California Health Benefits Review Program

Analysis of California Senate Bill SB 190
Acquired Brain Injury

A Report to the 2015–2016 California State Legislature

April 11, 2015

Key Findings:

Analysis of California Senate Bill SB 190 Acquired Brain Injury

Summary to the 2015–2016 California State Legislature, April 2015

CALIFORNIA HEALTH BENEFITS REVIEW PROGRAM

AT A GLANCE

Senate Bill SB 190 (introduced February 2015) would require coverage for a coordinated and particularly comprehensive service set, post-acute residential transitional rehabilitation services (PARTRS), for persons with acquired brain injury (ABI).

- **Enrollees covered.** CHBRP estimates that in 2016, 17.1 million Californians will have state-regulated health insurance that would be subject to Senate Bill SB 190.
- **Impact on expenditures.** Expenditures would increase by 0.16%, due to projected shifts in utilization among persons with ABI from other post-acute rehabilitation services to PARTRS.
- **EHBs.** Because PARTRS is *residential* and because the *residential* aspects of habilitative and rehabilitative essential health benefits (EHB) requirements are unclear, it is unclear whether SB 190 would exceed EHBs.
- **Medical effectiveness.** There is a preponderance of evidence that PARTRS is associated with outcome improvements for persons with ABI. However, there is insufficient evidence to state that PARTRS results in different outcomes than other post-acute rehabilitation services. Note: insufficient evidence is not evidence of no effect.
- **Benefit coverage.** Premandate, all enrollees with ABI have coverage for post-acute rehabilitation services, but not all have coverage for PARTRS. Postmandate, all enrollees would have coverage for PARTRS.
- **Utilization.** Postmandate, among persons with moderate-to-severe ABI who gain coverage for PARTRS, utilization by 2,500 patients would shift from post-acute skilled nursing facility (SNF)-based or outpatient services to PARTRS.
- **Public Health.** Because a shift but no additional rehabilitation is projected and because there is insufficient evidence of greater medical effectiveness for PARTRS than for the other post-acute rehabilitation services, no change in health outcomes can be projected.

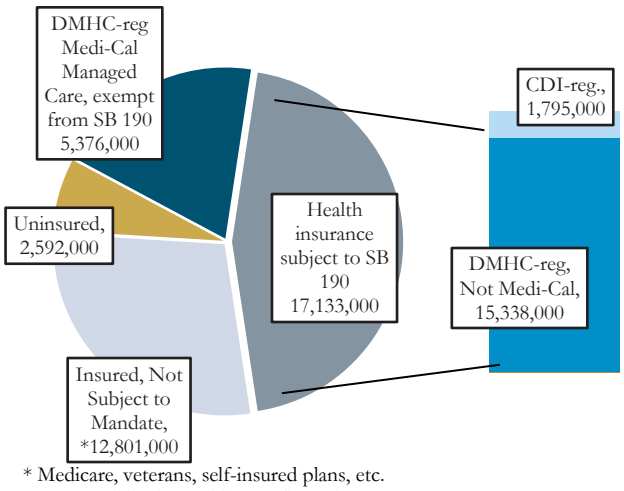
ACQUIRED BRAIN INJURY

Acquired brain injury (ABI) is a rapid onset brain injury occurring after birth. ABI excludes congenital disorders, developmental disabilities, or processes that progressively damage the brain. ABI is most frequently associated with stroke or traumatic brain injury (TBI). ABI ranges in severity, from mild concussion (requiring little or no treatment) to impairment to coma to death. Impairments suitable for rehabilitation treatment may include: physical symptoms (physical disabilities from weakness, impaired coordination, or spasticity); cognitive abilities (thinking, memory, reasoning); issues around sensory processing and/or communication; mental or behavioral health (depression, anxiety, personality changes, aggression, social inappropriateness). Acute and post-acute rehabilitation outcomes range from complete restoration of pre-injury function to permanent, severe disability.

BILL SUMMARY

As illustrated in Figure 1, SB 190 would affect the health insurance of 17.1 million Californians.

Figure 1. Health Insurance in CA and SB 190



* Medicare, veterans, self-insured plans, etc.
Source: California Health Benefit Review Program, 2015.

The number of persons with ABI among persons with health insurance subject to SB 190 is less than might be expected because age interacts with both health insurance status and the two most common sources of ABI, stroke and TBI. Stroke is most common among persons over 65 years of age, and Medicare is not subject to state-level benefit mandates. TBI is most common among younger persons, who are over-represented among Medi-Cal beneficiaries, whose health insurance is exempt from SB 190.

For persons with ABI with health insurance subject to SB 190, the mandate would require coverage for post-acute residential transitional services (PARTRS). The bill defines PARTRS as a comprehensive set of services delivered to persons who have been discharged from an acute hospital stay (so "post-acute"). PARTRS is a coordinated form of care, as are most "residential" forms of rehabilitation. SB 190 defines PARTRS as inclusive of a combination of physical/occupational/speech/respiratory therapy, prosthetic/orthotic services, rehabilitation nursing, and neuropsychology and psychology services. Some or all of the elements of PARTRS may be available through other post-acute rehabilitation services, such as skilled nursing facility (SNF)-based and outpatient. However, rehabilitation nursing and neuropsychology are not commonly available in other post-acute rehabilitation services.

SB 190 would also require that terms and conditions for PARTRS coverage be in parity with other benefit coverage and SB 190 would prohibit exclusion of adult residential facilities as PARTRS providers due to their licensure.

IMPACT OF SB 190

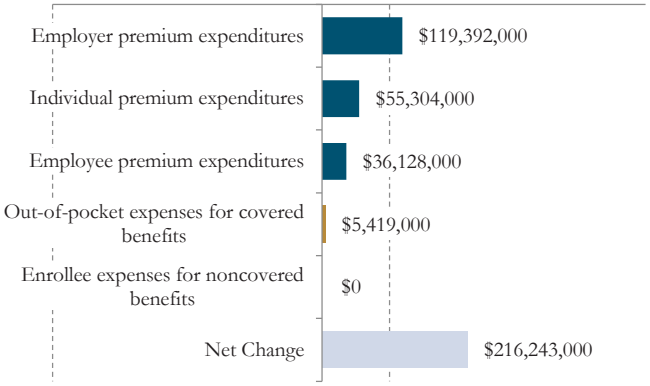
CHBRP found no evidence of terms and conditions for PARTRS coverage not being in parity with terms and conditions for other benefit coverage and so assumes the related SB 190 requirement would have no direct impact. CHBRP also found that adult residential facilities could be excluded for reasons other than licensure, and so projects no direct impact from SB 190's related prohibition.

