduce healthcare expenditures by about \$4.9 billion in current-year dollars between 2013 and 2022, or 0.11% of total healthcare spending during this period. Under the “Current Developments” scenario, the reduction in healthcare expenditures in 2022 averages \$0.9 billion, or 0.16% of total spending. Under the higher adoption rate and savings estimate assumed under the “Forum Vision” scenario, CPC would reduce healthcare expenditures by about \$11.4 billion total over the ten years between 2013 and 2022, or 0.26% of total healthcare spending during this period. Under the Forum Vision, in the highest adoption year of 2022, CPC would see healthcare spending reduced by an even greater 0.41%.

CPC creates a scalable response to the targeted needs of some of California’s most expensive patients. Given both the growth in the elderly population and the large role that new technology plays in increasing healthcare spending, targeting this population could help reduce volatility in the overall medical budget. Payers and providers could reduce exposure to large cost increases associated with new technologies that may be of marginal impact to certain patients.

We would expect other benefits from such an intervention besides a reduction in healthcare spending. Based on previous studies, it is likely patients would spend fewer of their precious remaining days in the uncomfortable atmosphere of a hospital or ICU, and more time at home or in a hospice. As a result, these patients and their families would be in a better emotional and mental position to manage their difficult situation. Patients would be likely have a higher quality of life, without the depressive symptoms common in elderly, critically ill patients. And they would be more likely to die at home, usually their preferred location. The Temel study discussed above suggests that palliative care may even increase survival.

However, there are a number of barriers to rapid adoption of CPC. A main challenge today is fee-for-service reimbursement and traditional Medicare, which incentivizes provision of additional services rather than improved patient care. Adoption of CPC would be facilitated by a rapid shift towards population and global payment models, such as capitation, shared savings or bundled payments, all of which encourage value-driven care delivery. Adoption could be expedited by state or industry-regulatory mechanisms to define, certify and license, and then and monitor CPC services, to assure they are offered in an effective, ethical and high-quality manner.

California must increase the general public’s awareness of palliative care. The state also needs a significant investment in workforce capacity to effectively manage the growing demand for palliative care services. Needs include both generalist and specialized palliative care training for doctors, nurses, social workers and other providers. General education of the workforce would greatly assist in



acceptance, recognition, delivery of and referrals to palliative care among healthcare professionals. Furthermore, providers must develop and invest in systems for collecting and sharing vital patient information, such as changes in Activities of Daily Living (ADLs) or frailty markers that can help target appropriate patients for intervention. Finally, provider organizations must develop capabilities to partner with hospice or home health agencies to create new cost-effective, community-based palliative care programs. CPC effectiveness will also depend on providers' ability to improve coordination among the many community-based public and private services for the elderly.

While various studies have examined the effect of specific palliative care programs, the impact of a community based palliative care program on reducing state or regional healthcare expenditures has not been examined as closely. The Lewin Group estimated the potential healthcare expenditure reductions due to increasing inpatient palliative care access in New York to be about \$11 billion, or slightly under 0.5% of total New York healthcare spending over a ten-year period.⁴⁰ This result is roughly double our estimate under the "Forum Vision" of a 0.26% reduction in California healthcare expenditures over a ten-year period. However, the specific intervention modeled by the Lewin Group was more robust, in that it required all hospitals in New York to adopt a palliative care program and obtain certification that all of their chronically ill patients were offered the care. Lewin Group's different scenario and modeling approach resulted in a slightly lower per-case savings rate, but much higher number of patients served than in the Berkeley Forum analysis. A RAND Massachusetts study estimated that a policy to decrease "resource intensity at the end-of-life" would reduce state annual healthcare expenditures between 0.13% and 0.21% over the 2010 – 2020 period.⁴¹ The RAND modeling, however, was limited to people between the ages of 19 and 64. Furthermore, the intervention differed from the Berkeley Forum model because RAND's analysis was based on shifting end-of-life care to hospice and non-academic medical center settings.

We believe that our estimates provide a solid basis for understanding the potential impact of offering community-based palliative care interventions much more widely to those California patients needing them. Nonetheless, there are several limitations to our estimates. While our modeling approach assumes a single intervention type for all seriously ill patients, in practice, the palliative care model and services provided would vary by disease, illness stage, patient preferences and available resources. Our intervention relies heavily on appropriate identification of patients with serious illness who are likely to be in their last year of life. For some conditions, such as dementia, this type of identification and targeting is, at best, difficult. Our model includes an additional 25% more patients beyond those with the selected medical conditions. It is likely that many more patients with other diseases (e.g. curable cancer) or earlier in the course of a disease may benefit from palliative care. Some additional expenditure reductions for such patients would be likely, for example, through avoidance of hospitalizations. Although desirable, it is unclear whether six months is a realistic expectation for average patient enrollment in such a program, as it is on the higher end relative to the studies cited

⁴⁰ Lewin Group (2010).

⁴¹ Eibner, et al. (2009).



above. Finally, while our model estimates expenditure reductions, previous studies generally consider underlying care costs or charges. Thus, there is great uncertainty in terms of overall impact on expenditures.

Palliative care for seriously ill patients who may not be in the end of life (e.g. patients with curable cancers) could offer great benefits to patients as well as additional cost savings not included in this model, for example, through avoidance of hospitalizations. Aside from the relatively large expenditure reductions possible for the California healthcare system, we believe that care quality as well as patient and caregiver well-being would greatly improve with expanded access to community-based palliative care.

Acknowledgements

We are very grateful for the comments we received on this memorandum from Kathleen Kerr, healthcare consultant; Diane E. Meier, Center to Advance Palliative Care, Mount Sinai Medical Center; Kate O'Malley, California HealthCare Foundation; and Lynn H. Spragens, Spragens & Associates. These individuals do not necessarily endorse the contents of this memorandum.



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A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM: Integrated Care with Aligned Financial Incentives

Appendix VIII. Physical Activity (Initiative Memorandum)

APRIL 2013

<http://berkeleyhealthcareforum.berkeley.edu>





Appendix VIII. Physical Activity (Initiative Memorandum)

See “Appendix IV: Introduction to Appendices V-XI” for brief background on this Appendix.

Executive Summary

Inadequate physical activity creates an enormous burden on health and healthcare. Lee et al. recently estimated that 5.3 million of 57 million premature deaths globally in 2008 could be attributed to physical inactivity.¹ Lack of exercise has been associated with an array of chronic diseases; for example, the World Health Organization estimates that physical inactivity is linked to between 21% and 25% of breast and colon cancers, 27% of diabetes and 30% of coronary heart disease cases.²

Over the past decade, the Behavioral Risk Factor Surveillance System (BRFSS) has found a high rate of physical inactivity among Californians. Based on BRFSS data, 54.2% of Californians in 2001 failed to meet the U.S. Department of Health and Human Services’ Healthy People 2020 goal of at least 30 minutes of moderate activity, five days per week. Based on the same indicator, BRFSS data shows that 48.7% of Californians were physically inactive in 2007.³ While trending in the right direction in recent years, BRFSS data suggests that about half of Californians remain physically inactive.

In this analysis, we provide an estimate of the potential reduction in California’s healthcare expenditures that might occur if a higher percentage of residents were physically active, potentially via a statewide walking and physical activity campaign. To estimate the expenditure reductions associated with this initiative, we referred to studies that estimate the share of healthcare expenditures directly attributed to physical inactivity. These studies were conducted in differing years and geographies, but reached similar conclusions, i.e. that between 2.5% and 3.9% of healthcare expenditures are due to physical inactivity.

Under the “Current Developments Scenario,” we assume that the current modest improvement in activity levels will continue and that 5% fewer Californians will be inactive by 2022. We estimate a midpoint healthcare expenditures reduction of \$3.4 billion in current-year dollars, or 0.08% of total California healthcare expenditures, during this period. Under our “Forum Vision” scenario, we envision that a concerted multi-stakeholder initiative will decrease inactivity levels by 10% over the same period. Under this scenario and its accompanying higher savings rate assumed due to a broader and deeper initiative, we estimate a reduction of \$8.2 billion, or 0.19% of total healthcare expenditures, between 2013 and 2022. As we expect that physical inactivity rates will continue to decline through 2022, the estimated reduction under the Forum Vision scenario reaches 0.29% of total healthcare expenditures in 2022.

¹ Lee, et al. (2012).

² World Health Organization (2012).

³ Behavioral Risk Factor Surveillance System (2012).



The Underlying Situation

The percentage of Californians who are physically inactive decreased from 54.2% in 2001 to 48.7% in 2007.⁴ Despite this improvement, California still faces a major challenge from physical inactivity and the toll it takes on health and the healthcare system.

Significant improvement in physical activity levels requires a coordinated, multi-stakeholder effort that touches all Californians where they live, work and play. Regular walking is considered an effective way to increase physical activity because it does not require special equipment, skills or facilities, and has demonstrated significant health benefits. In some communities, though, regular walking may be more challenging, due to insufficient lighting, lack of walkable areas and unsafe neighborhoods.

Established in 1996 and renamed in 2004, California Active Communities is a major program by the state government to encourage physical activity. The group leads several initiatives targeted at encouraging children to walk to school and adults to walk to work.⁵ The California Obesity Prevention program, run by the Department of Public Health, gives community grants to physical activity programs.⁶ The California Endowment sponsors several programs to encourage more active lifestyles and healthier eating in low-income communities. One such effort, Healthy Communities, is a 10-year, \$1 billion program that addresses a range of social and economic issues in 14 communities, including supporting safe neighborhoods that encourage physical activity.⁷

At the local level, municipalities such as Pasadena offer classes on physical activity and nutrition through their public health department.⁸ At the employer level, many large companies offer employees incentives to exercise and stay healthy, while others offer more comprehensive onsite wellness and activity programs. However, there is need for a broader, more sustained and more coordinated effort to increase physical activity among all Californians.

Previous Studies

Health Benefits of Physical Activity

Lack of physical activity has been linked to increased risk for a wide range of chronic diseases. Various studies provide strong evidence that regular physical activity contributes to primary and secondary prevention of cardiovascular disease (CVD), diabetes, certain cancers, osteoporosis, depression, obesity and hypertension.⁹ The World Health Organization estimates that physical inactivity is the primary cause of 21%-25% of breast and colon cancers worldwide, 27% of type II diabetes cases and 30% of coronary heart disease cases.¹⁰ In addition, the Colditz et al.,¹¹ Chenoweth,¹² and Katzmarzyk¹³ studies all identify

⁴ Ibid.

⁵ California Department of Public Health (2007).

⁶ California Department of Public Health (2010).

⁷ California Endowment (2011).

⁸ Nutrition and Physical Activity Program (PACE) (2012).

⁹ Warburton, et al. (2006).

¹⁰ World Health Organization (2012).



physical inactivity as a risk factor for CVD, stroke, depression, anxiety and sleep apnea. Numerous studies have linked physical activity to greater longevity and improved quality of life. In a 1995 Journal of the American Medical Association article, Blair et al. conducted a prospective study of nearly 10,000 men who were given physical examinations and fitness tests five years apart. Those men who had improved from unfit to fit experienced a 44% drop in all-cause mortality risk compared to those who remained unfit.¹⁴ Paffenberger et al. completed a similar study on a cohort of Harvard alumni who completed two questionnaires ten years apart. Those men who took up any type of moderately vigorous sport or physical activity between the first and second survey experienced 23% lower levels of all-cause mortality compared to those who had not.¹⁵

Growing evidence shows that increases in exercise and physical activity can lead to very rapid improvements in key risk factors for chronic disease and mortality. Kraus et al. studied 111 sedentary, overweight men and women assigned to three different exercise groups for six months. The study found a clear and immediate impact on lipoproteins and lipoprotein sub-fractions from vigorous exercise. The study also found that even without significant weight loss, those in the highest-exercising group improved their overall lipoprotein profile, thus helping mitigate a key risk factor for cardiovascular disease.¹⁶ Reviews of randomized trials on activity interventions show significant improvements in overall health-related quality of life in newly active individuals, such as improved functional capacity and mood states.¹⁷

Relationship Between Physical Activity and Healthcare Expenditures

Several studies have attempted to calculate the relationship between physical inactivity and healthcare expenditures by calculating population attributable risk (PAR). PAR estimates the effect of a single risk factor on the incidence of a given disease. The PAR calculation takes into account the prevalence of the risk factor (in this case, physical inactivity) in the population, as well as the relative risk of a given disease being caused by that particular risk factor.¹⁸

Table 1 shows estimates of healthcare expenditures attributed to physical inactivity, ranging from 2.5% to 3.9%. We discuss each of the three studies in turn. In 1999, Colditz conducted a literature review and

¹¹ Colditz (1999).

¹² Chenoweth (2005).

¹³ Katzmarzyk, et al. (2004).

¹⁴ Blair, et al. (1995).

¹⁵ Lee, et al. (2001).

¹⁶ Kraus, et al. (2002).

¹⁷ Penedo, et al. (2005).

¹⁸ PAR is useful for translating data on disease prevalence and relative risks into specific numbers that can help policy makers understand the potential benefits of addressing specific risk factors. PAR studies rely on meta-analyses to assign a portion of responsibility for a disease to a specific risk factor. Rockhill et al. (1998) caution that attributable risk factor calculations make several assumptions, including, "a causal relationship between the risk factors and disease and the immediate attainment, among those formerly exposed, of the unexposed disease risk following elimination of the exposures." Even with these limitations, the causation between physical activity and key chronic diseases is well established, thus validating the PAR approach. The PAR approach is translated into healthcare expenditures by first calculating the expenditures from treating a particular condition, for example, through claims data. Researchers then multiply the PAR fraction by the healthcare expenditures stemming from that condition. For example, Colditz estimate that 12% of the risk for diabetes stems from physical inactivity, and multiplies this figure by the \$53.3 billion in expenditures for treating diabetes to attribute \$6.2 billion in diabetes expenditures to physical inactivity.



utilized the PAR method to calculate the healthcare expenditures associated with obesity and physical inactivity.¹⁹ Based on Colditz's definition of physical inactivity as the absence of any leisure-time physical activity during the previous month, 28.8% of Americans were considered inactive.²⁰ The study estimates that 22% of CVD, 22% of colon cancer, 22% of osteoporotic fractures, 12% of diabetes and hypertension, and 5% of breast cancer are attributable to lack of physical activity. Colditz uses these PAR estimates, along with data on the total healthcare expenditures linked to each of these diseases, to estimate that 2.5% of U.S. healthcare costs in 1995 could have been attributable to inactivity. Colditz also conducted a similar analysis assuming a 48% inactivity rate, in which 3.7% of healthcare expenditures were attributable to physical inactivity.

Katzmarzyk et al. conducted a similar PAR analysis and found that 2.5% of the healthcare expenditures in Canada in 1999 could be attributed to physical inactivity.²¹ This study relied on a survey in which 62% of Canadians reported not meeting national guidelines for physical activity. In a 2004 update to the study using newly available data, Katzmarzyk attributed 2.6% of Canadian healthcare costs to inactivity, based on a nationwide inactivity rate of 54%. In the follow-up study, Katzmarzyk relied on a new definition of inactivity from the Canadian Community Health Survey. In the new definition, "inactivity" means not meeting the standard of one hour of low-intensity activity every day, or either 30 to 60 minutes of moderate-intensity activity or 20 to 30 minutes of vigorous-intensity activity four to seven days a week.

More recently, a 2005 study conducted by Chenoweth and Associates on behalf of the California Department of Health Services estimated that 3.9% of California's healthcare expenditures are attributable to physical inactivity.²² Chenoweth created its own Proportional Risk Factor Cost Appraisal framework, a model similar to PAR, which was applied to medical claims data from 25,000 Californians, along with other data sources, to estimate the expenditures attributable to inactivity. The analysis assessed risk factor prevalence and inpatient and outpatient claims for each relevant diagnosis and the likelihood that an individual would be diagnosed with a relevant condition. Chenoweth used a state-specific complement to Behavioral Risk Factor Surveillance Survey (BRFSS) data, in which inactivity is defined as "no leisure time physical activity in the past month or irregular physical activity (fewer than three times per week or less than 20 minutes per session) in the past month." In 2001, 49.5% of Californians were inactive under this definition, which the study said was responsible for 3.9% of California healthcare costs.

¹⁹ Colditz (1999).

²⁰ Others define inactivity as not undertaking at least three exercise sessions of 20 minutes each week.

²¹ Katzmarzyk, et al. (2004).

²² Chenoweth (2005).