CHBRP found that coverage of PARTRS is not universal among persons with health insurance subject to SB 190 and so projects that 83% of these enrollees would gain benefit coverage. Because these enrollees already have coverage for other post-acute rehabilitation services (outpatient and SNF-based), CHBRP projects a utilization shift among enrollees with ABI who gain PARTRS coverage, but not an increase in over-all utilization of post-acute rehabilitation services. CHBRP assumes that persons with moderate-to-severe ABI who qualify for PARTRS and who gain PARTRS coverage were already using one of the other post-acute rehabilitation services. Therefore, CHBRP projects a utilization shift—greater use of PARTRS and less use of SNF-based and outpatient rehabilitation services by 2,500 enrollees with new benefit coverage and ABI—but no greater overall use of post-acute rehabilitation.

Because the unit cost for PARTRS is higher than the unit cost for SNF-based and outpatient rehabilitation services, CHBRP projects an increase in expenditures (premiums and enrollee expenses for covered services—a.k.a. cost sharing) as a result of the utilization shift (see Figure 2).

Because the number of persons with moderate-to-severe ABI annually qualifying for PARTRS is limited and because facilities that are PARTRS-ready or near-PARTRS-ready exist, CHBRP expects that persons with new benefit coverage would find a facility providing PARTRS.

Figure 2. SB 190 Postmandate Expenditure Changes



Medical Effectiveness and Public Health Impacts

CHBRP finds insufficient evidence to suggest that a switch to PARTRS from other post-acute rehabilitation services would change health outcomes. Note: insufficient evidence is not evidence of no effect.

A Report to the California State Legislature

Analysis of California Senate Bill SB 190
Acquired Brain Injury

April 11, 2015

California Health Benefits Review Program
1111 Franklin Street, 11th Floor
Oakland, CA 94607
Tel: 510.287.3876
Fax: 510.763.4253
www.chbrp.org

ABOUT CHBRP

The California Health Benefits Review Program (CHBRP) was established in 2002 to provide the California Legislature with independent analysis of the medical, financial, and public health impacts of proposed health insurance benefit mandates and repeals, per its authorizing statute. The state funds CHBRP through an annual assessment on health plans and insurers in California.

An analytic staff in the University of California's Office of the President supports a task force of faculty and research staff from several campuses of the University of California to complete each CHBRP analysis. A strict conflict-of-interest policy ensures that the analyses are undertaken without bias. A certified, independent actuary helps to estimate the financial impact, and content experts with comprehensive subject-matter expertise are consulted to provide essential background and input on the analytic approach for each report.

More detailed information on CHBRP's analysis methodology, as well as all CHBRP reports and publications, is available at www.chbrp.org.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

Table 1. SB 190 Impacts on Benefit Coverage, Utilization, and Cost, 2016

	Premandate	Postmandate	Increase/ Decrease	Change Post-mandate
Benefit Coverage				
Total enrollees with health insurance subject to state-level benefit mandates (a)	24,557,000	24,557,000	—	0%
Total enrollees with health insurance subject to SB 190	17,133,000	17,133,000	—	—
Percentage of enrollees with coverage for PARTRS	17%	100%	83%	485%
Utilization and Cost				
Total enrollees with a moderate to high severity acquired brain injury subject to SB 190	8,800	8,800	—	0%
Total enrollees with a moderate to high severity acquired brain injuring using post-acute residential transitional rehab services	500	3,000	2,500	500%
Days of post-acute residential transitional rehab services	30,265	177,356	147,092	486%
Days of SNF-based post-acute rehab services	370,586	256,181	-114,405	-31%
Days of post-acute outpatient rehab services	124,650	91,963	-32,687	-26%
Average per-day cost of post-acute residential transitional rehab	$2,050	$2,050	$0	0%
Average per-day cost of SNF-based rehab services	$780	$690	-$90	-12%
Average per-day cost of outpatient rehab services	$90	$60	−$30	−33%

	Premandate	Postmandate	Increase/ Decrease	Change Post-mandate
Expenditures				
Premium Expenditures by Payer				
Private Employers for group insurance	$58,393,205,000	$58,503,001,000	$109,796,000	0.19%
CalPERS HMO employer expenditures (c)	$4,391,552,000	$4,401,148,000	$9,596,000	0.22%
Medi-Cal Managed Care Plan expenditures (d)	$17,667,731,000	$17,667,731,000	$0	0.00%
Enrollees for individually purchased insurance	$21,319,735,000	$21,375,039,000	$55,304,000	0.26%
Individually Purchased – Outside Exchange	$8,581,274,000	$8,608,511,000	$27,237,000	0.32%
Individually Purchased – Covered California	$12,738,461,000	$12,766,528,000	$28,067,000	0.22%
Enrollees with group insurance, CalPERS HMOs, Covered California, and Medi-Cal Managed Care (a) (b)	$18,703,917,000	$18,740,045,000	$36,128,000	0.19%
Enrollee Expenses				
Enrollee out-of-pocket expenses for covered benefits (deductibles, copayments, etc.)	$15,510,004,000	$15,515,423,000	$$5,419,000	0.03%
Enrollee expenses for noncovered benefits (e)	$0	$0	$0	0.00%
Total Expenditures	$135,986,144,000	$$136,202,387,000	$$216,243,000	0.16%%

Source: California Health Benefits Review Program, 2015.

Notes: (a) This population includes persons with privately funded (including Covered California) and publicly funded (e.g., CalPERS HMOs, Medi-Cal Managed Care Plans) health insurance products regulated by DMHC or CDI. Population includes enrollees aged 0 to 64 years and enrollees 65 years or older covered by employer-sponsored health insurance.

(b) Of the increase in CalPERS employer expenditures, about 55% or $5.3 million would be state expenditures for CalPERS members who are state employees, state retirees, or their dependents. This percentage reflects the share of enrollees in CalPERS HMOs as of September 30, 2013. CHBRP assumes the same ratio in 2015.

(c) Enrollee premium expenditures include contributions to employer-sponsored health insurance, health insurance purchased through Covered California, and contributions to Medi-Cal Managed Care.

(d) Includes only those expenses that are paid directly by enrollees or other sources to providers for services related to the mandated benefit that are not currently covered by insurance. This only includes those expenses that will be newly covered postmandate. Other components of expenditures in this table include all health care services covered by insurance.

Key: CalPERS HMOs=California Public Employees' Retirement System Health Maintenance Organizations; CDI=California Department of Insurance; DMHC=Department of Managed Health Care; PARTRS=post-acute residential transitional rehabilitation services, as defined by SB 190; SNF=skilled nursing facility.

POLICY CONTEXT

The California Senate Committee on Health has requested[1] that the California Health Benefits Review Program (CHBRP)[2] conduct an evidence-based assessment of the medical, financial, and public health impacts of SB 190, Acquired Brain Injury.

It is important to note that CHBRP's analyses of proposed bills address the bills' incremental effects—how the proposed legislation would impact benefit coverage, utilization, costs, and public health. CHBRP's estimates of these incremental effects are presented in this report.[3]

If enacted, SB 190 would affect the health insurance of approximately 17.1 million enrollees. This represents 70% of the 24.6 million Californians who will have health insurance regulated by the state[4] that may be subject to any state health benefit mandate law.[5,6] Specifically, the Department of Managed Health Care (DMHC)-regulated plans and/or the California Department of Insurance (CDI)-regulated policies, exempting Medi-Cal Managed Care, have health insurance that would be subject to SB 190.

Bill-Specific Analysis of SB 190, Acquired Brain Injury

SB 190 references acquired brain injury (ABI) and post-acute residential transitional rehabilitation services (PARTRS).

A more complete discussion of ABI and the broader "post-acute rehabilitation services," of which PARTRS is one option, is included in *Background on Acquired Brain Injury*, page 15 of this document. However, for a discussion of the language of SB 190, it is important to know that ABI is a rapid onset brain injury occurring after birth. ABI excludes congenital disorders, developmental disabilities, or processes that progressively damage the brain. ABI ranges in severity, from mild concussion (requiring little or no treatment) to severe brain injury with physical and cognitive impairments to coma to persistent vegetative state to death. Impairments suitable for rehabilitation treatment may include: physical symptoms (physical disabilities from weakness, impaired coordination, or spasticity); cognitive abilities (thinking, memory, reasoning); issues around sensory processing and/or communication; mental or behavioral health (depression, anxiety, personality changes, aggression, social inappropriateness). Acute and post-acute rehabilitation outcomes range from complete restoration of pre-injury function to permanent, severe disability, depending on the severity of the injury.

[1] Available at www.chbrp.org.
[2] CHBRP is authorized to review legislation affecting health insurance regulated by the state. CHBRP's authorizing statute is available at www.chbrp.org/docs/authorizing_statute.pdf.
[3] For CHBRP's technical approach to developing estimates, please see Appendix C.
[4] State benefit mandates apply to a subset of health insurance in California, those regulated by one of California's two health insurance regulators: the California Department of Managed Health Care (DMHC) and the California Department of Insurance (CDI).
[5] CHBRP's estimates of the source of health insurance available at: www.chbrp.org/other_publications/index.php.
[6] Of the rest of the state's population, a portion will be uninsured (and therefore will have no health insurance subject to any benefit mandate), and another portion will have health insurance subject to other state laws or only to federal laws.

Bill Language

SB 190 would define post-acute residential transitional rehabilitation services (PARTRS) and place related requirements on DMHC-regulated plans and CDI-regulated policies (exempting Medi-Cal Managed Care).

PARTRS is not a commonly used phrase, but SB 190 would define PARTRS as a treatment that utilizes an interdisciplinary, coordinated team approach in a residential facility and provides direct medical and goal-oriented treatment for a complex range of medical, physical, communicative, cognitive, neurobehavioral and psychological conditions arising from or associated with ABI. The treatment approach includes physical therapy, occupational therapy, speech therapy, rehabilitation nursing, respiratory therapy, neuropsychology and psychology services, prosthetic/orthotic services, or a combination thereof. The goal of post-acute residential transitional rehabilitation is to minimize or eliminate medical complications, reduce disability, and return the person to self-sufficiency and/or maximal possible functional independence. Post-acute residential transitional rehabilitation may be indicated for individuals who can be treated more effectively in a residential setting, or may not have had access to appropriate or adequate hospital or sub-acute rehabilitation in a long-term acute hospital or skilled nursing facility and who have any combination of the following conditions and factors due to ABI:

- Have continuing medical complexity;
- Have significant functional deficits;
- Are deemed unsafe to be discharged to his or her personal residence;
- Require continued neurobehavioral treatment; or
- Have a deteriorated medical, physical, communicative, cognitive, neurobehavioral and psychological status.

A more complete discussion of PARTRS and other forms of post-acute rehabilitation services is included in Background on Acquired Brain Injury, page 15, and the *Benefit Coverage, Utilization, and Cost Impacts, page 28* of this document. However, for a discussion of the language of SB 190, it is important to note that post-acute rehabilitation is “post-acute,” so it follows a hospital admission and is “residential” and “transitional.” Such care is often associated with skilled nursing facilities (SNFs), free-standing rehabilitation programs, and residential community reintegration programs. However, the full set of services defined as being PARTRS, particularly rehabilitation nursing and neuropsychology, are not available in all such settings.[7]

Having defined PARTRS, SB 190 would place the following requirements on DHMC-regulated plans and CDI-regulated policies (exempting Medi-Cal Managed Care).

1. require coverage of PARTRS;
2. prohibit making PARTRS coverage subject to acute care treatment lifetime days limits;
3. require that any limit on PARTRS coverage be separately stated in the plan contract/policy;
4. require that coverage for PARTRS have the same terms/conditions (including deductibles, copayments, coinsurance, annual/lifetime maximum payment limits) as other similar coverage;

[7] Personal communication, C. Spalding-Dias MD, medical director, Adult Acute Rehabilitation Unit at the University of California, Davis, Medical Center. March 2015.

5. prohibit plans and insurers that contract with or approve admission to a service provider pursuant to this mandate from refusing to contract with or approve admission to that facility to provide services that meet the specified criteria solely because a facility is licensed by this state as an adult residential facility.

The full text of SB 190 can be found in *Appendix A, Text of Bill Analyzed*.

Analytic Approach and Key Assumptions

Because stroke and TBI are associated with as much as 80% of ABI (see *Background on Acquired Brain Injury,* page 15), this analysis focuses PARTRS related to those two diagnoses.

As discussed further in *Benefit Coverage, Utilization, and Cost Impacts*, page 28, because premandate coverage for post-acute rehabilitation services is broad and because PARTRS is such a service, this analysis focuses on the way in which increasing PARTRS coverage could shift utilization. Postmandate, the overall number of enrollees using post-acute rehabilitation services is assumed not to change, but this report does project a utilization shift to PARTRS from post-acute SNF-based and outpatient rehabilitation services for a portion of enrollees with new PARTRS coverage and moderate-to-severe ABI.

SB 190's last requirement would prohibit plans and insurers that contract with or approve admissions to adult residential facilities from refusing to contract with or refusing to approve PARTRS admissions because of licensure of an adult residential facility (ARF) as an ARF. However, SB 190 does not require plans and insurers to make such contract, nor does SB 190 prohibit them from denying admissions approval based on factors other than licensure.[8,9] For example, a plan or insurer could cite prices as the reason not to establish a contract and could note the absence of a contract as the reason not to approve a PARTRS admission to an ARF. For this reason, CHBRP assumes no postmandate change related to SB 190's ARF licensure-related prohibition. CHBRP assumes that plans and insurers that premandate contracted with and approved admissions to ARFs for PARTRS will continue to do so -- and those that have not done so will not be compelled to change by SB 190.