Table 1: Estimated Share of Healthcare Expenditures Attributed to Physical Inactivity

Study	Estimated Share of Healthcare Expenditures Attributed to Physical Inactivity	Geographic Scope
Colditz, 1999	2.5% (48.5% inactivity rate)	USA
Katzmarzyk, 2004	2.6% (54% inactivity rate)	Canada
Chenoweth, 2005	3.9% (49.5% inactivity rate)	California

Effectiveness of Interventions to Increase Physical Activity

There is an emerging body of literature evaluating the effectiveness of various interventions intended to increase levels of physical activity, including walking. One of the most comprehensive analyses was published in 2002 in the American Journal of Preventative Medicine (AJPM). In connection with the CDC “Community Guide” website, Kahn et al. reviewed studies of three approaches to physical activity interventions:²³ Informational campaigns, social and behavioral approaches and environmental and policy approaches. Within these broad groupings, the review examined the effectiveness of specific interventions. The study had several key findings regarding the programs’ effectiveness at increasing the number of physically active individuals:

- Certain types of informational campaigns, such as “point-of-decision prompts” in the workplace or school, were modestly effective in increasing physical activity, such as using the stairs or walking rather than driving (median net increase in physical activity of 4.2%)
- Social support interventions focused on changing physical activity behavior through social networks that provided supportive relationships for behavior change were especially effective (median net increase in physical activity of 44.2%)
- The interventions that provided both enhanced access to places for physical activity and informational outreach activities were the most effective at increasing physical activity levels (median net increase in physical activity of 48.4%)

Kahn’s review concluded that some of the most effective campaigns were community-wide or multi-pronged initiatives. Because these campaigns often included efforts to reduce other risk factors for cardiovascular disease, including smoking and obesity, it is challenging to isolate their specific impact on inactivity. Multi-pronged community campaigns typically include some combination of social support, such as self-help groups, as well as risk factor screening and counseling. They also typically include an educational component that stresses the value of physical activity and that gives advice about becoming more active. These educational elements take place in a variety of settings, including at worksites,

²³ Kahn, et al. (2002).



schools and community events. Finally, they include the aforementioned strategy of environmental or policy changes, such as the creation of walking trails.

Recent literature continues to provide evidence for the effectiveness of multi-pronged workplace interventions. Naito et al. studied a five-year workplace intervention in Japan that sought to increase physical activity and improve other CVD risk factors through a workplace campaign.²⁴ The campaign involved frequent presentations on physical activity, enabled the use of pedometers twice per year to encourage walking, provided instructions on stretching and walking, hosted sporting events, constructed walking paths and distributed walking maps. The study found that the percent of employees who were active for fewer than 30 minutes per day decreased from 13.5% to 8.2%. The percent of participants who had decreased their walking time during the five-year period was 18.6% for the intervention group versus 25.7% for the control group. These encouraging results suggest that workplace interventions have the potential to improve and maintain activity rates, even for employees who are already relatively active.

Other studies shed light on newer types of interventions, such as the use of pedometers. For example, one study asked sedentary adult women to report their daily walking using a mobile phone and a pedometer.²⁵ Daily prompts delivered via mobile phones encouraged participants to increase the number of steps taken by 20%; over the course of the four-year intervention, average daily steps increased by 15% (800 steps). A 2007 meta-analysis of 26 studies on pedometers, with 2,767 participants, found that pedometer users significantly increased their physical activity, taking 2,491 steps per day more than control participants. The overall increase in activity was 26.9% over baseline. This meta-analysis included eight randomized controlled trials and 18 observational studies.²⁶

Finally, some evidence exists that “lifestyle” interventions to encourage fitness and physical activity may be as effective as traditional “structured” interventions. Dunn et al. performed a randomized trial that placed previously sedentary adults into two different activity intervention groups for two years and then tracked their progress.²⁷ One group was enrolled in a “structured” program in which subjects were given individualized sessions with a trainer five days a week for the first six months. This group was then given the freedom to design their own program for the remaining 18 months, with trainer support available and with frequent reminders to maintain their regimens. Alternatively, the “lifestyle” intervention group received much less structured support. They were simply encouraged to exercise every day, or at least five days each week, for more than 30 minutes, but did not receive a gym membership or access to a trainer. Instead, they met weekly (later biweekly) in small group sessions with facilitators who helped develop cognitive and behavioral strategies to maintain their exercise regimen. Over 24 months, both the lifestyle and structured exercise groups significantly increased their total energy expenditure from their baselines. But the lifestyle group increased moderate-intensity physical activities nearly three

²⁴ Naito, et al. (2008).

²⁵ Fukuoka, et al. (2010).

²⁶ Bravata Dm, et al. (2007).

²⁷ Dunn Al (1999).



times more than structured group. These findings suggest there is a potential for less-expensive lifestyle interventions to yield more cost-effective results than costlier traditional “structured” interventions.

Cost Effectiveness of Interventions

The cost-effectiveness of interventions to improve levels of physical activity has been studied extensively. While estimates range widely, in general, most interventions are found to be cost-effective using any of a number of different valuation techniques.

A recent American Heart Association study reviewed a range of previous studies that calculated the cost effectiveness of interventions to decrease risk factors for cardiovascular disease.²⁸ Multi-pronged community-wide interventions to increase physical activity, improve nutrition and prevent smoking were found to save an average of \$5.60 in healthcare expenditures for every \$1 invested. Comprehensive worksite wellness programs, which include components to improve rates of physical activity, are estimated to decrease medical expenditures \$3.27 for every \$1 spent within the first 12-18 months of the program. Building new bike and pedestrian trails were found to have a return-on-investment of \$3 for every \$1 spent.

Other studies have measured intervention effectiveness in terms of cost per quality-adjusted life year (QALY). The Dutch Heart Health intervention for diabetics, which seeks to improve both nutrition and physical activity for 180,000 people in the city of Limburg, cost \$4,000 to \$5,000 per QALY gained.²⁹ This is considered a good return, given that most cost benefit analyses value a QALY at much more than \$4,000. One literature review of cost effectiveness benchmarks found a range of \$24,777 to \$428,286 per QALY depending on the method of calculation.³⁰

As previously discussed, investments facilities that encourage activity have been shown to be highly effective in increasing activity rates. But they are also generally expensive, requiring significant upfront capital as well as coordination across a range of agencies and officials. Portland has long been known for its extensive municipal support for bicycling. Recently, Gotschi et al. estimated that by 2040, the city's biking-related investments, which will be in the range of \$138 million to \$605 million, would result in direct healthcare savings of \$388 million to \$594 million, as well as savings in the value of statistical lives of \$7 billion to \$12 billion.³¹ The study evaluated the cost of investments in biking capacity compared with healthcare cost savings and statistical life savings (QALYs) based on longevity. Portland's initiative is an encouraging example of a systematic, regional effort to promote increased physical activity within regular daily life.

²⁸ Weintraub, et al. (2011).

²⁹ Jacobs-van der Bruggen, et al. (2007).

³⁰ Hirth, et al. (2000).

³¹ Gotschi (2011).



Proposed Initiative

Our proposed initiative would involve a multi-stakeholder effort across California to significantly increase rates of walking over the next 10 years, thus decreasing the number of Californians deemed to be physically inactive. The California Department of Public Health (CDPH) could lead the program with support and funding from employers, health plans and other healthcare stakeholders. The initiative should involve proven approaches to increasing physical activity, such as information campaigns, social support interventions, point-of-decision prompts, major urban and environmental improvements to support walking, and use of such technologies as pedometers and mobile phones. Based on the evidence available, effective implementation of such a program would significantly improve rates of physical activity. The program should reach the majority of Californians at their school or job. However, to ensure that all Californians can get involved, it should also include programming at community facilities such as libraries and places of worship.

Another successful model is known as a “wellness trust.” This is a fund managed by an appointed board that is designed to support a specific set of public health initiatives. In the case of California, a state-level department, such as CDPH, could appoint a multi-stakeholder board to disburse the funding. Massachusetts’s wellness fund, which is financed by a tax on insurers and a fee assessed on large hospitals, provides a blueprint for this approach. The Massachusetts Wellness and Prevention Trust will disburse \$60 million for wellness initiatives across the state over four years, starting in this year.³²

Modeling Approach and Assumptions

Based on the literature attempting to correlate physical inactivity with healthcare expenditures, we modeled the effects of an increase in physical activity rates in California under two scenarios. Under the “Current Developments” scenario, in which we assume that current trends, initiatives and policies will continue, we expect the number of physically inactive people to continue decreasing at a modest rate. Under this scenario, 5% fewer Californians would be physically inactive in 2022. Under the Forum Vision scenario of integrated delivery systems, aligned financial incentives and a prioritization of population health, we model the more ambitious goal of decreasing the percent of inactive Californians by 10%. This also aligns with the Healthy People 2020 goal to decrease the number of inactive Americans by 10%.

Costs of Inactivity

For the percent of healthcare expenditures due to physical inactivity in California, we used a lower bound of 2.5% from Colditz and an upper bound of 3.9% from Chenoweth.

Direct Relationship between Inactivity Levels and Cost

Our model assumes that as the proportion of physically inactive Californians decreases, there will be a proportional decrease in healthcare expenditures. For example, if the current 48.7% rate of physically

³² Massachusetts Public Health Association (2012).



inactive Californians decreases 10% by 2022, only 43.8% of Californians would then be considered inactive. If we assume that 3.9% of California's healthcare expenditures are due to physical inactivity, then 10% of that 3.9% of projected 2022 expenditures will be reduced.

Uptake and Improvement Rates

Under both the Current Developments and Forum Vision scenarios, we envision a concerted campaign to encourage walking, starting this year. In doing so, we model an adoption curve that is steeper in the first five years than in the latter five years. This is because in its early years, a statewide physical activity campaign is likely to be effective at increasing activity among the "low-hanging fruit," while later years may see more modest take-up rates.

The Timing of Physical Activity Benefits

The studies shown in Table 1, which were used in our healthcare expenditures analysis, do not address the potential time lag between an increase in physical activity rates and its benefits, especially a reduction in healthcare expenditures. On that issue, one study of a range of modifiable health risks, including physical activity, concluded that statistically significant savings in direct healthcare expenditures emerge within 12 to 18 months of behavior change.³³

Overall, however, there is minimal research that directly establishes the timing between physical activity increases and healthcare expenditure decreases. For the purpose of our analysis, we estimate a one-year lag.

The Cost of a Physical Activity Initiative

Our proposed initiative describes a multi-pronged campaign to increase walking and physical activity in the state. Given that many of the details of the initiative have not yet been worked out, to estimate its cost, we look to relevant cost-effectiveness analyses. We rely on the aforementioned Weintraub et al. meta-analysis that found that on average, community-wide multi-pronged physical activity interventions achieve \$5.60 in savings for every \$1 invested. We use this ratio and estimate that projected expenditure reductions are decreased by 17.9% (\$1.00/\$5.60) to account for the initiative cost.

Estimated Impact

As described in the above assumptions, we examined the potential reduction in total healthcare spending under two scenarios. Under the Current Developments scenario, we assume that small-scale efforts to increase physical activity continue in California over the next 10 years. This results in an overall 5% decrease in inactivity, similar to the trend observed between the 2000 and 2007 BRFSS data. Under the Forum Vision scenario, we envision a healthcare system that encourages greater physical activity. The result is a 10% decrease in physical inactivity rates by 2022, similar to the Healthy People 2020 goal.

³³ Pronk, et al. (1999).



Table 2: Healthcare Expenditure Reduction Estimates Under the Current Developments Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	(\$0.0)	(\$0.0)	\$0.5	\$0.8	\$2.6	\$3.4	\$4.1
Expenditure Reduction (%)	0.00%	0.00%	0.09%	0.15%	0.06%	0.08%	0.09%

Table 2 shows that under Current Developments, we use the midpoint results to estimate healthcare expenditures reductions of \$3.4 billion in current-year dollars over the period 2013 and 2022 (or 0.08% of total expenditures during this period) due to increases in physical activity rates.

Table 3: Healthcare Expenditure Reduction Estimates Under the Forum Vision Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	(\$0.0)	(\$0.0)	\$1.1	\$1.7	\$5.3	\$6.7	\$8.2
Expenditure reduction (%)	0.00%	0.00%	0.19%	0.29%	0.12%	0.15%	0.19%

Table 3 shows that under the Forum Vision, we use the upper results to estimate healthcare expenditure reductions of \$8.2 billion over the period 2013 and 2022 (or 0.19% of total healthcare expenditures during this period) due to decreases in physical inactivity rates.

Discussion

High physical inactivity rates continue to create an unnecessary burden on Californians' health status and healthcare system. Both the existing literature and numerous economic models suggest there is significant potential to decrease healthcare expenditures in California by promoting physical activity.

We estimate that a decrease in physical inactivity under the "Current Developments" scenario would reduce healthcare expenditures by about \$3.4 billion in current-year dollars by 2022, or 0.08% of total healthcare expenditures during this period. In 2022 under "Current Developments, the reduction in healthcare expenditures averages \$0.84 billion, or 0.15% of total expenditures in that year. Under the lower overall physical inactivity and savings rates assumed under the "Forum Vision" scenario, this initiative for the same period would reduce healthcare expenditures by about \$8.2 billion, or 0.19% of total healthcare spending. In 2022, decreased physical inactivity would reduce healthcare expenditures by an estimated 0.29%.

In addition to reduced healthcare expenditures, we would expect other significant benefits from such an initiative. Inactivity takes a great physical and emotional toll on Californians who should be enjoying healthier lives. Physical activity has been linked to improved mood, lower rates of depression, lower rates of breast and colon cancer and various chronic conditions, along with general improved quality of life.



There are several limitations in our analysis. First, we based it on three major studies that link physical inactivity and healthcare expenditures.³⁴ The three studies each attribute a certain share of healthcare expenditures to physical inactivity. The risk factor weights used in these studies are based on the general adult population, which may be different for California given the state's unique demographic mix. These weights may also have changed on account of the data that has emerged since the early and mid-2000s, when these studies were first published. Second, the disease costs caused by physical inactivity may be understated, given that some of the studies do not include the costs from diseases which can't easily be attributable to physical inactivity. For example, the PAR model used by Colditz did not include dyslipidemia, anxiety or depression, all of which have frequently been associated with physical inactivity

Third, we have not encountered randomized control trial evidence that directly links a specific physical activity intervention with a specific reduction in either the incidence of certain diseases or overall healthcare expenditures. Instead, existing studies link specific interventions to decreases in physical inactivity levels, or, at best, to changes in risk factors such as blood pressure. Establishing the direct link between a physical inactivity intervention and disease incidence requires sustained longitudinal study.

It is also important to note that although our analysis focuses on the healthcare expenditures attributed to inactivity, the separate challenge of obesity is intimately related. The Chenoweth study³⁵ attributes a separate share of healthcare expenditures directly to obesity, in addition to the share due to inactivity. This implies is that our modeling estimates may be conservative. Any successful initiative that decreases inactivity may also have positive impacts on obesity and may potentially decrease other risk factors, thus decreasing healthcare expenditures.

A final limitation of our study is that we have not modeled the initiative's impact on mortality and morbidity, which may result in increased healthcare expenditures in the long-term. A large body of literature exists on the quality of life and longevity benefits of physical activity. Lee, et al. used a population attributable risk (PAR) method to suggest that eliminating physical inactivity in the United States could add 0.78 years to national life expectancy.³⁶ Other studies have concluded that the additional life years gained by improvements in obesity (and by extension, physical activity) may lead to additional healthcare spending that could exceed whatever reductions are attained from improved health in earlier years. Van Baal et al. used a simulation model to estimate healthcare expenditures for obese non-smokers, non-obese smokers, and non-obese non-smokers ("healthy") in the Netherlands. Somewhat surprisingly, the "healthy" cohort had the highest lifetime healthcare expenditures, followed by the obese non-smokers and finally, the non-obese smokers. Their simulation concluded that any obesity-related reduction in healthcare expenditures might be offset, over the course of 20 years, by the extra medical expenses incurred by residents during their longer life spans.³⁷ However, while the Dutch

³⁴ Chenoweth (2005); Colditz (1999); Katzmarzyk, et al. (2004).

³⁵ Chenoweth (2005).

³⁶ Lee, et al. (2012).

³⁷ van Baal, et al. (2008).



study suggested that decreasing obesity and smoking might not reduce costs, it also concluded that the additional life-years came at a relatively low cost, in terms of quality-adjusted life years.

In the case of the Forum's proposed initiative, much of the additional longevity created by decreased physical inactivity may not take effect within the 10 years that are modeled. Therefore, we assume that the increased healthcare expenditures due to additional longevity in newly active people would not significantly impact our projected expenditure reductions. In the long run, added longevity may reduce our expenditure reduction estimates; however, the goal aligns well with the spirit of the Forum Vision of improving the overall health of California's population.