Interaction With Existing Requirements

Health benefit mandates may interact and align with the following state and federal mandates or provisions.

State Requirements

California law and regulations

CHBRP is not aware of other state-level requirements that would directly impact the benefit coverage requirements SB 190 would add.

[8] Personal communication, D. Lowenstein, DMHC. February 2015.
[9] Personal communication, J. Yee, CDI. February 2015.

Similar requirements in other states

CHBRP is aware of requirements relevant to ABI in five other states: Hawaii, Indiana, Kentucky, Pennsylvania, and Texas. From discussions with the bill's sponsor, [10] CHBRP is aware that SB 190 has been modeled on the Texas requirement.

Federal Requirements

Affordable Care Act

The Affordable Care Act (ACA) has profoundly impacted health insurance, its financing, and regulation in California. As of January 2014, an expansion of the Medi-Cal program, California's Medicaid program,[11] and the availability of subsidized and nonsubsidized health insurance purchased through Covered California,[12] the state's health insurance marketplace,[13] significantly increased the number of people with health insurance in California.

A number of ACA provisions have the potential to or do interact with state benefit mandates. Below is a short discussion of the ACA's requirement for certain health insurance to cover "essential health benefits" (EHBs)[14] followed by a brief consideration as to how SB 190 might interact with the EHB requirement.

Essential Health Benefits

State health insurance marketplaces, such as Covered California, are responsible for certifying and selling qualified health plans (QHPs) in the small-group and individual markets.[15] Health insurance offered in Covered California is required to at least meet the minimum standard of benefits as defined by the ACA as essential health benefits (EHBs), and available in the Kaiser Foundation Health Plan Small Group Health Maintenance Organization (HMO) 30 plan, the state's benchmark plan for federal EHBs through December 31, 2016.[16,17]

States may require such QHPs to offer benefits that exceed EHBs.[18] However, a state that chooses to do so must make payments to defray the cost of those additionally mandated benefits, either by paying the

[10] Personal communication, Mark Ashley. February 2015.
[11] The Medicaid expansion, which California will pursue, is to 133% of the federal poverty level (FPL)—138% with a 5% income disregard.
[12] The California Health Benefits Exchange (Covered California) Authorizing Statute is available here: http://board.coveredca.com/meetings/2011/04%20Apr-20%20Meeting%20Materials/PDFs/California%20Codes%20Governing%20the%20Health%20Benefit%20Exchange.pdf.
[13] The ACA requires the establishment of health insurance exchanges in every state, now referred to as health insurance marketplaces.
[14] The ACA requires nongrandfathered small-group and individual market health insurance—including, but not limited to, QHPs sold in Covered California—to cover 10 specified categories of essential health benefits (EHBs). Resources on EHBs and other ACA impacts are available on the CHBRP website: www.chbrp.org/other_publications/index.php.
[15] Effective 2017, states may allow large-group purchasing through health insurance marketplaces, which may make some large-group plans and policies subject to the requirement to cover EHBs [ACA Section 1312(f)(2)(B)].
[16] The U.S. Department of Health and Human Services (HHS) has allowed each state to define its own EHBs by selecting one of a set of specified benchmark plan options. HHS Notice of Benefit and Payment Parameters for 2016. Final Rule. Federal Register, Vol. 80, No. 39. February 27, 2015. Available at: www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03751.pdf.
[17] H&SC Section 1367.005; IC Section 10112.27.
[18] ACA Section 1311(d)(3).

purchaser directly or by paying the QHP.[19] On the other hand, "state rules related to provider types, cost-sharing, or reimbursement methods" would *not meet* the definition of state benefit mandates that could exceed EHBs.[20]

SB 190 and EHBs

It is unclear whether the PARTRS coverage SB 190 would mandate would exceed EHBs. [21],[22] The language of SB 190 is complex, but at least three elements, the definition of PARTRS as "residential" and the inclusion in PARTRS of "rehabilitation nursing" and "prosthetic and orthotic services," seem to make interaction with EHBs unclear. EHBs require coverage of habilitative services and habilitative services are defined in state law,[23] but it is unclear whether such would include residential services. Similarly, California's benchmark plan covers rehabilitation services within a skilled nursing facility. However, it is unclear whether this coverage includes PARTRS requirement regarding "rehabilitation nursing." Similarly, EHBs require coverage of prosthetic and orthotic devices covered by the Benchmark plan and related regulation[24] includes a list of covered devices. However, it is unclear whether this benefit coverage includes "prosthetic and orthotic services" as would be required for PARTRS. For these reasons, it is unclear whether SB 190 would or would not trigger the ACA requirement that the state defray the cost of additional benefit coverage for enrollees in federally subsidized qualified health plans (QHPs)[25] in Covered California.

[19] As laid out in the Final Rule on EHBs HHS released in February 2013, state benefit mandates enacted on or before December 31, 2011, would be included in the a state's EHBs and there would be no requirement that the state defray the costs of those state mandated benefits. For state benefit mandates enacted after December 31, 2011, that are identified as exceeding EHBs, the state would be required to defray the cost. Patient Protection and Affordable Care Act: Standards Related to Essential Health Benefits, Actuarial Value, and Accreditation. Final Rule. Federal Register, Vol. 78, No. 37. February 25, 2013. Available at: www.gpo.gov\fdsys\pkg\FR-2013-02-25\pdf\2013-04084.pdf.

[20] Essential Health Benefits. Final Rule. A state's health insurance marketplace would be responsible for determining when a state benefit mandate exceeds EHBs, and QHP issuers would be responsible for calculating the cost that must be defrayed.

[21] Personal communication, J. Yee, CDI. February 2015.

[22] Personal communication, S. Lowenstein, DMHC. February 2015

[23] Health & Safety Code 1367.005 and Insurance Code 10112.27

[24] California Code of Regulations Title 10 2594.3(a)(4)

[25] In California, QHPs are non-grandfathered small-group and individual market DMHC-regulated plans and CDI-regulated policies sold in Covered California, the state's online marketplace.

BACKGROUND ON ACQUIRED BRAIN INJURY

This background section provides context for the analysis of the impact of SB 190 by defining ABI, describing the continuum of care for acquired brain injury (ABI) patients, including use of post-acute residential transitional rehabilitation services (PARTRS), and estimating the incidence of ABI in California.

Acquired Brain Injury Definition

A recent systematic review notes the absence of standard definitions regarding ABI and post-acute rehabilitation (Brasure et al., 2012). However, after a thorough review of the literature and consultation with content experts, CHBRP is defining acquired brain injury (ABI) as the acute (rapid onset) brain injury of any cause sustained any time after birth; it excludes "congenital disorders, developmental disabilities, or processes that progressively damage the brain" such as Alzheimer's disease (Cattelani et al., 2010). Causes of ABI include traumatic brain injury (TBI), stroke, cerebral tumor, cerebral anoxia (oxygen deprivation), or infectious diseases such as encephalitis or meningitis (Chevignard et al., 2009). Approximately 80% of moderate-to-severe ABI may be attributable to TBI and stroke.

Severity of ABI ranges from a mild concussion—requiring little to no treatment—to severe brain injury with physical and cognitive impairments to coma, persistent vegetative state, or death. ABI may result in short-term or long-term impairments that affect physical functioning (strength, coordination, spasticity, etc.) or cognitive abilities (thinking, memory, and reasoning), sensory processing (using the five senses), communication (expression and understanding), and behavior or mental health (depression, anxiety, personality changes, aggression, and social inappropriateness) (NINDS, 2015). ABI also increases the risk for Alzheimer's and Parkinson's diseases, and premature death (Brasure et al., 2012; CDMH, 2010).

Acute medical and post-acute rehabilitative treatment outcomes for ABI range from complete restoration of pre-injury function to permanent, severe disability. Prognosis is dependent upon many factors including the severity and location of the brain injury, and patient age and comorbidities (Brasure et al., 2012).

ABI Continuum of Treatment: Array of Options

In addition to acute medical care services (emergency department and hospitalization), post-acute rehabilitation services for ABI are prescribed in accordance with the severity and location of the brain injury, type of deficits, patient's capacity for participating in rehabilitation, and insurance coverage (Brasure et al., 2012). ABI severity and its effects manifest differently for each patient; therefore, acute and post-acute treatment varies widely.

Figure 2 approximates the continuum of care for ABI patients. For those patients who are unable to care for themselves at hospital discharge, there are several paths for post-acute rehabilitation depending on their medical needs, rehabilitative capacity, and insurance status (CDMH, 2010). For example, those ABI patients who are so severely incapacitated (where rehabilitation would not be expected to help) may move to a skilled nursing facility or long- term supported living facility for care (State of Colorado Department of Labor and Employment, 2012).

Patients sustaining moderate-to-severe ABI who are able to participate in intensive, multidisciplinary rehabilitation may step-down from the acute hospital setting to an inpatient rehabilitation hospital setting for up to several weeks and/or move to a PARTRS or a skilled nursing facility, and/or may eventually use weekly therapy in an outpatient setting.

Types of Post-Acute Rehabilitation Services

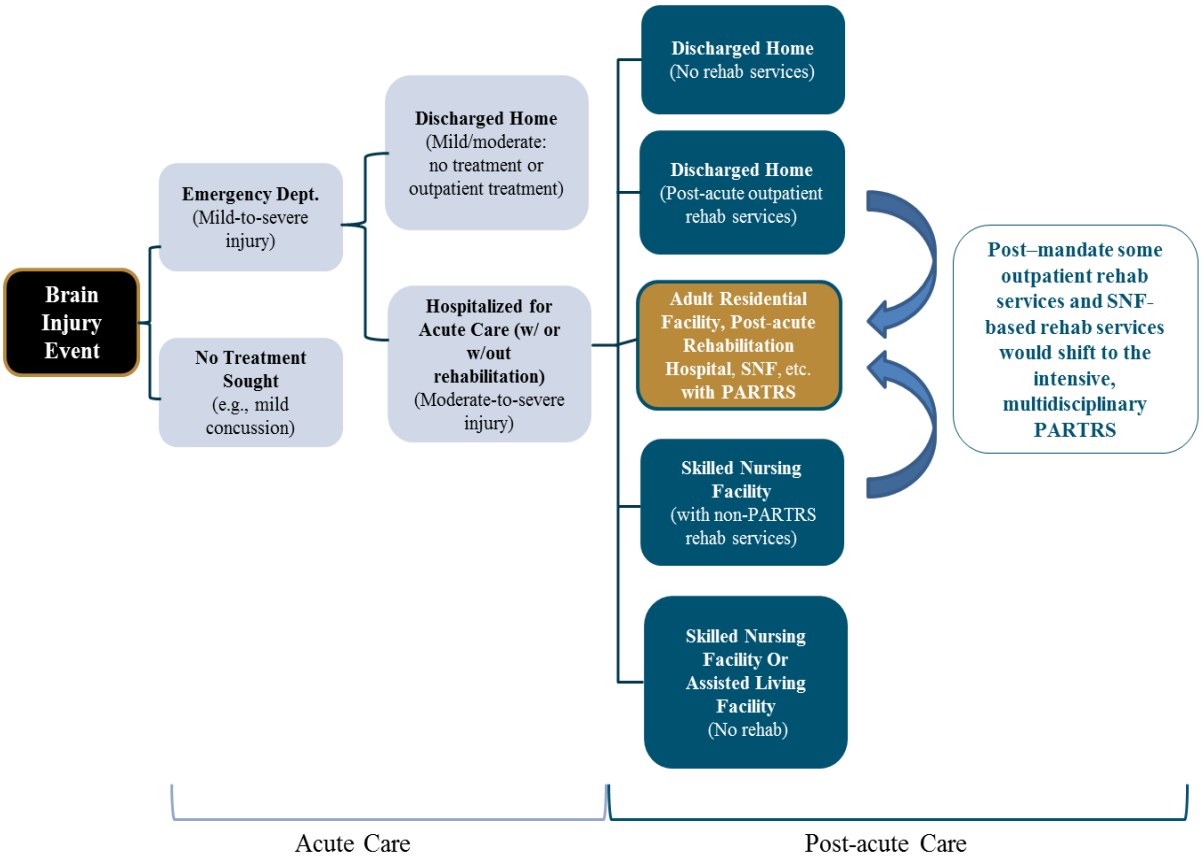
Those patients diagnosed with moderate-to-severe brain injuries who are medically stable are likely candidates for one or more post-acute rehabilitation services in inpatient, residential, or outpatient settings. Rehabilitation services may include physical therapy, occupational therapy, speech/language therapy, psychology/psychiatry, orthotic services, neuropsychology, cognitive behavioral therapy, vocational rehabilitation and social support provided at an array of inpatient, residential, and outpatient facilities or programs (NINDS, 2013). *Inpatient post-acute rehabilitation settings* are generally associated with acute care hospitals providing a step-down unit where medical care (e.g., 3 physician visits/week) continues in conjunction with multidisciplinary, intensive rehabilitation. *Residential settings* range from long term custodial to short-term transitional settings where the range of post-acute rehabilitation services varies from providing separate individual therapies to coordinated, multi-disciplinary, intensive rehabilitation. Examples of this setting category include skilled nursing facilities, free-standing rehabilitation programs, and residential community reintegration programs. *Post-acute outpatient rehabilitation services* may occur through home-based rehabilitation, comprehensive day treatment programs, clubhouse programs, rehabilitation within schools, vocational rehabilitation programs, and neurobehavioral programs (NIH, 1998). These services are generally less intensive and less coordinated than that of inpatient rehabilitation settings and some residential settings.