Another body of evidence suggests that healthy lifestyles can shorten the period of disability often experienced at the end of life. This evidence runs counter to van Baal et al., in that it suggests that physical activity in earlier years may in fact decrease healthcare costs in the last few years of life. Between 1986 and 1998, Hubert et al. conducted an observational study of lifestyle-related risk factors (including physical activity) for disability prior to death in a group of older individuals. He found that group members without any significant risk factors showed average disability scores near zero at 10-12 years before their deaths, with relatively little decrease in function as death approached. By comparison, those in the group with two or more risk factors experienced a greater level of disability and more marked decline in functionality over the same period.³⁸ Another longitudinal study, comparing female runners and non-runners over age 50, found reductions in morbidity duration and longer life spans of those in the first group.³⁹

Overall, we expect that decreased physical inactivity will significantly reduce healthcare expenditures over the coming 10 years, while offering major benefits to the health status and quality of life for all Californians, everywhere in the state.

Acknowledgements

We are very grateful for the comments we received on this memorandum from David Chenoweth, Ph.D., President, Chenoweth and Associates, Inc., and Peter Katzmarzyk, Ph.D., FACSM, FAHA, Associate Executive Director for Population Science, Professor and Louisiana Public Facilities Authority Endowed Chair, Pennington Biomedical Research Center, Louisiana State University. These individuals do not necessarily endorse the contents of this memorandum.

³⁸ Hubert, et al. (2002).

³⁹ Fries (1996).



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**A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM:
Integrated Care with Aligned Financial Incentives**

**Appendix IX. Nurse Practitioners and Physician
Assistants (Initiative Memorandum)**

APRIL 2013

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Appendix IX: Nurse Practitioners and Physician Assistants (Initiative Memorandum)

See “Appendix IV: Introduction to Appendices V-XI” for brief background on this Appendix.

Executive Summary

Nurse practitioners (NP) and physician assistants (PA) provide many healthcare services, particularly involving primary care. But, the volume of services that they provide relative to primary care physicians varies by state. In 2009, NPs and nurses provided a lower share of office visits to primary care clinicians in California (9.7%), as compared to their share in the rest of the United States (13.9%). In 2009, the PA share in California (2.5%) was similar to the rest of the United States (2.7%).

Increasing the use of NPs and PAs within primary care could reduce California’s healthcare expenditures, because their wages are about half of those for primary care physicians. We used data from the Medical Expenditure Panel Survey’s Office-Based Medical Provider Visits files and the U.S. Bureau of Labor Statistics to estimate the healthcare expenditure reductions that would result if the shares of office visits to primary care clinicians provided by NPs and PAs were to increase in California.

Under the Current Developments scenario, we assume NP and PA shares of office visits to primary care clinicians increase to 11.8% and 3.2% by 2022, respectively, resulting in a healthcare expenditure decrease of between \$260 million and \$330 million in current-year dollars from 2013-2022, representing 0.006% to 0.008% of projected healthcare expenditures. Under the Forum Vision scenario, we assume NP and PA shares of office visits to primary care clinicians increase to 24.5% and 5.5% by 2022, respectively, which would put California in the 95th percentile for each share among the 29 states with credible data to measure the shares. This results in a healthcare expenditure decrease of between \$1.4 billion and \$1.8 billion in current-year dollars from 2013-2022, which represents 0.033% to 0.041% of projected healthcare expenditures. In 2022, the percentage peaks at 0.06% to 0.07%, because NP and PA shares of office visits to primary care clinicians are assumed to reach their highest levels in the 10-year period leading up to 2022.

These expenditure reductions are modest, but they could continue to increase after 2022 if the share of office visits to primary care clinicians provided by NPs and PAs continues to grow. The results are sensitive to the relative productivity of an NP or PA as compared to a primary care physician, which we assumed to be between 80% and 95%. Further research is needed to refine these estimates for particular patient types and different physician/non-physician clinician arrangements, from independent practice to closely integrated teams. One potential barrier to increasing NP and PA shares involves state regulatory requirements pertaining to physician supervision of NPs and PAs, which may indirectly reduce their ability to be reimbursed directly and be empaneled as primary care providers. Under the Forum Vision, which includes a higher adoption of Accountable Care Organizations with global budgets, there will be a greater financial incentive to increase the use of NPs and PAs.



The Underlying Situation

Nurse practitioners (NP) and physician assistants (PA) provide many healthcare services, particularly in primary care. Increasing the use of NPs and PAs within primary care, particularly for routine and follow-up visits, could reduce California's healthcare expenditures. The wages in California for these occupations are about half of those for primary care physicians, while the Medicare reimbursement for NPs is usually 85% of the physician reimbursement level.¹

The increased use of NPs and PAs could occur in different models, each with different levels of healthcare integration. On the one hand, NPs and PAs could complement existing primary care physicians and be part of a closely integrated team, such as in a Patient-Centered Medical Home. On the other hand, they could substitute for primary care physicians and practice more independently, something particularly true for NPs in rural areas. Even while practicing independently, NPs could still be virtually integrated and collaborate with a larger team.

The Affordable Care Act is expected to reduce the number of uninsured in California, generating a need to increase the primary care health workforce capacity. In 2014 alone, 1.9 million additional Californians are expected to gain insurance coverage,² resulting in an estimated healthcare expenditure increase of 118% for these individuals.³ This will increase the demand for healthcare workers, particularly in primary care. While there are challenges connected to this development in all parts of the state, rural areas and vulnerable populations are of special concern.

Grumbach et al. used workforce administrative and survey data to estimate the proportion of primary care physicians, NPs, PAs, and other professions that practiced in rural areas, health professional shortage areas, and vulnerable-population areas that were defined by a high concentration of racial minorities and low-income residents.⁴ As compared to primary care physicians practicing in these areas, higher shares of both PAs and NPs were practicing (although the result for NPs was not statistically significant at the 0.05 level).⁵

In 2010-2011 in California, there were an estimated 26,230 primary care physicians (family/general practitioners, pediatricians, internists, and gynecologists/obstetricians), as well as 17,032 NPs and 8,170

¹ Spetz, et al. (2011); U.S. Bureau of Labor Statistics (2011).

² Kominski, et al. (2012).

³ Hadley, et al. (2008).

⁴ Grumbach, et al. (2003).

⁵ In California, primary care physicians practice in the same rural areas as advanced practice registered nurses (e.g., see National Center for the Analysis of Healthcare Data (2008)). However, Grumbach and colleagues' key results "indicate the proportion of clinicians within each discipline who practice in a rural area and do not indicate the proportion of all clinicians in rural areas who belong to each discipline" (p. 100). Their results did not include whether patients in rural areas, health professional shortage areas, or vulnerable-population areas reported using an NP or PA as their usual source of care. However, a study in Wisconsin found that NPs and PAs serve as primary care providers to underserved patients (Everett, et al. (2009)).



PAs.⁶ In the United States, 88% of NPs work in primary care, but only 31% of PAs do so, with much of the remaining working in surgical subspecialties (23%), other specialties (19%), emergency medicine (11%), and internal medicine subspecialties (10%).⁷ Table 1 shows the supply and annual wage differences among these workforce professions in and outside of California. California has relatively few NPs and PAs per capita, as compared to the rest of the United States. In 2011, there were 45 and 60 NPs per 100,000 population in California and outside of California, respectively, along with 22 and 28 PAs per 100,000 population, respectively. However, California has more primary care physicians, at 70 per 100,000 population, than the rest of the United States, which has 63 per 100,000 population. In California, the annual wages of NPs and PAs average \$93,000 and \$97,000, respectively, about half that of primary care physicians at \$187,000. PA and primary care physician annual wages in California were similar to those outside of California.

Table 1: Supply and Annual Salary of Health Workforce Professions in California vs. the Rest of the United States, 2010-2011

Variable	Nurse Practitioners	Physician Assistants	Primary Care Physicians (1)
Number per 100,000 population			
California	45	22	70
Non-California	60	28	63
California rank (2)	42	35	22
Number of states in sample (3)	51	50	42
Annual Wage (\$2012)			
California	\$92,963	\$96,998	\$187,127
Non-California	N/AV	\$90,650	\$186,716
California rank (2)	N/AV	13	24
Number of states in sample (3)	N/AV	51	41

(1) Primary care physicians include family/general practitioners, pediatricians, internists, and gynecologists/obstetricians. The number of geriatricians by state was not available from the U.S. Bureau of Labor Statistics (2011).

(2) States are ranked in descending order.

(3) Number of states is out of 51, including the 50 states and the District of Columbia.

N/AV: not available

Sources: Nurse practitioner supply in 2011 – Pearson (2012); nurse practitioner wage in 2010 - Spetz et al. (2011); and physician assistant and primary care physician supply and wages in 2011 - U.S. Bureau of Labor Statistics (2011)⁸

⁶ U.S. Bureau of Labor Statistics (2011); Pearson L.J. (2012); American Academy of Physician Assistants (2011); American Academy of Nurse Practitioners (2011). Gynecologists/obstetricians are not always counted as primary care physicians, but they are included here because they provide primary care services to women, and some of their services could be performed by an NP or PA.

⁷ American Academy of Nurse Practitioners (2011); American Academy of Physician Assistants (2011).

⁸ The U.S. Bureau of Labor Statistics' Occupational Employment Statistics Survey Employees includes all part-time and full-time workers who are paid a wage or salary, including paid owners of incorporated firms. The survey does not cover the self-



Comparing Outcomes of Nurse Practitioners and Physician Assistants with those of Primary Care Physicians

In this section, we briefly review studies that compared NPs to primary care physicians with respect to healthcare quality, patient satisfaction, and health outcomes in primary care settings.⁹ In summary, the studies find that NPs produce similar results to those of primary care physicians.

The most recent systematic review of the literature was a 2004 Cochrane Review by Laurant et al., who examined 16 studies from the United Kingdom, United States, and Canada, 13 of which were randomized control trials or had quasi-experimental designs.¹⁰ They found that highly trained nurses, such as NPs, clinical nurse specialists, or advanced practice nurses provided comparable or higher quality care and had comparable patient satisfaction and health outcomes as physicians. Laurant et al. noted caveats to their findings, including concerns about studies having insufficient power and methodological limitations, as well as studies having the patient follow-up period typically being 12 months or less. However, their findings are generally consistent with two previous meta-analyses on doctor-nurse substitution.^{11,12} Horrocks and colleagues reviewed 11 randomized controlled trials and 23 observational studies from developed countries, and Brown and Grimes reviewed 38 published and unpublished studies from the United States and Canada.¹³

One study included in the Laurant et al. meta-analysis utilized a randomized control trial to compare NPs with primary care physicians in settings where NPs had the same degree of independence as primary care physicians, including the same authority and responsibilities, and both workforce professions drew from the same patient population.¹⁴ They found that NPs generated comparable results to primary care physicians across measures of satisfaction, self-reported health status, physiologic measures, and utilization. Although the study was rigorous by virtue of including random assignment to the provider type, its external validity may be limited, because the study participants were primarily a safety net population. Further research is needed with independent or small group physician offices with commercially insured patients.¹⁵ Furthermore, preliminary evidence suggests that NPs may use more

employed, owners and partners in unincorporated firms, household workers, or unpaid family workers; therefore, it undercounts physicians, because some are owners/partners of medical groups (whose total compensation includes profits).

⁹ We also discuss comparing physician assistants to primary care physicians, but no systematic review of the literature has been published, so the discussion is briefer.

¹⁰ Laurant, et al. (2004). The study defined patient outcomes as morbidity, mortality, satisfaction, compliance, and patient preferences. It defined primary care physicians as general practitioners, family physicians, pediatricians, general internists and geriatricians.

¹¹ Horrocks, et al. (2002).

¹² Brown, et al. (1995).

¹³ Additional studies are catalogued by the American College of Nurse Practitioners (see American College of Nurse Practitioners (2012).

¹⁴ Mundinger, et al. (2000).

¹⁵ Sox (2000).



resources than primary care physicians in certain situations; however, these studies were not based on randomized controlled trials.^{16,17}

After the three meta-analyses, Roblin and colleagues analyzed patient satisfaction survey data from Kaiser Permanente Georgia.¹⁸ Their study is noteworthy for its inclusion of both PAs and NPs, when comparing patient satisfaction with physicians. No significant differences in patient satisfaction were found between NPs and PAs versus physicians. Hooker et al. found similar results with Medicare beneficiaries.¹⁹ However, research in the United Kingdom found a physician is preferred by patients for more serious or difficult conditions, while a nurse is preferred for minor or routine conditions.²⁰

Proposed Initiative

The proposed initiative is to increase the number of office visits to primary care clinicians provided by NPs and PAs. We used the 2002-2009 Medical Expenditure Panel Survey (MEPS) Office-Based Medical Provider Visits files to estimate NPs' and PAs' current shares of office visits in California and other states. These files are based on the information collected in the MEPS Household and Medical Provider Components.²¹ While its sampling method is designed to produce a nationally representative sample of office visits by the civilian non-institutionalized population of the United States, it is also possible to produce state-level estimates in the 29 most populous states, which includes California.²²

To isolate the sample to mostly include primary care visits, we examined only visits provided by NPs and nurses²³ and PAs, as well as the following types of physicians: general practitioners, family practitioners, pediatricians, internists, gynecologist/obstetricians, or geriatricians.²⁴ In 2009, there were 64 million visits to these clinicians in California. Figure 1 shows the share of these visits provided by NPs and nurses as well as PAs in California versus the rest of the United States, from 2002 to 2009. For most years, NPs

¹⁶ Hooker, et al. (2001).

¹⁷ Hemani, et al. (1999).

¹⁸ Roblin, et al. (2004).

¹⁹ Hooker, et al. (2005).

²⁰ Drury, et al. (1988).

²¹ The research using the MEPS was conducted while co-author (Fulton) was a Special Sworn Status researcher of the U.S. Census Bureau at the Center for Economic Studies. Research results and conclusions expressed are those of the co-author and do not necessarily reflect the views of the Census Bureau. The results have been screened to insure that no confidential data are revealed.

²² Sommers (2005).

²³ The MEPS Office-Based Medical Provider Visits questionnaire asks if the patient saw a physician. For patients who did not see a physician, the questionnaire asks the type of provider the patient saw. It lists several choices, including nurse/nurse practitioner and physician assistant. The choice of nurse and nurse practitioner is combined, so it encompasses all nurses as well as other advanced practice registered nurses, including clinical nurse specialists and nurse anesthetists. Because a physician was not seen during the visit, we assume most of the visits indicated by nurse/nurse practitioner were provided by nurse practitioners. If not, we assume the nurse practitioner share of these visits was similar across states.

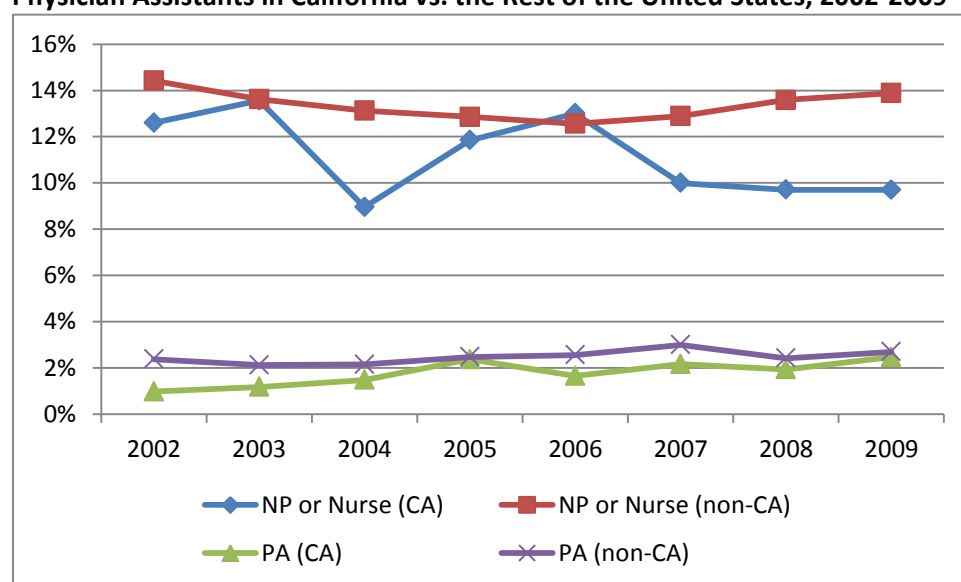
²⁴ NPs and PAs, PAs in particular, work outside of primary care, so we are overstating the number of primary care visits provided by these clinicians. However, the number will be overstated in every state, and our principal purpose was to compare the share of visits to primary care clinicians provided by NPs and PAs in California with the share provided in the rest of the United States. This value of this comparison would be reduced if the share of NPs and PAs working outside of primary care significantly varies between California and the rest of the United States.



and nurses provided a higher share of these visits outside of California as compared to their share in California, particularly during the past three years when the difference was statistically significant at the 0.05 level. From 2007-2009, the mean share of office visits provided by NPs and nurses ranged from a low of 5.1% in New Jersey to a high of 29.8% in Missouri. The share in California was 9.8%.

PAs provided a higher share of these visits from 2002-2004 outside of California, but the differences in the latter years diminished and were not statistically significant at the 0.05 level. From 2007-2009, the mean share of office visits provided by PAs ranged from a low of 0.1% in Alabama to a high of 6.6% in Arizona. The share in California was 2.2%.

Figure 1: Shares of Office Visits to Primary Care Clinicians Provided by Nurse Practitioners/Nurses and Physician Assistants in California vs. the Rest of the United States, 2002-2009



Source: Medical Expenditure Panel Survey Office-Based Medical Provider Visit Files. Shares are based on total number of office visits provided by nurse practitioners and nurses, physician assistants, as well as the following types of physicians: general practitioners, family practitioners, pediatricians, internists, gynecologist/obstetricians, or geriatricians.²⁵

Abbreviations: NP: nurse practitioner, PA: physician assistant, CA: California, non-CA: United States (excluding California)

Modeling Approach & Assumptions

In this section, we discuss our approach and the assumptions used to estimate the healthcare expenditure reductions that would result from increasing the use of NPs and PAs. The section discusses

²⁵ These estimates are based on MEPS national-level sampling weights, because state-level sampling weights were not available for the 21 least-populous states or the District of Columbia, and because our principal purpose was to compare California with the rest of the country. When state-based weights were used for California, the shares of office visits to primary care clinicians provided by NPs and PAs in California averaged only 0.40 and 0.04 percentage points higher, respectively, over the eight-year period, than when national-level sampling weights were used.



the shares of office visits to primary care clinicians provided by NPs and PAs under the Current Developments and Forum Vision scenarios as well as the wage and productivity differences between NPs and PAs versus primary care physicians.

Initiative Penetration Rates: Share of Office Visits to Primary Care Clinicians Provided by Nurse Practitioners and Physician Assistants

In California from 2007-2009, there was an average of 61 million, or 1.7 per capita, office visits to primary care clinicians. We assumed the number of visits per capita would remain constant from 2013-2022. We also assumed that in the Berkeley Forum's status quo 2013-2022 healthcare expenditure projections, the NP share of the 2007-2009 visits (9.8%) and the PA share of the 2007-2009 visits (2.2%) would remain constant.

Current Developments Scenario: Nurse Practitioner and Physician Assistant Shares of Office Visits to Primary Care Clinicians

As shown in Figure 1, the share of office visits to primary care clinicians provided by NPs and nurses decreased in California during 2002-2009, approximately 0.4 percentage points per year.²⁶ However, during the last three years of the period, 2007-2009, the shares were fairly stable at 10.0%, 9.7%, and 9.7%, respectively. The demand for primary care will significantly increase in 2014, when an estimated 1.9 million Californians gain health insurance because of the Affordable Care Act. This increase in demand, coupled with the formation of accountable care organizations, may result in the increased use of NPs. Based on a 2010 survey of NPs in California, approximately one-quarter of them were not working as NPs, and some could presumably help fill the additional demand.²⁷ Therefore, under the Current Developments scenario, we assume the share of these visits provided by NPs will increase at a constant rate from 9.8% in 2012, which is the 2007-2009 average share, to 11.8% by 2022, a two percentage point increase.

As shown in Figure 1, the share of office visits to primary care clinicians provided by PAs increased in California during 2002-2009 by approximately 0.2 percentage points per year.²⁸ As stated above, the demand for primary care will significantly increase in 2014. Therefore, under the Current Developments Scenario, we assume the share of these visits provided by PAs will increase at a constant rate from 2.2% in 2012, which is the 2007-2009 average share, to 3.2% by 2022, a one percentage point increase.

Forum Vision Scenario: Nurse Practitioner and Physician Assistant Shares of Office Visits to Primary Care Clinicians

The MEPS is able to produce state-level estimates for the 29 most populous states, which includes California. Under the Forum Vision scenario, like the Current Developments scenario, we assume the NP and PA shares of office visits to primary care clinicians start at 9.8% and 2.2%, respectively, in 2012.

²⁶ This estimate is based on the slope of the NP and nurse line for California in Figure 1, using an ordinary least squares regression model.

²⁷ Spetz, et al. (2011).

²⁸ This estimate is based on the slope of the PA line for California in Figure 1, using an ordinary least squares regression model.



Next, we assume the shares increase at a constant rate so that by 2022, the shares reach the 95th percentile of 29 states during 2007-2009, or 24.5% for NPs and 5.5% for PAs. These shares are still much lower than the highest states. During 2007-2009, the mean share of these visits provided by NPs was 29.8% in Arizona, and 6.6% for PAs in Oklahoma.

Wage and Productivity Differences

The reduction in healthcare expenditures per visit is based on the difference between the weighted mean annual wage of primary care physicians and the mean annual wage of NPs or PAs (see Table 1),²⁹ adjusted for their relative productivities, which are affected primarily by the additional education and training that physicians receive. A number of studies have examined the relative productivity of NPs and PAs as compared to primary care physicians.³⁰ For example, a study found that all three provider types saw the same number of patients per hour.³¹ Another study of PAs found they saw 86% as many patients per week as the supervising physician.³² Furthermore, studies have provided preliminary evidence suggesting higher resource utilization among NPs as compared to physicians.^{33,34} Therefore, we assumed NPs and PAs were 80% as productive as primary care physicians for our low expenditure reduction estimate, and were 95% as productive for our high expenditure reduction estimate. We assumed a primary care physician provides an average of 3,626 office visits per year, based on data from the 2009 National Ambulatory Medical Care Survey.³⁵

Estimated Impact

Table 2 shows healthcare expenditure reduction estimates under the Current Developments scenario. They range from \$3 million to \$4 million in 2013, and then increase to between \$55 million and \$70 million by 2022.³⁶ During 2013-2022, the expenditure reduction estimates range from \$260 million to \$330 million, representing 0.006%-0.008% of projected healthcare expenditures.

²⁹ The wages in Table 1 are stated in 2012 dollars (as of May 2012). From 2013-2022, we converted wages to current-year dollars by using forecasts of the All Items Consumer Price Index for All Urban Consumers (CPI-U) for the U.S. City Average from the Puget Sound Economic Forecaster, prepared by Conway Pedersen Economics, Inc. The forecasted compounded average annual increase between 2012 and 2022 was 2.4% (Puget Sound Economic Forecaster (2012)).

³⁰ Hooker (2006); Scheffler (2008).

³¹ Hooker (1993).

³² Gryzbicki, et al. (2002).

³³ Hemani, et al. (1999).

³⁴ Hooker, et al. (2001).

³⁵ The number of visits by a primary care physicians is based on the total number of visits provided by general and family practitioners, internists, pediatricians, and obstetricians/gynecologists divided by the number of these physicians, assuming 70% full-time employment (Centers for Disease Control and Prevention (2009a & 2009b). Based on a 46-week year, this results in 79 visits per week, consistent with the volume in Eibner, et al. (2009).

³⁶ All healthcare expenditure reduction estimates are reported in current-year dollars.



Table 2: Healthcare Expenditure Reduction Estimates Under the Current Developments Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	\$0.003	\$0.004	\$0.055	\$0.070	\$0.260	\$0.295	\$0.330
Expenditure Reduction (%)	0.001%	0.001%	0.010%	0.012%	0.006%	0.007%	0.008%

Table 3 shows healthcare expenditure reduction estimates under the Forum Vision scenario. They range from \$15 million to \$19 million in 2013, and then increase to between \$334 million and \$423 million by 2022. During 2013-2022, the expenditure reduction estimates range from \$1.426 billion to \$1.802 billion, representing 0.033%-0.041% of projected healthcare expenditures.

Table 3: Healthcare Expenditure Reduction Estimates Under the Forum Vision Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	\$0.015	\$0.019	\$0.334	\$0.423	\$1.426	\$1.614	\$1.802
Expenditure Reduction (%)	0.004%	0.006%	0.058%	0.074%	0.033%	0.037%	0.041%

Discussion

Under the Current Developments scenario, we assume California nurse practitioners will increase their share of office visits to primary care clinicians from 9.8% in 2012 to 11.8% by 2022, and physician assistants will increase their share from 2.2% in 2012 to 3.2% by 2022. During 2013-2022, healthcare expenditures are estimated to decrease between \$260 million and \$330 million, representing 0.006%-0.008% of projected healthcare expenditures. In 2022, the percent reduction is 0.010%-0.012%. Under the Forum Vision scenario, we assume California NPs will increase their share of office visits to primary care clinicians from 9.8% in 2012 to 24.5% by 2022, and PAs will increase their share from 2.2% in 2012 to 5.5% by 2022. The higher shares represent the 95th percentile share among 29 states with credible data. During 2013-2022, healthcare expenditures are estimated to decrease between \$1.4 billion and \$1.8 billion, representing 0.033%-0.041% of projected healthcare expenditures. In 2022, the percent reduction is estimated to be 0.06%-0.07%. These expenditure reductions are modest, but they could increase beyond 2022 if the share of office visits to primary care clinicians provided by NPs and PAs continues to increase.

Our estimated expenditure reduction is significantly less than Eibner et al. found in Massachusetts when they simulated the increased use of NPs and PAs in that state.³⁷ They estimated that Massachusetts could decrease its healthcare expenditures from 0.63%-1.25% from 2010-2020. There are two major reasons why their estimate was higher. First, their per-visit expenditure difference between physicians

³⁷ Eibner, et al. (2009).



versus NPs and PAs was \$77, while ours was lower, ranging from \$18 to \$25 (all figures reported in 2012 dollars). This is because our difference included only the wage differential between primary care physicians versus NPs and PAs, while their difference was based on the actual reimbursement difference. We did not use actual reimbursement differences, because we were primarily interested in estimating expenditure reductions that would likely occur in the long run through lower cost workforce professions.³⁸ Because of Massachusetts' record of high healthcare expenditure increases, Eibner et al. increased the \$77 difference at 5.72% per year over their 11-year forecast period. We increased annual wages of each provider based on CPI-U forecasts, which averaged 2.4% per year. In addition, a small portion of the difference is attributed to our assumption that NPs and PAs were moderately less productive than physicians. Second, Eibner et al.'s model included all office visits, while our model only included office visits provided by primary care physicians, NPs or PAs.

Barriers to Increasing the Use of Nurse Practitioners and Physician Assistants

The barriers to increasing NP and PA shares of office visits to primary care clinicians include state regulatory requirements, such as physician supervision of these workforce professions, which may indirectly reduce their ability to be reimbursed directly and be empaneled as primary care providers. We do not find evidence of supply constraints. Under the Forum Vision scenario, which includes a higher adoption of Accountable Care Organizations with a global budget, there will be a greater financial incentive to increase the use of NPs and PAs.

Supervision Requirements

In the United States, NPs can practice in three different roles depending on the state: independently without physician involvement (18 states and the District of Columbia); with written documentation of physician involvement to prescribe, but physician involvement is not required to diagnose and treat patients (eight states); and with written documentation of physician involvement to prescribe as well as to diagnose and treat patients (24 states).³⁹ California is in the third category, and a physician can supervise up to four NPs who prescribe medications.⁴⁰

A PA's practice is either determined by the state or is delegated to the supervising physician. Five key affected practice areas include the following: prescription authority, scope of practice, adaptable supervision, chart co-signature, and ratio of PAs to supervising physician.⁴¹ California delegates three of these practice decisions to the supervising physician, but it mandates chart co-signatures and limits physician supervision to a maximum of four PAs.⁴² It is not clear whether these requirements decrease the use of PAs in California. In 2007, Assembly Bill 3 "California Physician Team Practice Improvement

³⁸ In Medicare, NPs and PAs can bill under the physician's billing number at 100% of the physician's rate, if the service is incidental to the physician's service and they are under the physician's supervision (Rickard (2009)). Therefore, there would be no expenditure difference, even with the lower cost of providing these services by NPs and PAs.

³⁹ Pearson L.J. (2012). Of the 24 states that require physician involvement to prescribe or to diagnose and treat patients, written documentation of the relationship is not required to diagnose and treat patients in four of the states.

⁴⁰ Christian, et al. (2008).

⁴¹ American Academy of Physician Assistants (2012).

⁴² Nineteen states do not mandate chart co-signatures, and nine states do not mandate a maximum ratio restriction.



Act” relaxed some state mandates, increasing from two to four the number of PAs a physician could supervise and allowing PAs to issue drug orders for Schedule II to Schedule V controlled substances. But the law also stipulated that PAs could make these prescriptions only if protocols were established by the supervising physician, and only if the PA completed certain educational requirements.

Reimbursement and Empanelment

NP and PA reimbursement levels and policies by private and public payers vary across states.⁴³ In some states, private commercial payers are required to reimburse NPs and PAs at the physician rate and/or require the reimbursement be paid directly to the NP or PA. California does not have either of these requirements, which may potentially contribute to the state’s relatively low use of NPs and PAs. Medicare generally reimburses NPs and PAs at 85% of a physician’s rate, if they bill under their own Medicare number. If the treatment is incidental to that provided by a physician, they can bill at 100% of the physician’s rate if they are under the physician’s supervision. Medi-Cal reimburses at 100% of a physician’s rate, but the reimbursement can only be made to the employing physician, organized outpatient clinic, or hospital outpatient department.⁴⁴

Although reimbursement levels and policies are important, reimbursements depend on a strong demand for NPs and PAs, which is affected by empanelment policies of managed care organizations (MCO). In 2005, 2007, 2009 and 2011, the National Nursing Centers Consortium conducted a telephone survey asking the 10 largest MCOs offering health maintenance organization products in each state if they credentialed NPs as primary care providers.⁴⁵ Between 2007 and 2011, the share of MCOs outside of California that credentialed NPs increased from 53% to 75%; however, the share in California was lower and has been flat at about 40%.⁴⁶ The demand for NPs could be increased if more managed care organizations for commercially insured patients empaneled NPs, because more patients would have the opportunity to select them, and indeed might do so if their resulting cost sharing payments were lower.⁴⁷ The demand for PAs could be increased if managed care organizations for commercially insured patients empaneled PAs directly, or else allowed primary care physicians to increase their patient panel size if they were being supported by PAs. Medi-Cal allows NPs and PAs to be empaneled to provide primary care services, but their panel is restricted to 1,000 patients versus 2,000 for physicians.⁴⁸

Potential Supply Barriers

Overall, there seems to be a sufficient supply of NPs and PAs in California to increase their shares of office visits to primary care clinicians. Based on California having approximately 15,000 NPs and 2,500 PAs working in primary care, these workers could provide approximately 51 million to 60 million visits

⁴³ Chapman, et al. (2010).

⁴⁴ California Department of Health Care Services (2010).

⁴⁵ Hansen-Turton, et al. (2008).

⁴⁶ National Nursing Centers Consortium (2012).

⁴⁷ In California, Medi-Cal allows nurse practitioners to be empaneled in their managed care contracts.

⁴⁸ Medi-Cal Managed Care Division (2011).



per year, far more than the 23 million visits under the Forum Vision scenario in 2022.⁴⁹ Moreover, as of 2010, approximately one quarter of licensed NPs were not working as an advanced practice registered nurse (e.g., as an NP).⁵⁰ If some of these licensed NPs became employed as NPs, more patients could be provided services by them. However, an increase in demand for NPs would be needed to induce them back into the role of NP. In the United States as a whole, the number of NPs who self-identify their positions as NPs is projected to increase by 130% between 2008 and 2025, from 86,000 to 198,000.⁵¹ If California increased its demand for NPs, some NPs in other states might migrate into California. This projection may be high if the American Association of Colleges of Nursing's recommendation that the APRN education level be increased from a master's to a doctorate degree by 2015 is adopted.⁵²

In the United States, the number of clinically active PAs is expected to increase by 72% between 2010 and 2025, from 74,500 to 128,000.⁵³ If California increased its demand for PAs, some PAs in other states might migrate into California. The California Academy of Physician Assistants notes the state-generated supply of PAs in California is limited by the number of clinical training sites. The number of sites could be increased if Song-Brown training funds were made available to community clinics to train primary healthcare teams.⁵⁴

Limitations

The assumptions used to estimate expenditures reductions from increasing the use of NPs and PAs have six limitations that should be noted. First, estimates are based on the annual wage difference between those workforce professions and primary care physicians. In the long run, the wage difference reflects supply-side factors, principally the longer education and post-education training required for physicians. If wage costs are reduced, it does not mean reimbursement rates would necessarily decrease by the same proportion, particularly in the short run. However, in the long run, when a medical group negotiates reimbursement levels with private payers, it might be willing to accept a lower reimbursement if more NPs and PAs were being used, particularly if its competition was doing the same thing. With respect to Medicare Part B, physician reimbursement rate increases are supposed to be aligned with increases in the U.S. gross domestic product, as also known as the Medicare Sustainable Growth Rate (SGR). However, during most of the past decade, the U.S. Congress has over-ridden the proposed rate cuts necessary for SGR. If medical groups increased the use of NPs and PAs, then Part B rates might have to increase less, better enabling the program to meet the SGR.