Description of Services Covered by SB 190: Post-Acute Residential Transitional Rehabilitation Services (PARTRS)

PARTRS, as defined by SB 190, is a specific set of services, including physical therapy, occupational therapy, speech therapy, respiratory therapy, neuropsychology and psychology services. In addition, SB 190 defines PARTRS as including rehabilitation nursing and prosthetic/orthotic services.

SB 190 further defines PARTRS as both post-acute and as available in a transitional residential setting such as free-standing rehabilitation programs, skilled nursing facilities, adult residential facilities, and residential community reintegration programs. However, the full set of services identified by PARTRS, particularly rehabilitation nursing and neuropsychology, are not available in all such settings.

Figure 2. Overview of Acquired Brain Injury Continuum of Care for ABI Survivors



Note: This figure represents the continuum of care for ABI rehabilitation – not all patients participate in all settings or services. Dark gold box represent settings with PARTRS; arrows indicate shifts from settings that provide other rehabilitation services to settings providing PARTRS, post-mandate.
Key: PARTRS=post-acute residential transitional rehabilitation services
Source: California Health Benefits Review Program, 2015

The number of California patients with moderate-to-severe ABI who require multidisciplinary services through PARTRS is difficult to gauge as there is no data source that links injury severity to subsequent medically necessary post-acute rehabilitation treatment. There are snapshots from different data sources that help characterize the burden of ABI in California; however, they do not track the continuum of care (hospitalization and/or inpatient rehabilitation and/or post-acute rehabilitation services) to determine the injury outcome.

Acquired Brain Injury Incidence in California

CHBRP found no standard clinical definition or diagnosis for ABI; therefore, there is no corresponding single data source that captures the incidence or prevalence of ABI. To estimate the incidence of ABI, CHBRP presents the most recent data available for traumatic brain injury (TBI) and stroke, which account for about 80%[26] of ABI. These incidence rates are used to estimate the subset of patients sustaining ABI

[26] Personal communication with C. Spalding-Dias MD, medical director, Adult Acute Rehabilitation Unit at the University of California, Davis, Medical Center. March 23, 2015.

that is severe enough to warrant PARTRS. Incidence data are unavailable for other causes of ABI (e.g., diseases, hypoxia, etc.) that result in injury severe enough to warrant PARTRS.

Stroke Incidence[27] in California

In California, the number of hospitalized cases of stroke for all ages was 54,983 (of which 5,072 died) based on the 2014 OSHPD[28] Hospital Inpatient Mortality Indicator for acute stroke (OHSPD, 2015). Of the 49,911 survivors, CHBRP estimates that 16,970 are under age 65 (see Table 2). The severity of stroke is unreported in these data sources. However, using the literature, *CHBRP estimates the incidence of moderate-to-severe stroke to range from 5,940 to 11,879 cases annually for those who are under age 65* (see *Appendix D, Public Health Calculations,* for assumptions and calculations).

Note that persons over age 65 are insured primarily by Medicare, which is not subject to state regulation. Because stroke predominately affects those over age 65 (CDC, 2013b; Fang et al., 2012), a large proportion of stroke patients would not be subject to SB 190, as shown in Table 2.

Traumatic Brain Injury Incidence in California

Recent data obtained from California's online traumatic brain injury (TBI) surveillance program shows that were 241,291 non-fatal TBI visits to the emergency department in 2013 and 31,552 hospitalizations for non-fatal TBI in 2013 (CDPH, 2013). For those under age 65, there were 19,093 nonfatal TBI hospitalizations in 2013 (TBI as primary or secondary diagnosis) of which:

- 79% were treated and discharged;
- 6% were transferred to an acute care hospital;[29]
- 12% were transferred to a non-acute care hospital;[30] and
- 3% discharges were unknown/other (CDPH, 2015).

Children and young adults comprise a significant proportion of TBI (CDPH, 2015; Langlois et al., 2006), many of whom are insured through Medi-Cal. As Medi-Cal is exempt from SB 190, a portion of ABI patients would not be affected by the insurance mandate. See Table 2 for estimated number of Californians with ABI who would be impacted by SB 190.

[27] Incidence is the number of new cases (or rate) of the disease/condition (moving from no disease/condition to disease/condition) in a particular time period (commonly measured per year).

[28] OSHPD=California Office of Statewide Planning and Development.

[29] In this case, transferred to an "acute care hospital" includes discharged/transferred to a short-term general hospital for inpatient care, or to a critical access hospital as defined by the California Department of Public Health EPICenter Traumatic Brain Injury data report. California Department of Public Health (CDPH). EPICenter: California Injury Data Online, Traumatic Brain Injury. 2013. Available at: http://epicenter.cdph.ca.gov/ReportMenus/TraumaticBrainInjury.aspx. Accessed March 5, 2015.

[30] In this case, transferred to a "non-acute care" hospital includes discharged/transferred to a skilled nursing facility (SNF) with Medicare certification (in anticipation of covered skilled care); a facility that provides custodial or supportive care; a federal health care facility; a medical facility with hospice care; a hospital-based, Medicare-approved swing bed; an inpatient rehabilitation facility, including rehabilitation as a distinct unit of a hospital; a Medicare-certified long-term care hospital; a nursing facility certified under Medicaid (Medi-Cal), but not certified under Medicare; or to another type of health care institution not defined elsewhere on this code list, as defined by the California Department of Public Health EPICenter Traumatic Brain Injury data report.

Estimated number of Californians with ABI and insurance subject to SB 190 by age group

CHBRP estimates that about 8,800 Californians with moderate-to-severe ABI have insurance subject to SB 190 (Table 2). Of those, about 3,000 enrollees with moderate-to-severe ABI may be clinically eligible for PARTRS (See *Appendix D* for details about assumptions and calculations).

Table 2. Estimate of Californians With Acquired Brain Injury and Health Insurance Subject to or Not Subject to SB 190, Annually

	Health Insurance Subject to SB 190	Health Insurance Not Subject to SB 190[(a)]	Total (All of CA)
Population	17,133,000	20,772,000	37,905,000
Population over age 65	102,000	5,282,000	5,384,000
Population with moderate-to-severe ABI[(b)] (all ages)	8,800	30,600	39,400
Population with moderate-to-severe ABI* for whom PARTRS may be appropriate (all ages)	3,000	9,900	12,900

Source: California Health Benefits Review Program, 2015.