Second, because NPs and PAs can provide services at a lower cost, if that reduction is passed onto patients, there will likely be an increased demand for services. Depending on the elasticity of demand,

⁴⁹ The 51 million to 60 million figure is based on 15,000 NPs and 2,500 PAs providing 80%-95% of 3,626 visits per year, the average for primary care physicians. For more information, see Wage and Productivity Differences section.

⁵⁰ Spetz, et al. (2011).

⁵¹ Auerbach (2012).

⁵² Bellini, et al. (2012).

⁵³ Hooker, et al. (2011). This forecast is for all PAs, not just PAs projected to practice in primary care.

⁵⁴ Anderson (2013).



this could result in increased healthcare expenditures. However, this effect will be minimal for insured patients with low cost sharing.

Third, the estimates assume that an increasing number of patients are willing to have NPs and PAs provide their primary care services in California. This may indeed be the case, as NPs and PAs are already providing these visits in other states at the proposed shares. However, patient preferences likely differ around the country. Notwithstanding, reference pricing and value-based insurance designs could provide a financial incentive for patients to have NPs and PAs provide more of their primary care services.

Fourth, if NPs and PAs provide a higher share of office visits to primary care clinicians, it is important that they see patients with conditions that do not require a primary care physician. In a team-based practice that includes physicians as well as NPs and PAs, the NPs and PAs could focus on seeing established patients and consulting with a physician on complex cases. The decision criteria for how patients would be divided between physicians versus NPs or PAs in a team practice could be determined by that team, based on its particular relationships and experiences. Retail clinics cater to patients with routine conditions, so increasing the number of retail clinics may increase the number of primary care visits provided by NPs and PAs. However, it is important that these clinics do not lead to uncoordinated care, although that can be avoided with certain medical group-retail clinic models.⁵⁵

Fifth, by assuming NPs and PAs provide 80-95% of the number of visits that a physician would provide in a given amount of time, our healthcare reduction estimates accounted for the possibility that NPs and PAs may not be as productive as physicians,⁵⁶ or may use more resources.^{57,58} The 80%-95% factor could be further refined for specific healthcare settings with different physician/non-physician clinician team arrangements.

Sixth, we estimated healthcare expenditure reductions for the increased use of NPs and PAs only in primary care. These reductions could be greater if the analysis was expanded to include specialty care, particularly for PAs. The estimate could be even further expanded to include other less-expensive health workforce professions, such as optometrists, pharmacists, nurse anesthetists and midwives, marriage and family therapists, physical therapists, and paramedics.⁵⁹

Conclusion

Increasing the use of nurse practitioners and physician assistants within primary care could reduce California's healthcare expenditures; however, the reduction would be modest during 2013-2022. If

⁵⁵ Pollack, et al. (2010).

⁵⁶ Gryzbicki, et al. (2002).

⁵⁷ Hemani, et al. (1999).

⁵⁸ Hooker, et al. (2001).

⁵⁹ Dower, et al. (2007).



their shares of visits to primary care clinicians continued to increase beyond 2022, the potential for additional healthcare expenditure reductions would increase.

Acknowledgements

We are very grateful for the comments we received on this memorandum from the following individuals: Joanne Spetz, PhD, FAAN, Professor, Philip R. Lee Institute for Health Policy Studies & School of Nursing Faculty Researcher, Center for the Health Professions, University of California-San Francisco; Christine Eibner, Ph.D., Economist, RAND Corporation; and Christine M. Everett, PhD, MPH, PA-C, Health Innovation Program, University of Wisconsin-Madison. We also very much appreciate the comments and data provided by individuals within professional associations in California, including the following: Teresa Anderson, MPH, Public Policy Director, California Academy of Physician Assistants, and Surani Hayre-Kwan, MSN, RN, NP, Past President, California Association for Nurse Practitioners. These individuals do not necessarily endorse or agree with all the content within this memorandum.



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**A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM:
Integrated Care with Aligned Financial Incentives**

**Appendix X. Healthcare-Associated Infections
(Initiative Memorandum)**

APRIL 2013

<http://berkeleyhealthcareforum.berkeley.edu>





Appendix X. Healthcare-Associated Infections (Initiative Memorandum)

See “Appendix IV: Introduction to Appendices V-XI” for brief background on this Appendix.

Executive Summary

Healthcare-associated infections (HAIs) are infections that patients develop during the course of receiving treatment for other conditions. HAIs are the most common complication of hospital care, occurring in approximately one in every 20 patients. Because almost all facilities in California already have a plan in place for preventing HAIs, this policy option would provide financial support to improve staff training and ensure the full implementation of these existing plans. Our model assumes an intervention to target five common HAIs: Central line-associated blood stream infection, methicillin-resistant *Staphylococcus aureus*, *Clostridium difficile* infection, vancomycin-resistant *Enterococci* and surgical site infection. Under the “Current Developments” scenario, we estimate a 22% decline in HAIs over 10 years, and then estimate the resulting reduction in healthcare expenditures. For the “Forum Vision” scenario, the decline in HAI rates is estimated to be 40% over 10 years.

The cumulative reduction in spending from 2013 to 2022 will be as high as \$660 million in current-year dollars under the Forum Vision scenario, depending on the cost of the intervention. Under the mid-level assumption for the Forum Vision, there is about a \$300 million reduction. Under the Current Developments scenario, there is a \$190 million reduction when a lower intervention cost is assumed (\$28.5 million). But the cost of the intervention exceeds the reduction in spending by \$540 million when a higher intervention cost (\$85.5 million) is considered.

The Underlying Situation

HAI infections are caused by a wide variety of bacteria, fungi and viruses. They can occur in hospitals or outpatient surgery centers, as well as in other healthcare facilities, such as community clinics or dialysis centers, along with long-term care facilities such as nursing homes and rehabilitation centers.¹

One important recent development involving HAIs was the 2008 decision by Centers for Medicare and Medicaid Services (CMS) to stop paying for certain “preventable complications,” including HAIs.² Many states, including California, are required to report HAIs occurring in hospitalized patients. California’s public reporting law requires that all California general acute care hospitals report the incidence of HAIs to the California Department of Public Health (CDPH). Despite this law, public health authorities found in 2011 that facilities failed to report as many as a third of the infections that they should have.³ Another study found that a majority of these hospitals failed to report HAI rates consistently.⁴ Public health

¹ California Department of Public Health (2009-2010).

² Milstein (2009).

³ California Department of Public Health (2012).

⁴ Halpin, et al. (2011).



authorities attribute underreporting to confusion resulting from the complex instructions involving identifying which infections are caused by hospital practices.⁵

Current efforts in California to prevent HAIs include multiple initiatives to train infection prevention professionals, including a program to train HAI-focused epidemiologists and to implement an HAI Prevention Collaborative.⁶ At the federal level, there are efforts to increase the use of the complex National Healthcare Safety Network (NHSN), which is a surveillance system managed by the Division of Healthcare Quality Promotion at the Centers for Disease Control and Prevention. In 2012, the Affordable Care Act provided funding for a program to train clinicians in targeting infections as a team, implementing prevention strategies through culture change, sharing experiences between facilities, measuring progress as a group and providing feedback to clinicians and staff.⁷

Previous Studies

Systematic review of the literature estimates the average U.S. costs for HAI, including human suffering, at between \$28 billion and \$45 billion per year.⁸ The wide variation is a result of the different methods used in conducting the economic analyses. Different studies may use different patient populations and study settings; or track different infections; or include only hospitalization cost; or those costs as well as outpatient expenses. Previous studies suggest that in assessing the economic impact of HAIs, it is also important to consider patients' underlying severity of illness and comorbid conditions, as well as their length of stay in the hospital prior to acquiring the infection.

Studies examining the specific cost estimate attributable to HAIs have found HAIs to be extremely expensive, and that it would be beneficial for hospitals to invest in programs to successfully control them.⁹ Previous studies have examined the effectiveness of preventing specific HAIs, such as methicillin-resistant *Staphylococcus aureus* (MRSA)¹⁰ and central line-associated bloodstream infection (CLABSI).¹¹ They found that programs with surveillance, contact precautions and culture change were associated with a decrease in infections. The studies also highlighted the importance of adequately staffed HAI prevention and control programs.¹²

Proposed Initiative

We estimate the reduction in healthcare expenditures in California from a policy option to target the following five HAIs that are required to be reported:

⁵ Jewett (2012).

⁶ Centers for Disease Control and Prevention (2012).

⁷ Ibid.

⁸ Scott (2009).

⁹ Anderson, et al. (2007); Muto, et al. (2002); Stone (2009).

¹⁰ Jain, et al. (2011).

¹¹ Goeschel, et al. (2008); Pronovost, et al. (2011).

¹² Marschall, et al. (2008).



- Central Line-Associated Bloodstream Infection (CLABSI)
- Methicillin-Resistant Staphylococcus Aureus (MRSA) Bloodstream Infection
- Vancomycin-Resistant Enterococci (VRE) Bloodstream Infection
- Clostridium Difficile Infection (C. difficile, C. diff, CDI, CDAD)
- Surgical Site Infection (SSI)

Each of these infections can be difficult to treat with conventional medicines and all of them cause significant morbidity and mortality. Because almost all hospitals in California already have departments of Infection Prevention and Control, this policy option would provide financial support to improve staff training and to ensure implementation of the interventions. Interventions will vary by facility, and clinicians should be actively involved in implementing infection control measures.¹³ The funding would provide additional resource to support otherwise unaffordable prevention products, such as data mining programs, automated hand hygiene monitoring technology and UV light units for environmental disinfection. An intervention may also include the implementation of an auditing process to improve reporting and surveillance. For facilities that already have well-developed interventions, the funding could be applied to any areas that would aid with HAI prevention.¹⁴

Modeling Approach and Assumptions

Under the Current Developments scenario, we estimate an annual 2.5% reduction in healthcare expenditures for each participating hospital from reducing the five listed HAI infections. Under the Forum Vision, the assumption is for a 5% annual reduction.

We estimate that the reporting facilities cover 86% of all inpatient beds in California.¹⁵ In 2010, CDPH reported that about 80% of facilities reported complete facility-wide data on CLABSIs, and 88% reported complete data on MRSA and VRE blood stream infections.¹⁶ We assume that all of the reporting facilities would be willing to participate in implementing the interventions. We estimated the cost of these interventions from existing literature describing both general hygiene and training programs as well as more intense prevention strategies, such as data mining, UV light units, and culturing and isolating infected patients.

Because there are existing state funds for HAI prevention initiatives, our policy option would add to these resources. In 2012, for example, \$670,000 was available to California through the Affordable Care Act.¹⁷ We assume that the impact of the additional funding will vary by facility, given that some may have already implemented many of the prevention protocols or achieved lower infection rates.

¹³ Goeschel, et al. (2008).

¹⁴ Individual facilities will have discretion in how they use the funding, whether it be to expand existing programs or to buy surveillance technology to improve data collection.

¹⁵ California Department of Public Health (2009-2010).

¹⁶ California Department of Public Health (2012).

¹⁷ Centers for Disease Control and Prevention (2012).



Number of affected patients

Table 1 shows the number of HAI cases, as reported by the CDPH.¹⁸ For status quo numbers, we assume that without the intervention, there would be no reduction in the number infections by 2022.

For our model, we assume that all general acute care hospitals with more than 60 inpatient beds will implement an HAI prevention program, for a total of 370 facilities.¹⁹

Table 1. Number of HAI and Estimated Cost of Infection in California for One Reporting Year (2011)²⁰

HAIs	Number of cases	Associated cost per infection ²¹
CLABSI	3,163	\$33,400 ²²
MRSA	869	\$9600 ²³
CDI	13,968	\$9200 ^{24,25}
VRE	831	\$33,500 ²⁶
SSI ²⁷	1,395	\$24,200 ²⁸

Intervention Penetration Rates

The objectives of Healthy People 2020 include reducing CLABSI and MRSA infection by 70%.²⁹ After reviewing the feasibility of reducing HAIs in California, we set a goal for 2022 of reducing CLABSIs, MRSAs and three additional HAIs by 22% under the Current Developments scenario and by 40% for the Forum Visions scenario.

Intervention Cost

When we estimate the cost per facility, we considered the number of inpatient beds. We estimate that the average cost of the intervention for facilities with fewer than 200 beds will be half of what it would be for facilities with more than 200 beds.³⁰ We estimate that in California, there are 170 facilities with fewer than 200 beds and 200 facilities with more than 200 beds.³¹ The lower cost estimate for the intervention is between \$50,000 and \$100,000, and the upper cost estimate is between \$150,000 and \$300,000.

¹⁸ California Department of Public Health (2012).

¹⁹ Extrapolated from the number of facilities reporting HAIs; California Department of Public Health (2011).

²⁰ Ibid.

²¹ Associated costs were estimated from various sources and converted to 2012 dollars using the Consumer Price Index growth rate.

²² Pronovost, et al. (2006); Warren, et al. (2006).

²³ From communications with the Infection Prevention and Control Quality and Safety Department at Kaiser Permanente. Cost estimates are based on published data for California.

²⁴ Scott (2009).

²⁵ From communications with the Infection Prevention and Control Quality and Safety Department at Kaiser Permanente. Cost estimates are based on published data for California.

²⁶ Muto, et al. (2002).

²⁷ Surgical site infections are reported for cardiac, gastrointestinal, and orthopedic procedures.

²⁸ Anderson, et al. (2007); Scott (2009).

²⁹ Healthy People 2020 (2011).

³⁰ A survey involving infection control cost showed that facilities with more than 220 beds spent, on average, twice as much as facilities with fewer than 220 beds; Anderson et al. (2007).

³¹ Office of Statewide Health Planning & Development (2010-2011).



The cost of the intervention:

Lower cost: $(170 \text{ facilities} \times \$50,000) + (200 \text{ facilities} \times \$100,000) = \$28,500,000$

Upper cost: $(170 \text{ facilities} \times \$150,000) + (200 \text{ facilities} \times \$300,000) = \$85,500,000$

We assume that all facilities with more than 60 beds will implement the intervention and will have the associated intervention cost. We estimate that there are 370 acute care hospitals in California with more than 60 beds.³² This is approximately equal to the number of California facilities that report HAIs.

Estimated Reduction in Expenditure

The status quo spending amount assumes that the number of HAIs will remain unchanged. The reduction in expenditure is estimated from the annual HAI reduction of 2.5% (Current Developments scenario) or 5% (Forum Vision scenario).

The cost estimates in Table 1 consider only the direct costs, and may underestimate the true cost of specific HAIs. The direct cost reflects the cost associated with increased length of hospital stay, but excludes other costs, such as the cost of readmission or costs involving rehabilitation or lost wages.

The lower bound estimates assume a higher cost of implementing an intervention (\$85.5 million) and the upper bound estimates assume that the cost will be lower (\$28.5 million). We project that these costs will grow at the per capita healthcare growth rate.

The reduction in expenditures is the status quo expenditures minus the sum of projected expenditures (under Current Developments or Forum Vision scenarios) and intervention cost (lower and upper bound estimates).

Estimated Impact

Table 2 shows that under the Current Developments scenario, the total reduction in spending will be \$190 million in current-year dollars from 2013 to 2022 under the lower intervention cost assumption. The cost exceeds the reduction in spending by \$540 million when a higher intervention cost is assumed in the lower bound estimate. In 2022, the cost of the intervention exceeds the reduction in spending under the lower bound assumption, resulting in an increase in spending of about \$20 million. In the same year, the upper bound assumption shows that there is a reduction in spending of about \$70 million.

Table 3 shows that under the Forum Vision scenario, the cumulative reduction in spending could be as much as \$660 million from 2013 to 2022, which is about 0.02% of total state healthcare expenditures. This assumes the infection rate will be reduced by 5% annually. The lower bound Forum Vision estimate shows an increase in spending of about \$70 million from 2013 to 2022. The mid-level assumption shows

³² Ibid.



that the cumulative reduction in spending from 2013 to 2022 will be \$300 million, or about 0.01% of total healthcare expenditures.

Estimated Healthcare Expenditure (2013-2022)

Table 2: Healthcare Expenditure Reduction Estimates Under the Current Developments Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	-\$0.08	-\$0.02	-\$0.02	\$0.07	-\$0.54	-\$0.18	\$0.19
Expenditure Reduction (%)	-0.02%	-0.01%	-0.004%	0.01%	-0.01%	-0.004%	0.004%

Table 3: Healthcare Expenditure Reduction Estimates Under the Forum Vision Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	-\$0.07	-\$0.01	\$0.07	\$0.16	-\$0.07	\$0.30	\$0.66
Expenditure Reduction (%)	-0.02%	-0.004%	0.01%	0.03%	-0.002%	0.01%	0.02%

Discussion

Experts suggest that HAI infection rates can be lowered by infection prevention and control policies and practices, such as assuring that staffing levels are adequate and staff members are well trained. Also important is effective hand hygiene and proper disinfection of medical devices. Better reporting and monitoring systems will also lower HAI infection rates.