Notes: (a) Disproportionate difference between enrollees' insurance subject/ not subject to SB 190: Medicare is not subject to state regulation; stroke predominately affects those over age 65, who are covered by Medicare. A large portion of the TBI population is comprised of children and teens some of whom are covered by Medi-Cal. which is exempt from SB 190. (b) These estimates represent a lower bound because other conditions (e.g., hypoxia, brain abscesses, etc.) and diseases (e.g., encephalitis, meningitis, etc.) that may lead to ABI are not included in this count due to a lack of incidence data. Content expert opinion[31] and literature indicate that stroke and TBI comprise the vast majority of ABI.

Key: ABI=acquired brain injury.

Variation in Acquired Brain Injury

Variation in Incidence by Gender and Race/Ethnicity

There is variation in the incidence of TBI and stroke across gender and racial/ethnic categories. Consistent with the national trend, California men have a higher proportion of nonfatal hospitalizations from TBI (72%) as compared to women (Coronado et al., 2011; CDPH, 2015); however stroke appears to affect men and women similarly (53% female) (Fonarow et al., 2010).

Regarding racial/ethnic differences in stroke, California data demonstrate similar findings to national data; although whites comprise 65% of stroke-related hospital discharges, African Americans have the highest rate of stroke morbidity (12.1 hospital discharges/1,000 population) and American Indians have the lowest

[31] Personal communication, C. Spalding-Dias, MD, medical director, Adult Acute Rehabilitation Unit at the University of California, Davis, Medical Center. March 2015

(1.8 discharges/1,000 population). Whites, Hispanics, and Asians have similar rates of 5.8/1,000, 5.8/1,000 and 5.4/1,000, respectively (CDPH, 2007).

Racial/Ethnic Disparities[32] in ABI Rehabilitation

Use

Research on various measures of recovery from TBI suggests that minorities fare worse than whites. Gary et al. (2009) conducted a literature review of post-TBI outcomes by race and ethnicity using 39 articles meeting review criteria. They found that African Americans and Hispanics were less likely to be discharged to rehabilitation centers for further treatment, less likely to receive additional/more intensive rehabilitative treatments and less likely to be discharged for further rehabilitation after inpatient treatment (7 of 9 studies). Seven of 8 studies of functional outcomes found that minorities had worse outcomes 1 to 5 years after discharge from inpatient rehabilitation programs (Gary et al., 2009). Other studies of TBI have confirmed lower use of rehabilitation services and greater impairment at discharge (Heffernan et al., 2011; Niemeier et al., 2007).

A study of 11,119 northern California Kaiser Permanente members who were hospitalized for *stroke* between 1996 and 2003 found that Asian and Black patients were more likely to receive the most intensive level of post-acute care (21% and 16%, respectively) than Hispanics or whites. The authors ranked inpatient rehabilitation hospitals as the highest intensity of rehabilitation care followed by skilled nursing facilities, home health, outpatient, and no post-acute care (Sandel et al., 2009). Another study about post-acute rehabilitation for stroke patients found that Blacks and females were more likely to receive institutional care, or if discharged home, were more likely to receive home health care than the uninsured and Hispanics. However, Blacks and females were more likely to use skilled nursing facility care than inpatient rehabilitation facilities (Freburger et al., 2011).

Outcomes

Studies by Arango-Lasprilla found that African Americans and Hispanics had statistically significant poorer outcomes than whites for TBI rehabilitation as measured by community integration, disability rating, and functional independence. Additionally, African Americans had lower life satisfaction scores than whites and Asians one year after injury despite all receiving multidisciplinary rehabilitation treatments and controlling for pre-injury marital and employment status, cause and severity of injury, and functional status (Arango-Lasprilla et al., 2007; Arango-Lasprilla et al., 2009). However, a literature review by Gary et al., found ambiguous evidence of differences in quality of life between whites and minorities with TBI (Gary et al., 2009).

Racial/ethnic disparities in TBI outcomes have been reported by residence and employment among studies using large patient databases from the national Traumatic Brain Injury Model Systems of Care project. For instance, 1 year post-injury, minorities were significantly more likely to be unemployed than whites, even after controlling for factors including pre-injury employment status, education, and level of disability at discharge (Arango-Lasprilla et al., 2008). At 1, 2, and 5 years post-injury, whites were more likely to be living independently compared to African Americans (Penna et al., 2010). This finding

[32] Several competing definitions of "health disparities" exist. CHBRP relies on the following definition: "Health disparities are potentially avoidable differences in health (or health risks that policy can influence) between groups of people who are more or less advantaged socially; these differences systematically place socially disadvantaged groups" at risk for worse health outcomes (Braveman, 2006).

controlled for the effects of place of residence pre-injury, as well as gender, age, severity of injury, and level of disability at discharge.

MEDICAL EFFECTIVENESS

Research Approach and Methods

Analytic Approach and Key Assumptions

SB 190 approaches benefit coverage by emphasizing a condition—acquired brain injury (ABI)—which itself is a broad category of injuries. Most persons enrolled in these studies had traumatic brain injury (TBI), although some had injuries due to stroke or other conditions.

Many persons with moderate-to-severe ABI would need (1) medical services, to treat the injury clinically, and (2) rehabilitation treatments, with the goal of improving the patient's level of functioning. CHBRP assumes the acute medical care services (emergency department and hospitalization) required to address the injury (whether by stroke, encephalitis, car accident, and other causes) would be considered medically necessary and already covered in all instances. **Therefore, this analysis focuses primarily on access to and the effect of post-acute residential transitional rehabilitation services (PARTRS) as defined by SB 190**.

Coverage at Facilities Versus Coverage for Treatments

Because of variability in treatments, CHBRP focuses on multidisciplinary rehabilitation programs that provide for and coordinate the complex array of treatments for patients with ABI for the following reason. While many persons with moderate to severe ABI may need some combination of treatments including, but not limited to, behavioral management training, bladder and bowel retraining, cognitive rehabilitation, electrical stimulation of limbs, memory rehabilitation, movement therapy, occupational therapy, physical therapy, psychotherapy, speech therapy, neuropsychological evaluations and therapy, and training in the performance of activities of daily living and instrumental activities of daily living, the specific mix of types, duration, and intensity of rehabilitation varies depending on the type of brain injury and the severity of the injury(CHBRP; 2013).