Our estimates indicate that it is difficult to reduce healthcare spending via HAI prevention efforts because the intervention cost per facility may exceed the savings from reducing infections. It is important to note that our estimates include only costs associated with hospitalization. It is possible that a higher savings estimate would be attained if one also considered the costs associated with long-term medical expenses or with lost productivity.

There are several limitations to our estimates. First, the cost estimates of HAI infections come from studies that were conducted in limited settings, involving either a specific region or a single hospital, and may not necessarily reflect the conditions in California. Second, the cost of the intervention is an estimate extrapolated from a previous study that surveyed facilities about their HAI prevention efforts. We make an assumption that larger facilities will have higher intervention costs, but do not account for the facility-specific interventions that may already be in place. Lastly, there are other types of HAI infections not considered in our estimates that may also be lowered by the suggested interventions.



Acknowledgements

We are very grateful for the comments we received on this memorandum from Peter J. Pronovost, MD., Professor in the Departments of Anesthesiology/Critical Care Medicine and Surgery & The Department of Health Policy & Management at The Johns Hopkins University School of Medicine; Pat W. Stone, Ph.D, RN, *Director of the Center for Health Policy & Centennial Professor in Health Policy at Columbia University, School of Nursing; and Sue Barnes, RN, CIC, National Leader, Infection Prevention and Control, Quality and Safety Department at Kaiser Permanente.* These individuals do not necessarily endorse the contents of this memorandum.



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**A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM:
Integrated Care with Aligned Financial Incentives**

**Appendix XI. Preterm Births
(Initiative Memorandum)**

APRIL 2013

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Appendix XI. Preterm Births (Initiative Memorandum)

See “Appendix IV: Introduction to Appendices V-XI” for brief background on this Appendix.

Executive Summary

Preterm births, defined as babies born before 37 weeks of gestation, occur in about 12% of all U.S. pregnancies and are one of the leading causes of infant death. The U.S. preterm birth rate peaked in 2006 at 12.8%, and dropped to less than 12% in 2010. California’s 2011 preterm rate of 9.8% was already one of the lowest in nation. In this appendix, we estimate the effect of implementing an initiative to reduce it even further.

We estimate that the initiative will target about 20% of all births in California, in order to reach high-risk pregnancies and provide medical and social services to improve prenatal health and birth outcomes. With the initiative, at-risk mothers will be given access to a variety of services and initiatives, including medical and mental healthcare as well as education programs warning of the dangers of smoking, alcohol and illicit drug use during pregnancy.

Under the “Current Developments” scenario, the cumulative reduction in spending is about \$20 million by 2022 in current-year dollars, but only under the lower initiative cost assumption. The cost of the initiative exceeds the reduction in spending under the higher initiative cost assumption. This scenario assumes the initiative will either prevent preterm births entirely, or else increase the gestational age, in 4% of California births in 10 years. Under the “Forum Vision” scenario, the cumulative reduction in spending through 2022 is estimated to be about \$130 million in current-year dollars, but only under the lower initiative cost assumption. This scenario estimates that the initiative will prevent preterm births or increase the gestational age in about 6% of births in 10 years. The cost of these initiatives are modeled at \$150 and \$400 per woman.

The Underlying Situation

Premature infants may have health complications such as low birth weight, breathing problems and increased susceptibility to life threatening infections.¹ Premature babies often spend weeks or even months in a neonatal intensive care unit.² And they face a greatly increased risk for such lifelong challenges as intellectual disabilities, cerebral palsy, vision and hearing loss and digestive problems.³

Common risk factors that can increase the chance of preterm birth include a history of preterm births, multiple births, smoking during pregnancy, inadequate prenatal care, short inter-pregnancy intervals, and births to either adolescents or women over age 35.⁴ African American infants are 1.5 times more

¹ National Institute of Child Health & Human Development (2011).

² Centers for Disease Control and Prevention (2012).

³ Ibid.

⁴ California Department of Health Care Services (2010).



likely to be born prematurely than infants who are not African-American.⁵ Higher preterm rates also have been associated with a lack of high school education in mothers, and with mothers who have had two or more previous births.⁶

The U.S. preterm birth rate peaked in 2006 at 12.8%, but dropped to less than 12% in 2010.⁷ The March of Dimes attributes the improvement to better hospital practices that discourage the sorts of early, non-medically indicated elective deliveries that can result in premature births. The March of Dimes set a goal of lowering the national preterm birth to 9.6% of all births by 2020.⁸ They hope to achieve this by increasing healthcare access to women of childbearing age, implementing effective initiatives such as preconception and early prenatal care, providing progesterone treatments for women who are medically eligible, encouraging pregnant women to stop smoking, and discouraging elective Cesarean-sections and induction before 39 weeks of pregnancy.⁹

Recently, there has been a focus on preventing late preterm births, defined as those three to six weeks early or after 34 to 36 weeks of gestation. Despite the evidence that even babies born late preterm are less healthy, the number of births and induction of labor preterm has been increasing.¹⁰ Induced labor preterm births increased from 7.5% to 17.3% between 1990 and 2006; and late preterm births delivered through C-section rose from 23.5% to 34.3% during the same period.¹¹ The change in preterm rates from 2000 to 2010 is mainly due to the number of late preterm deliveries between 34 to 39 weeks. Although the percentage of babies born full-term (40 weeks) has remained steady from 2000 to 2010 in California, births between 34 to 39 weeks gestation has increased from 53% to 62% during this time.¹² Currently there is an emphasis on preventing induction and C-sections prior to 39 weeks without a medical reason. An increase in elective C-section or elective induction of labor between 34 and 36 weeks, which are not recommended under any circumstances, may have partly contributed to the increase of late preterm births.¹³

California's preterm birth rate was 9.8% in 2011, lower than the national rate of 11.7%.¹⁴ In 2011, both the national and California preterm birth rate fell for the fifth straight year.¹⁵ Figure 1 shows the rate of preterm births for California and the United States from 1999 to 2011.¹⁶ Since 2006, the preterm rate for Hispanic infants has declined more slowly than it has for non-Hispanic white and black infants (a 5%

⁵ March of Dimes Foundation (2010).

⁶ California Department of Health Care Services (2010).

⁷ Centers for Disease Control and Prevention (2010).

⁸ March of Dimes Foundation (2010).

⁹ Ibid.

¹⁰ National Business Group on Health (2012).

¹¹ Ibid.

¹² Centers for Disease Control and Prevention (2010).

¹³ Bettegowda, et al. (2008); Fuchs, et al. (2006).

¹⁴ Hamilton, et al. (2012).

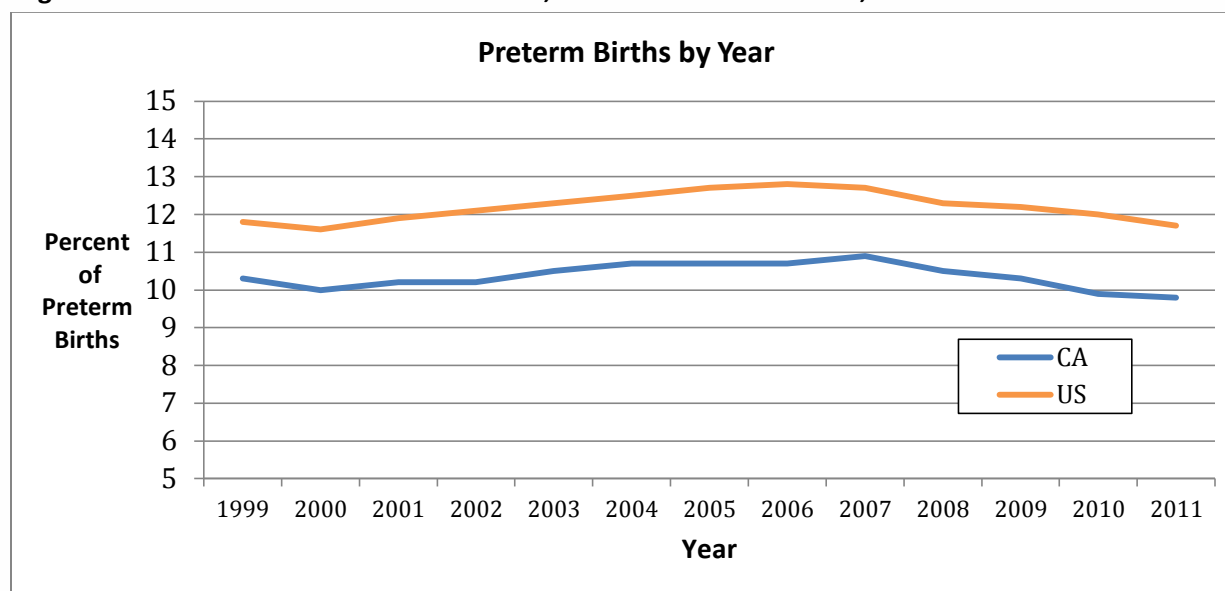
¹⁵ Martin, et al. (2012).

¹⁶ Not shown in Figure 1, but there was a growth in preterm rates due to increase in multiple births associated with the use of Assisted Reproductive Technology (ART) in the 1980's. This affected preterm rates across the entire range of preterm births. While the use of ART continues to grow, this trend of multiple births, especially high-order multiples, has leveled off in recent years due to improvement in treatment technology; National Institute of Child Health & Human Development (2012).



decline compared to declines of 8% and 9%, respectively).¹⁷ The preterm rates in 2011 for non-Hispanic black infants were lower than they have been for 30 years.¹⁸

Figure 1: Percent of Births that are Preterm, in the U.S. and California, 1999-2011



Source: Centers for Disease Control and Prevention/National Center for Health Statistics, National Vital Statistics System

There are several reasons for California's lower-than-average preterm birth rate. Perhaps most importantly, the prenatal care rate in California is higher than it is in most other states, with most women receiving prenatal care starting in the first or second trimester.¹⁹ California extends Medicaid coverage eligibility to all pregnant women with incomes 200% or below the federal poverty level, a more generous eligibility standard than in most states. There is an additional state program, Access for Infants and Mothers that extends coverage to women with incomes between 200%-300% of the federal poverty level.²⁰ About 47% of all births in California are covered under Medicaid (Medi-Cal), compared to about 40% nationally.²¹ Lack of access to insurance coverage was cited by several studies as the single most important barrier to prenatal care.²² Medi-Cal and other state and local programs encourage prenatal care and there are special programs directed at populations at high risk for preterm labor who lack adequate insurance. All of these factors contribute to more Californians receiving prenatal care than the U.S. average. While the Healthy People 2020 goal is for 77.9% of women to receive prenatal care beginning in the first trimester, California has already exceeded that goal (80% of California women got

¹⁷ Hamilton, et al. (2012).

¹⁸ Ibid.

¹⁹ Braveman, et al. (2003); Centers for Disease Control and Prevention (2010).

²⁰ The State of California's Access for Infants & Mothers program; <http://www.aim.ca.gov/Home/default.aspx>.

²¹ Johnson (2012).

²² Braveman, et al. (2003).



first trimester prenatal care in 2010²³). Another reason for low rates of preterm birth in California involves demographics; about half of all births in California are to Hispanics, who tend to have low preterm birth rates.²⁴ Also, smoking rates for pregnant women in California are lower than the U.S. average.²⁵

Previous Studies

Various studies have identified several risk factors for preterm births that may be addressed by appropriate interventions. They include smoking (about 5% to 7% of preterm births)²⁶, lack of prenatal care (about 3%) and inter-pregnancy intervals of insufficient duration. However, other risk factors are more complex and thus far more difficult to address. They include being African-American (about 17% of preterm births), having multiple pregnancies (about 15% to 20%),²⁷ becoming pregnant under the age of 17 or over the age 35 (about 25% to 29%),²⁸ and having had a previous preterm birth. Obesity in women of childbearing-age is also associated with poor perinatal outcomes, as is excessive maternal weight at the onset of pregnancy and excessive weight gain during pregnancy.²⁹ However, about 50% of preterm births are to women with no identified risk factors.³⁰

Although prenatal care is usually regarded as extremely important, studies show only a weak association between prenatal care and decreased risk for preterm birth. Various models of prenatal care are continually being examined to assess their effectiveness in improving perinatal outcomes. For example, the Comprehensive Perinatal Services Program in California, which is part of the Medi-Cal program, provides a wide range of culturally competent services to pregnant women from conception through 60 days postpartum, including psychosocial, nutrition and health education.³¹ An evaluation of home visiting programs found that women who were visited had fewer low birth weight newborns compared to those who were not.³² There is also some evidence of the efficacy of programs that target substance abuse, smoking cessation and teen pregnancy, and as well as programs targeted at African American women.

According to a March of Dimes report on preterm births during 2005, the average first-year medical costs for preterm infants were \$32,325, or ten times the expense associated with full-term infants (\$3,325).³³ A 2007 estimate showed that the average cost of medical care in the first year of life for a premature baby was \$49,000, compared to \$4,551 for a full-term baby.³⁴ Most of the higher cost for

²³ Centers for Disease Control and Prevention (2010).

²⁴ Ibid.

²⁵ Ibid.

²⁶ Goldenberg, et al. (2000).

²⁷ Goldenberg, et al. (2010).

²⁸ Hamilton, et al. (2012).

²⁹ Abrams, et al. (1989); Dietz, et al. (2006); Schieve, et al. (2000); Viswanathan, et al. (2008).

³⁰ Centers for Disease Control and Prevention (2012).

³¹ California Department of Public Health (2012).

³² Olds, et al. (2004); Lee, et al. (2009).

³³ March of Dimes Foundation (2008).

³⁴ Ibid.



preterm babies is the result of longer and thus more expensive hospital care. Their average length of stay is about 14 days, compared to two to five days for full-term births.³⁵

The Institute of Medicine has calculated the annual costs associated with preterm birth at more than \$26 billion, or \$51,600 for every infant born prematurely in the United States.³⁶ The components of that care are as follows³⁷:

- \$16.9 billion (65%) for medical care
- \$1.9 billion (7%) for maternal delivery
- \$611 million (2%) for early intervention services
- \$1.1 billion (4%) for special education services
- \$5.7 billion (22%) for lost household and labor market productivity

Proposed Initiative

We propose additional funding to implement initiatives that may reduce preterm births in California. We assume that the initiative will be modeled after existing programs in California that have been successful at preventing preterm births and improving prenatal health and birth outcomes. The initiative may be comprised of comprehensive prenatal care, or programs aimed at reducing barriers to prenatal care, reducing multiple gestation, increasing inter-pregnancy intervals and improving inter-conceptional care for women with medical problems. At-risk mothers can be given access to a variety of services to help prepare for healthy pregnancies as well as improve birth outcomes.

Although more than 95% of pregnant women in California reported receiving at least four prenatal visits,³⁸ there is room for improvement in the quality of that care. It is possible that if women receive prenatal care earlier in their pregnancies, healthcare providers may be better able to identify women at higher risk for preterm deliveries or adverse birth outcomes. Because smoking and drug use during pregnancy have been associated with preterm deliveries and low birth weight,³⁹ providers can identify and enroll women with these risks. The initiative may also provide necessary services for maternal depression or stress. Women who suffer from depression or stress during pregnancy are likely to exhibit behaviors that further increase the risk of preterm births and low birth weight babies, such as lack of prenatal care, smoking, substance abuse, inadequate nutrition and unhealthy weight gain.⁴⁰

There are examples of successful programs in California that serve pregnant women to promote healthy birth outcomes. For example, 31 counties participate in the Adolescent Family Life Program, which provides services to pregnant teens. This program provides approximately 3,000 adolescents each year

³⁵ Ibid.

³⁶ Institute of Medicine (2007).

³⁷ Almost two-thirds of the cost associated with preterm births was for medical care.

³⁸ Centers for Disease Control and Prevention (2010).

³⁹ Horta, et al. (1997); Kelly, et al. (2002); Robison, et al. (2012); Taylor-Robinson, et al. (2011).

⁴⁰ Bonari, et al. (2004).



with a comprehensive case management program, including prenatal and postpartum medical care, mental health care and substance abuse services.⁴¹ California's Black Infant Health (BIH) program is a group support program of 10 prenatal and 10 postnatal sessions located in the 15 areas of the state that account for 75% of African-American births.⁴²

Modeling Approach and Assumptions

The goal of the initiative is to provide the preventive services that have been shown to reduce preterm births.⁴³ In 2010, the state average percent of preterm births ranged from 8.4% to 17.6%. California at 9.8% had the fifth lowest percent, behind Vermont, New Hampshire, Alaska and Maine.⁴⁴ Without the implementation of an initiative program, it is estimated that the rate of preterm births will remain at 9.8%, the figure from 2011.

Targeted population

The initiative will target 20% of all pregnancies in California, focusing on high risk pregnancies. We assume that there will be prevention of preterm births in some cases and an increase in gestational age in others.

In the first year (2013), about 103,000 women will be receiving the initiative, a figure that increases steadily to about 110,000 women by 2022. These numbers are based on California's birth projections for the next 10 years.⁴⁵

Cost of the initiative

The cost of the initiative is estimated to be \$150 per enrolled woman under the upper bound reduction in spending estimate and \$400 for the lower bound reduction in spending estimate⁴⁶, resulting in a cost of the initiative of \$16 million and \$43 million in 2013, respectively.⁴⁷ We project that the cost of the initiative will increase at the same rate as healthcare expenditures, with the result that by 2022, the cost will be \$28 million for the lower estimate and \$74 million for the higher estimate.

Reduction in preterm births

The initiatives assume that the current downward trend of preterm birth rate will continue. Based on data from 2010, we estimate that under the Current Developments scenario analysis, 9.7% of California births will be between 24 to 36 weeks gestation in 2013. We estimate the reduction in healthcare expenditure if the number of preterm births decreases. We estimate that annually through 2022, 0.2%

⁴¹ California Department of Public Health (2012).

⁴² California Department of Public Health (2012).

⁴³ Modeling births prior to 39 weeks resulting from elective C-section or induction of labor is not the scope of this analysis. The data on costs associated with these deliveries are difficult to estimate and are different from costs associated with other preterm deliveries.

⁴⁴ Centers for Disease Control and Prevention (2010).

⁴⁵ California Department of Finance (2012).

⁴⁶ The estimate of the cost to provide healthcare to a pregnant woman is derived from the cost of managing a patient with a chronic condition and multiple needs. It is assumed that a physician or a healthcare staff would serve as a care manager, ensuring that pregnant women receive all necessary services. "Lower bound" estimates assumes a higher intervention cost, and therefore result in lower savings.

⁴⁷ Cost of intervention multiplied by targeted 20% of all births for each year.



of preterm births will be prevented and another 0.2% of preterm births will be delayed by one week. The result is an approximately 2% reduction in the number of preterm births in 10 years, bringing the rate of preterm births in 2022 to 9.5%.

Under the Forum Vision scenario, reduction in preterm deliveries will occur more quickly, decreasing at 0.3% annually and reaching 9.4% in 2022. We also estimate that annually, 0.3% of the preterm births from 24 to 36 weeks will be delayed by one week.

Targeted healthcare expenditure

We estimate the reduction in spending that will occur when preterm births are prevented as well as when they are delayed by one week.⁴⁸ For example, under the Current Developments scenario, in 2013, we estimate that 100 preterm births will be prevented and another 100 will be delayed by one gestational week. The total reduction in spending will be the sum of the estimated reduction in spending associated with each development. We estimate the costs associated with preterm births at 24 to 36 gestational weeks. To estimate the reduction in expenditure from preventing a preterm birth, we examined the cost associated with births occurring at each gestational week (24 to 36 weeks) and the proportion of preterm births that occur during those weeks. A weighted average cost per preterm birth was then estimated to be approximately \$23,000 in 2013, increasing to \$36,000 by 2022.⁴⁹

To estimate the reduction in expenditure that would result from increasing pregnancies by one gestational week, we estimated the number of preterm births that would occur at 24 to 36 weeks, and then applied the savings associated with increasing the gestational age by one week.

The cost associated with each increasing gestational week is not linear.⁵⁰ For example, delaying a preterm birth from 24 to 25 weeks is actually associated with an increase in average cost. This is because a birth at 24 weeks is less viable than a birth that occurs at 25 weeks. But delaying a birth from 29 to 30 weeks is associated with a savings of about \$23,000.⁵¹ The savings become much lower after 33 weeks of gestation; by 35 to 36 weeks, the figure is just \$2,563.⁵²

⁴⁸ Delaying preterm births will result in a change to the gestational age distribution. We assume that changes in the rates will be uniform across the entire gestational age spectrum.

⁴⁹ Projection is based on California's healthcare expenditure growth rate through 2022.

⁵⁰ Phibbs, et al. (2006).

⁵¹ Ibid.

⁵² Ibid.



Table 1: Target Reduction of Preterm Births

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Projected # of California births	515,029	519,969	523,178	525,455	535,534	543,601	545,351	547,845	549,304	551,218
Current Developments										
# of Preterm births reduced or delayed	200	403	607	813	1,034	1,259	1,472	1,688	1,902	2,119
Forum Vision										
# of Preterm births reduced or delayed	300	604	910	1,217	1,548	1,883	2,201	2,523	2,842	3,164

Estimated Impact

Table 2 and 3 show that under both the Current Developments and Forum Vision scenarios, the reduction in spending is insufficient to offset the cost of the initiative in 2013. Our estimates show only a modest reduction in spending under the upper bound scenario by 2022.

For the Current Developments scenario, which aims to prevent or increase the gestational age of 4% of preterm births, the cost of the initiative exceeds the reduction in spending through 2022. The cost exceeds the reduction in spending by \$340 million in current-year dollars under the higher initiative cost assumption (lower bound). The reduction in spending by 2022 is about \$20 million under the lower initiative cost assumption (upper bound).

Under the Forum Vision, there is cumulative reduction in spending of \$130 million from 2013 to 2022 for the upper bound estimate. The assumptions for this scenario are that the cost of the initiative is \$150 per enrollee. When the initiative cost is increased to \$400 per enrollee, the cost exceeds the reduction in spending by \$230 million. The results show that by 2022, there is about \$50 million reduction in spending under the upper bound assumption.

Table 2: Healthcare Expenditure Reduction Estimates Under the Current Developments Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	-\$0.04	-\$0.01	-\$0.02	\$0.02	-\$0.34	-\$0.16	\$0.02
Expenditure Reduction (%)	-0.012%	-0.004%	-0.004%	0.004%	-0.008%	0.004%	0.0004%



Table 3: Healthcare Expenditure Reduction Estimates Under the Forum Vision Scenario, 2013-2022

	2013		2022		2013 - 2022		
	Lower	Upper	Lower	Upper	Lower	Mid	Upper
Status Quo Expenditures (billions)	\$327.6		\$572.2		\$4,387.1		
Expenditure Reduction (billions)	-\$0.04	-\$0.01	\$0.00	\$0.05	-\$0.23	-\$0.05	\$0.13
Expenditure Reduction (%)	-0.012%	-0.004%	0.0001%	0.008%	-0.005%	-0.001%	0.003%

Discussion

The rates of preterm births have been declining in the past few years, and the rate for California is lower than the national average. The proposed initiative aims to achieve an even lower rate of preterm births during the next ten years. However, previous studies and the current estimates indicate that it is challenging to implement cost-effective strategies to improve birth outcomes. There is a lack of evidence about the effectiveness of enhanced prenatal care in preventing preterm births. And the fact that nearly half of all preterm births are not associated with any known risk factors adds to the difficulty involved in designing an initiative to significantly reduce their number.

In estimating our model, we considered the reduction in spending associated with delaying preterm births. There are differences in costs associated with gestational age at birth, and delaying preterm births even by couple of weeks can result in a significant reduction in expenditures. For example, a birth at 24 weeks can cost more than 100 times a birth at 37 weeks. At 34 weeks, the cost is about triple the cost at 37 weeks. The challenge is that the earliest births are the most difficult to prevent. Therefore, we estimate the reduction in spending not only from preventing preterm births, but also from delaying births until later in the gestation period.

There are several limitations in modeling the initiative. First, we do not specify the details of the initiative, but we assume it will include strategies that focus on both medical and social services. Second, our models are based on only one set of cost estimates from one source. Third, we consider only hospital costs, and do not include other costs associated with preterm births, such as those associated with long-term health and developmental effects. All of these factors can affect the accuracy of our estimates.

Acknowledgements

We are very grateful for the comments we received on this memorandum from Jeffrey Gould, MD, Professor in the Department of Pediatrics, Stanford University; Ciaran Phibbs, Ph.D., Health Economist at the VA Palo Alto Health Care System's Health Economics Resource Center and Associate Professor in the Department of Pediatrics, Stanford University; and Elliott Main, MD., Medical Director of the California Maternal Quality Care Collaborative and Chairman and Chief of Obstetrics at California Pacific Medical Center. These individuals do not necessarily endorse the contents of this memorandum.



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A NEW VISION FOR CALIFORNIA'S HEALTHCARE SYSTEM: Integrated Care with Aligned Financial Incentives

Appendix XII. Assessing California's Healthcare Spending (Brief)

APRIL 2013

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Appendix XII. Assessing California's Healthcare Spending

Summary

The Berkeley Forum report, “A New Vision for California’s Healthcare System: Integrated Care with Aligned Financial Incentives,” describes historical and projected healthcare expenditures in the state. This brief seeks to understand the factors that contribute to our level of healthcare spending by looking more closely at California’s healthcare utilization, unit costs and prices.

In 2009, California ranked ninth lowest among U.S. states in personal healthcare expenditures per capita, at \$6,238 versus the U.S. average of \$6,891.¹ The main driver of California’s lower per capita spending is the relatively low healthcare utilization in the state relative to the rest of the United States. Factors contributing to the state’s lower utilization include a relatively large percent of uninsured,^{2,3} a younger population as well as larger Asian and Latino populations.⁴ In addition, California has a long history of HMOs with risk-based payments and integrated care, which further contributes to the state’s lower-than-average healthcare utilization.

In contrast to its lower relative utilization, California has high unit costs compared to the rest of the country. There are several reasons for this. First, because the California system emphasizes the use of lower-cost settings whenever possible, those patients actually admitted to full-service hospitals are likely to have more acute conditions that are more expensive to treat. Second, California is in general expensive; the state’s cost of living is 20% to 30% higher than the national average. Another important element of California’s high unit cost is the relatively low supply and high wages associated with the state’s non-physician workforce. Finally, California hospital costs are likely higher because of regulations unique to the state, such as robust seismic building codes and mandatory minimum nurse-to-patient staffing ratios.

Healthcare costs are the major determinant of California’s health insurance premiums. However, over the past decade, employer-sponsored insurance (ESI) premiums in the state have grown significantly faster – at 1.6 times the annual rate, on average – than overall healthcare expenditures.⁵ The increase in commercial premiums is the result not only of the underlying cost of providing healthcare, but also other factors, notably the cost-shifting that results from uninsured patients and low Medi-Cal reimbursement as well as the presence of large provider groups with strong negotiating leverage. California has some of the most generous insurance mandates in the country along with a higher

¹ Centers for Medicare & Medicaid Services (2009) and Cuckler, et al. (2011). CMS releases state-level data on personal healthcare expenditures, rather than total healthcare expenditures (which also include the net cost of private health insurance, government healthcare administration costs, government public health activities and healthcare investments). As a point of comparison, at the national level in 2009, personal healthcare expenditures per capita were \$6,891, or 84% of the \$8,163 in total healthcare expenditures per capita.

² California Healthline (2012).

³ Hadley, et al. (2008).

⁴ U.S. Census Bureau (2012a).

⁵ See Appendix III: “California Cost Curve, Healthcare Expenditures and Premiums Projections (Methodology)” for more detail.



penetration of HMOs, which tend to have lower cost-sharing. These two factors likely result in richer benefit packages, but higher commercial premiums.

Selected factors that affect utilization

Overall, California has significantly lower utilization than other states. For example, in 2010, California's unadjusted rates of hospital admissions and inpatient days were 79% and 74%, respectively, those of the rest of the country.⁶ There are numerous factors that explain such utilization trends, including a high uninsured rate, the state's unique demographics and the impact of managed care and the delegated model.

High Uninsured Rate

According to the U.S. Census Bureau, California had the ninth-highest uninsured rate in the country in 2010.⁷ A recent study showed that one in five non-elderly Californians were uninsured in 2009, greatly reducing their ability to access care.⁸ Approximately two in five uninsured California children, and half of uninsured adults, reported not seeing a healthcare provider in the prior year, about four times the rates of their counterparts with employer-based insurance.⁹ Uninsured Californians, on average, utilize fewer healthcare services, with lower rates of regular or frequent physician or emergency room visits than the state's publicly or privately insured populations. California's uninsured also have lower rates of hospital overnights than the state's publicly insured populations.¹⁰ One study estimates that even including uncompensated care costs, the healthcare spending of an uninsured person in the United States is only 43% that of a privately-insured person.¹¹

Demographics

California has a younger population: Only 21.3% of Californians versus 24% of the entire U.S. population are over 55.¹² This contributes to California's lower rates of healthcare spending and utilization. The state also has more than twice the percent of Asians and Latinos or Hispanics, at 13.6% and 38.1%, compared to the country as a whole, at 5.0% and 16.7%, respectively.¹³ Asian and Hispanic populations generally have lower utilization rates for healthcare services, including routine care, emergency room visits and mental health care.¹⁴ We analyzed the Medical Expenditure Panel Survey – Household Component (MEPS-HC) for California between 2005 and 2009, and found similar results (See Table 1) even after controlling for socioeconomic, demographic and health status factors. Specifically, California Latinos and Asians had 78% and 61% the rate of physician visits, respectively, and Asians only had 43% the rate of emergency room visits, as the state's Caucasians.

⁶ Berkeley Forum analysis using Kaiser Family Foundation (2010).

⁷ California Healthline (2012).

⁸ Lavarreda, et al. (2012).

⁹ UCLA Center for Health Policy Research (2009).

¹⁰ Berkeley Forum analysis of the California Health Interview Survey (ibid.).

¹¹ Hadley, et al. (2008). Compares full-year uninsured to full-year privately insured.

¹² U.S. Census Bureau (2009).

¹³ Ibid.

¹⁴ Agency for Healthcare Research and Quality (2011).



Table 1: Healthcare utilization in California – incidence rate ratio of various races/ethnicities versus Caucasians, 2005-2009 ¹⁵

	Latino	Asian	Black
Number of inpatient discharges	0.991	0.760	1.132
Number of emergency room visits	0.944	0.433*	1.155
Number of inpatient days	1.186	0.815	1.632
Number of office-based physician visits	0.781*	0.611*	0.704*

Notes: All models controlled for gender, age, income, insurance status, number of key medical conditions and body mass index. An asterisk indicates a statistically significant difference ($p < 0.05$) between the race/ethnicity as compared to Caucasians. The models are based on negative binomial regressions and the reported statistic is an incidence rate ratio.

Source: Berkeley Forum analysis using MEPS-Household Component, 2005-2009.

Managed care and the delegated model

A major contributor to California's low utilization rates is the uniquely high adoption of managed care in the state. To account for demographic and health differences between California and the rest of the United States, we used the 2005-2009 MEPS-HC to compare utilization between California and the rest of the country, controlling for gender, age, race/ethnicity, income, insurance status, number of key medical conditions and body mass index. Table 2 shows that California's adjusted utilization is still significantly lower. Specifically, Californians' rate of inpatient discharges and inpatient days were only 76% and 83%, respectively, of the rest of the country. This provides evidence that California's healthcare system characteristics, including greater use of risk-based payments and integrated care compared to other parts of the country, may contribute to its lower utilization.

Our findings are consistent with earlier research, such as a 1996 study showing that areas of California with the highest HMO penetration were able to reduce hospital utilization over a 10-year period by 44%, compared to just 29% for the areas with the lowest HMO penetration.¹⁶ Similarly, a 1995 study showed that capitated California medical groups demonstrated lower hospital admissions and lengths of stay for non-Medicare patients, with such groups reporting average annual hospital days of 134 per thousand HMO enrollees, compared to an average U.S. rate of 297 per thousand.¹⁷

¹⁵ All analyses involving the Medical Expenditure Panel Survey in this memorandum were conducted while Christopher Whaley was a Special Sworn Status researcher of the U.S. Census Bureau at the Center for Economic Studies. Research results and conclusions expressed are those of authors and do not necessarily reflect the views of the Census Bureau. These results have been screened to insure that no confidential data are revealed.

¹⁶ Robinson (1996).

¹⁷ Ibid.



Table 2: Healthcare Utilization in California vs. Rest of the United States, 2005-2009

Healthcare Service	Incidence Rate Ratio: California vs. Rest of the U.S	Standard Error
Number of inpatient discharges	0.76***	0.04
Number of inpatient days	0.83*	0.07
Number of emergency room visits	0.78***	0.03
Number office-based physician visits	0.91***	0.02

Notes: Results are based on negative-binomial regression models, which control for gender, age, race/ethnicity, income, insurance status, number of key medical conditions and body mass index. The sample size for each model was 155,776. Asterisks indicate the significance level of the incidence rate ratio as compared to one: *p<0.05 and ***p<0.001.

Source: Berkeley Forum analysis using MEPS-Household Component, 2005-2009.

Selected factors that affect unit costs

At about \$903,000, the total annual expense per bed in a California hospital in 2010 was significantly higher than the \$711,000 figure for the rest of the country.¹⁸ What's more, adjusted hospital expenses per inpatient day were 34% higher in California (\$2,566 vs. \$1,910).¹⁹ These higher expenses are not correlated with supply or occupancy, as California also has the fourth lowest number of hospital beds per capita²⁰ and a 71% hospital occupancy rate, which is slightly higher than the U.S. average of 66%.²¹ The higher expenses are consistent with a care system focused on maintaining patients in lower cost settings. Patient admissions, when they occur, are likely to be more intense and thus more expensive. Several other factors we will explore, including the state's cost of living, its workforce mix and its regulatory framework, may also contribute to higher unit costs.

Cost of living

A major factor contributing to higher unit costs in California is the higher cost of living in the state, which leads to greater input costs for healthcare. According to an analysis by the Missouri Economic Research and Information Center using survey data from U.S. urban areas, California in 2012 had the seventh highest cost of living of the 50 states and the District of Columbia.²² This analysis estimates that California's average cost of living is 26% higher than the U.S. average. California's housing index, at 76% above the national average, is the largest contributor to this discrepancy. The Berkeley Forum constructed a similar cost of living index from 2010 data, and found that California is about 34% more

¹⁸ Berkeley Forum analysis of American Hospital Association database, American Hospital Association (2011). Statistically significant at a 95% confidence interval.

¹⁹ Kaiser Family Foundation (2012). The adjustment is described by KFF as: "Adjusted expenses per inpatient day include expenses incurred for both inpatient and outpatient care; inpatient days are adjusted higher to reflect an estimate of the volume of outpatient services."

²⁰ Ibid.

²¹ Centers for Disease Control and Prevention (2010).

²² Missouri Economic Research & Information Center (2012).



expensive than the U.S. average.²³ Our further analysis of intra-state cost of living suggests that Northern California is almost 10% more expensive than Southern California.

Workforce mix

California generally has a lower proportion of its workforce employed in the major healthcare occupations than other states – with particularly low proportions of non-physician providers.²⁴ Even with over half a million nurses, the state ranks 50th in terms of the ratio of registered nurses (RNs) to population (Table 3). As might be expected, this low supply of RNs is correlated with California's nearly top ranking for average RN wages, which are more than \$20,000 above the U.S. average, unadjusted for cost of living. Several periods of acute nursing shortages, compounded by the state's historical need to recruit nurses from outside California because of inadequate nursing school capacity, have contributed to higher nurse wages.²⁵ Also affecting wages is that fact that California has experienced increasing nurse unionization; one-half of the state's hospitals report unionized RNs in 2006 versus only one-third in 1996.²⁶ One study estimates that unionization adds approximately 8% to wages.²⁷

Similarly, California's relatively low supply of physician assistants, nurse practitioners and pharmacists leads to high relative wages for these professions, unadjusted for cost of living.²⁸ In contrast, primary care and specialist physician supply as well as overall wages in California are relatively similar to the national average.²⁹ California workforce projections for 2018 indicate that the state will continue to have low supplies of RNs relative to current U.S. averages.³⁰

²³ Cost of Living Index from the Council for Community and Economic Research, U.S. Census Bureau (2010), and population data from U.S. Census Bureau (2012b).

²⁴ For more background on workforce supply, see Scheffler (2008).

²⁵ Spetz (2004).

²⁶ Spetz, et al. (2012).

²⁷ Ash, et al. (2011).

²⁸ Non-California NP salary info was not available.

²⁹ U.S. Bureau of Labor Statistics (2011).

³⁰ Berkeley Forum analysis using California Occupational Employment Projections 2008-2018; Office of Statewide Health Planning and Development (2012).



Table 3: Supply and Annual Salary of Workforce Cadres in California vs. the Rest of the United States, 2010-2011

Variable	Pharmacists	Registered Nurses	Nurse Practitioners	Physician Assistants	Primary Care Physicians (1)	Surgeons	Anesthesiologists
Number per 100,000 population							
California	22	664	45	22	70	13	13
Non-California	28	903	60	28	63	14	10
California rank (2)	35	50	42	35	22	33	9
Number of states in sample (3)	50	51	51	50	42	50	40
Annual Wage (\$2012)			0				
California	\$96,998	\$92,830	\$92,963	\$96,998	\$187,127	\$221,040	\$226,802
Non-California	\$90,650	\$68,361	N/AV	\$90,650	\$186,716	\$232,359	\$237,125
California rank (2)	13	1	N/AV	13	24	30	24
Number of states in sample (3)	51	51	N/AV	51	41	35	34

Notes: N/AV: not available. The U.S. Bureau of Labor Statistics collects data on employees. "Employees" are all part-time and full-time workers who are paid a wage or salary. Paid owners of incorporated firms are included. The survey does not cover the self-employed, owners and partners in unincorporated firms, household workers or unpaid family workers. (1) Primary care physicians included family/general practitioners, pediatricians, internists, gynecologists/obstetricians. (2) Ranking is in descending order relative to wages. (3) Number of states is out of 51, including the 50 states plus the District of Columbia.

Sources: Nurse practitioner supply in 2011 - Pearson (2012); nurse practitioner wage in 2010 - Spetz et al. (2011); and physician assistant and primary care physician supply and wages in 2011 - U.S. Bureau of Labor Statistics (2011).

The higher wages for non-MDs correspond with significantly greater payroll expenses per bed for California hospitals (\$369,000) versus the rest of the U.S. (\$292,000).³¹ Since wages and employee benefits account for about 55% of operating expenses in California hospitals,³² the above-average compensation for healthcare workers in California hospitals is a significant contributing factor to the high unit cost of hospitalization.

Regulations

The state's regulatory requirements are another cost driver, particularly for hospitals. For example, following the 1994 Northridge earthquake, the California legislature passed new seismic safety standard requirements for state hospitals. A 2007 RAND study estimates that construction costs for seismic upgrade mandates in California could run between \$45 billion and \$110 billion in 2006 dollars (potentially double this amount including financing costs) and could add up to 50% to the cost of an adjusted inpatient day.³³ The RAND study also noted, however, that part of the cost may come from hospitals re-building facilities that are 35% – 60% larger, even though they accommodate the same patient capacity. This decision may stem from a desire to accommodate preferences for private rooms as well as provide greater space for surgery, maternal care and imaging devices.

In 2004, California became the first state to implement minimum nurse-to-patient staffing ratios in hospitals. Legislators took the step in the face of evidence that higher nurse-to-patient ratios can reduce

³¹ Berkeley Forum analysis of American Hospital Association (2011) database. Statistically significant at 95% confidence interval..

³² Office of Statewide Health Planning and Development (2010).

³³ California HealthCare Foundation (2007).



infection rates and “failure to rescue” incidents.³⁴ Initial data since implementation, however, has not yet specifically linked California’s staffing ratios to improved quality.³⁵ But these mandatory ratios may have impacted costs, as one study estimates a 16% increase in average nursing hours per patient day after the 2004 requirement,³⁶ while another study indicated that the ratios led to nurse wage increases in California approximately 12% above those in other states.³⁷

Selected factors that affect commercial health insurance premiums

While not affecting the underlying cost of providing healthcare, California’s commercial health insurance premiums are also affected by factors such as cost-shifting from low Medicaid reimbursement and the uninsured, the presence of insurer and provider groups with strong negotiating leverage, and more generous insurance mandates.

Cost-shifting

Studies suggest that providers shift costs from publicly-insured or uninsured patients to the commercially insured population. One 2006 study by Harbage and Nichols found that on account of cost-shifting, private insurance is 10% more expensive, resulting in families facing an average \$1,186 in additional annual premiums.³⁸ Several other studies confirm these findings, including a 2006 study on cost shifting in California hospitals that found that on average, 40% of Medicaid reductions in payment are shifted to commercial insurers.³⁹ While there is evidence both for and against the continued presence of cost-shifting, many observers are concerned that cost-shifting may increase after the implementation of the Affordable Care Act because of the growth expected to occur in the Medi-Cal population.

Increasing Consolidation

Since the rise of managed care in the 1970s, California has experienced market consolidation among health plans, provider groups and hospitals. The five largest health plans in California now account for about 75% of total premium revenues.⁴⁰ A national study of health plan consolidation concluded that consolidation, combined with other factors in the health insurance market such as barriers to entry, has been associated with increased premiums and profitability.⁴¹

Since the early 1990s, many California hospitals have merged into large hospital systems that negotiate with health plans collectively rather than individually. A Forum analysis of American Hospital Association data shows that California hospitals are significantly larger and more likely to be part of a multi-hospital

³⁴ Needleman, et al. (2002).

³⁵ California HealthCare Foundation (2009).

³⁶ Ibid.

³⁷ Mark, et al. (2009).

³⁸ Harbage, et al. (2006).

³⁹ Zwanziger, et al. (2006).

⁴⁰ California HealthCare Foundation (2011).

⁴¹ Robinson (2004).



system than hospitals in the rest of the United States (See Table A1 in “Additional Charts / Figures”). A similar trend is occurring with physicians. There were 35 organizations (mostly Independent Practice Associations) in California with greater than 500 physicians in 2004, but this figure grew to 65 in 2012 (See Figure A1 in “Additional Charts / Figures”).⁴²

After many years of downward movement in California hospital prices, prices increased at an average annual rate of 10.6% between 1999 and 2005.⁴³ One study of U.S. hospital mergers and acquisitions in the past two decades suggests that consolidation drives up prices.⁴⁴ Diminished competition may allow hospitals to charge higher prices, since they face a lower risk of being excluded from the insurers’ contractual networks. A recent study showed that facilities in non-competitive local markets charged higher prices and were more profitable than similar hospitals in competitive local markets.⁴⁵ Consolidation of individual physician practices can also lead to higher prices, as larger physician groups with added bargaining power can negotiate for higher capitation rates. Increasing capitation rates, leading to higher HMO commercial premiums, may be one of the reasons commercial HMO enrollment has declined in recent years.

On the other hand, there can be efficiencies to be gained through economies of scale in hospital operations. A study of the increasing formation of health systems in California identified such benefits as the potential for rationalized service delivery, improved information systems and better ability to effectively coordinate care for patients.⁴⁶ The benefits of larger integrated systems, along with some of the challenges of provider consolidation, are discussed in detail in the Berkeley Forum Report, “A New Vision for California’s Healthcare System: Integrated Care with Aligned Financial Incentives.”

Broader insurance mandates

One analysis found the average state had 29 benefits mandates versus California’s 52.⁴⁷ Since 2003, the independent California Health Benefits Review Program (CHBRP) has been required to assess the cost impact of all proposed benefit mandates. However, many of California’s benefit mandates were implemented in the 1990s, and thus no estimate of their total cost burden exists. The Congressional Budget Office has estimated that benefit mandates increase health insurance premiums by approximately 2%-3%,⁴⁸ which may be somewhat higher in California due to the state’s larger number of mandates. Although mandates cover health services that represent up to 20% of the cost of coverage, many of these services are regularly covered by insurance plans even in the absence of a mandate. Furthermore, state mandates also do not apply to the self-funded plans that cover about one-third of Californians.

⁴² Cattaneo & Stroud Inc. (2012).

⁴³ Antwi, et al. (2009).

⁴⁴ Ibid.

⁴⁵ Robinson (2011).

⁴⁶ Cuellar, et al. (2003).

⁴⁷ Laugesen, et al. (2006).

⁴⁸ Congressional Budget Office (2008).



In a separate issue, California also has a higher regulatory administrative burden for many health plans because of the existence of two regulatory bodies for health insurance: the Department of Managed Health Care and the California Department of Insurance.

Conclusion

The preceding discussion provides context on healthcare expenditures in California. However, there are several limitations to the assessment. First, this brief does not represent a comprehensive list of all factors affecting spending. Furthermore, while factors mentioned above partially explain the current level of healthcare spending in California, in fact, it is medical technology, or new or broader applications of treatments, that is principally responsible for the continuous growth in healthcare expenditures, both nationally and in California. Several studies have concluded that nearly half of all such growth can be tied to medical technology.⁴⁹ For example, one study estimated that medical technology accounted for 27%-48% of the growth in healthcare spending per capita from 1960-2007.⁵⁰ Other key factors included income growth (29%-43%) and higher medical prices (5%-19%). Changes in coverage expansion and benefit design, administrative costs and population aging also affected growth, albeit less so than the other factors. Some of these elements are inter-related; for example, higher incomes coupled with more expansive insurance coverage helps to fuel medical technology growth.

A second limitation of this brief is that while we believe that all the factors discussed here have some role in affecting healthcare expenditures in the state, we do not attempt to isolate the impact of each factor quantitatively or even relative to the other factors. Much more investigation, and the availability of new data, would be needed to do so. A final limitation is that we do not attempt to provide a cost-benefit analysis or discuss the tradeoffs of some of the above factors, such as workforce supply and compensation or specific healthcare regulations.

In 2009, California ranked ninth lowest among U.S. states in personal healthcare expenditures per capita, at \$6,238 versus the U.S. average of \$6,891. Overall, we see that California has lower than the U.S. average for healthcare utilization, most likely due a high numbers of uninsured, the state's age and ethnic composition and high HMO penetration, among other factors. In contrast, California has higher unit costs than the U.S. average, likely due to such factors as the higher overall cost of living in the state, relatively low supply and high wages of non-physician providers, and several unique regulations affecting the healthcare system. Finally, other factors such as cost-shifting from the uninsured and public to private payers, increasing market consolidation and richer benefit packages are also likely to affect Californian's health insurance premium rates.

⁴⁹ Cutler (1995); Newhouse (1992); Smith, et al. (2000).

⁵⁰ Smith, et al. (2009).



Acknowledgements

We are very grateful for the comments we received on this memorandum from the national reviewers of the main Berkeley Forum Report, “A New Vision for California’s Healthcare System: Integrated Care with Aligned Financial Incentives,” including: Timothy T. Brown, Department of Health Policy and Management, School of Public Health, University of California, Berkeley; William H. Dow, Department of Health Policy and Management, School of Public Health, University of California, Berkeley; Deborah A. Freund, Claremont Graduate University; Elizabeth McGlynn, Kaiser Permanente Center for Effectiveness and Safety Research; Cathy Schoen, The Commonwealth Fund; Tom Williams, Integrated Healthcare Association (IHA). These individuals do not necessarily endorse the contents of this memorandum.



Additional Charts / Figures

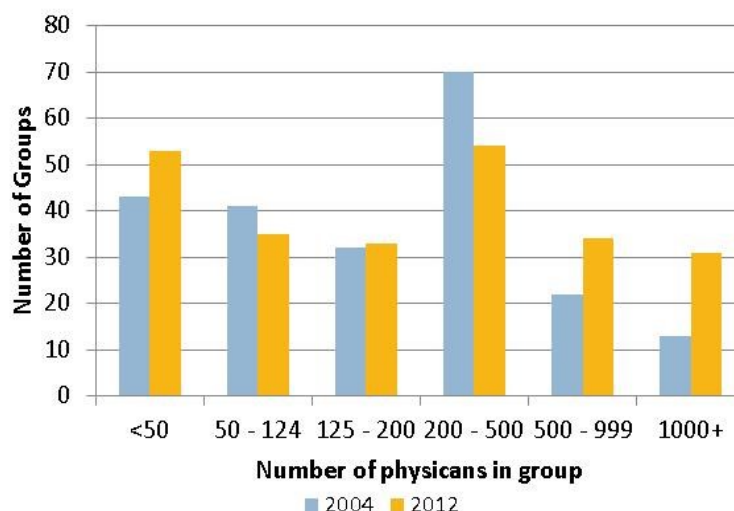
Table A1: Organizational and Payment Characteristics of California vs. Rest of U.S. Hospitals, 2011

	California	Rest of the U.S.
Hospital is a member of health system	65%	57%
Average number of hospital beds / hospital	205	150
Average number of ICU beds / hospital	22.7	17.8
Total admissions / bed per year	43	34
Contracts directly w/employers on a shared-risk / capitated basis	7.3%	2.7%
Percent of hospital net patient revenue paid on a capitated basis	2.9%	0.6%
Percent of hospital net patient revenue paid on a shared risk basis	4.8%	0.6%

Notes: Analysis was conducted at the individual hospital level with the following sample sizes: California (422) and Rest of the U.S. (5,912). All reported statistics are unadjusted means or proportions. The California results are statistically different than the Rest of the U.S. Results are all significant at ($p < 0.05$)

Source: Berkeley Forum analysis using American Hospital Association (2011) database.

Figure A1: Distribution by Practice Size of HMO-Accepting Physician Practices in California (2004, 2012)



Notes: Only includes groups with six or more PCPs and at least one HMO contract, including Medi-Cal, Medicare and commercial.

Source: Berkeley Forum analysis using Cattaneo & Stroud Inc. (2012).



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