The medical effectiveness review assessed the subset of studies on multidisciplinary rehabilitation for ABI that present the strongest evidence regarding the effectiveness of these post-acute rehab services including PARTRS. Severity of injury and types of rehabilitation needed vary widely among persons with these conditions. Unless care is taken to ensure that persons who receive a multidisciplinary rehabilitation intervention are similar to persons in a comparison group at baseline, it is difficult to know whether any differences in outcomes that are found are due to the intervention versus differences in the cognitive and functional status of the persons in the two groups at the point at which they begin to receive rehabilitation (NIH, 1998).

Many of the studies included in the medical effectiveness review cannot be compared directly to one another because their study populations and research designs differ. Specifically, some studies compared multidisciplinary rehabilitation to no intervention or a minimal intervention, such as providing written information. Others compared more intensive to less intensive interventions. Because the essence of PARTRS is its multidisciplinary nature, we did not include studies that were not multidisciplinary rehabilitation programs regardless of setting. The medical effectiveness review assessed the subset of studies on multidisciplinary rehabilitation for ABI that present the strongest evidence regarding the effectiveness of such multidisciplinary treatments.

Studies that compare similar treatments delivered in different settings may provide information about the relative effectiveness of different settings. It is uncertain how generalizable the comparisons with no intervention, minimal intervention, more vs. less intensive interventions, and different types of interventions within the same setting are to SB 190 because the studies do not specifically enumerate the medically necessary rehabilitation treatments that are in the bill language. Additionally, severity of injury and types of rehabilitation needed vary widely among persons with these conditions. Not surprisingly, current systematic reviews on this topic arrive at seemingly inconsistent conclusions (Brasure et al., 2013).

The methods and results of the literature review may be found in *Appendix B, Literature Review Methods.*

Outcomes Assessed

The research question CHBRP seeks to answer is if there is a difference in outcomes such as function, independence, social interaction, and/or work status for patients who receive care in PARTRS compared to other types of post-acute rehabilitation for persons with moderate to severe ABI.

The outcomes assessed varied widely across the studies included in the medical effectiveness review. Frequently measured outcomes included ability to function independently (e.g., ability to perform activities of daily living [ADLs] or instrumental ADLs[33] without assistance), social interaction, and work status. Work status was defined as having paid employment or, in some cases, enrollment in an educational program or engaging in volunteer activity. Other outcomes measured included cognitive function, depression, quality of life, and physical ability (e.g., dexterity, ability to walk). Function was assessed by using the Pate Environmentally Relevant Program Outcome System (PERPOS) scale. The PERPOS assesses 3 separate dimensions, including the patient's overall ability level across multiple domains (range, 1-7), a measure of environmental distraction (measured on a 4-point scale), and a measure of structure inherent in the environment or activity (measured on a 4-point scale). The Functional Independence Measure (FIM) was used to provide a measure of disability and an indication of independence in activities of daily living by assessing cognitive and motor functioning (Keith et al., 1987). The FIM consists of 18 items that are scored on a 7-point Likert scale, with higher scores indicating a greater level of independence (1=total assistance, 7=total independence; total=126). This measure has demonstrated excellent reliability and validity within a stroke population (Hobart et al., 2001; Kwon et al., 2004).

[33] Activities of daily living (ADLs) are self-care activities such as bathing, dressing, walking, eating, and toileting. Instrumental activities of daily living are activities that are important for persons to live independently, such as preparing meals, doing housework, shopping for groceries, talking on the telephone, and managing money.

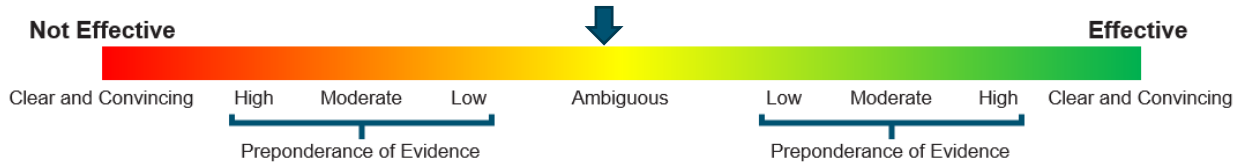
Overall Study Findings

Figure 3. Summary of Medical Effectiveness Findings

Treatment	Conclusion
PARTRs for persons with moderate-to-severe ABI, measured by functional status and other outcomes post-treatment compared to pre-treatment functional status and other outcomes.	CHBRP concludes that the preponderance of evidence suggests that PARTRs for persons with moderate-to-severe ABI improves functional status and other outcomes post-treatment compared to pre-treatment functional status and other outcomes.

Source: California Health Benefits Review Program.

Treatment	Conclusion
PARTRs for persons with moderate-to-severe ABI, measured by functional status and other outcomes post-treatment compared to other multidisciplinary rehabilitation.	CHBRP concludes that there is insufficient evidence that PARTRS is more effective than any other form of multidisciplinary rehabilitation. The lack of evidence for PARTRS does not mean that it is not effective, only that the effectiveness has not been established by studies using the most rigorous research designs.



CHBRP concludes that the preponderance of evidence, including the literature and content expert, suggests that PARTRS for persons with moderate-to-severe ABI statistically significantly improves functional status and outcomes compared to pre-treatment levels.

However, there is insufficient evidence that PARTRS if more effective than any other form of multidisciplinary rehabilitation. The lack of evidence for PARTRS does not mean that it is not effective, only that the effectiveness has not been established by studies using the most rigorous research designs.

Studies of Persons With Moderate-to-Severe ABI

PARTRS is appropriate only for individuals with moderate to severe ABI because those with mild ABI would receive care as an outpatient or if admitted to a hospital would be discharged to home or a less intensive setting than PARTRS. Thus, all 11 studies included assessed the impact of multidisciplinary rehabilitation interventions provided to persons with moderate or severe ABI.

Following the CHBRP protocol for assessing the medical effectiveness of interventions, the medical analysis relied heavily on a systematic review conducted by Brasure and colleagues (Brasure et al, 2013). In the systematic review, twelve studies met inclusion criteria, of which 8 were deemed to have acceptably minimal risk of bias because they were either randomized controlled trials or cohort studies. However, several of the studies were conducted in inpatient facilities and several were conducted at outpatient facilities. In evaluating the evidence from all 8 included studies, Brasure and colleagues concluded that there was little evidence either way to support the effectiveness of multidisciplinary rehabilitation programs.

Studies Comparing PARTRS to Other Types of Rehabilitation

No studies were found that specifically compared PARTRS to other types of rehabilitation for persons with moderate to severe ABI.

The lack of evidence for PARTRS does not mean that it is not effective, only that the effectiveness has not been established by studies using the most rigorous research designs.

Due to weak evidence for the question of whether PARTRS is more medically effective than other treatments, CHBRP considered clinical guidelines from National Institute of Health, United States Department of Veterans Affairs, Model Systems Knowledge Translation Center and Colorado Department of Labor and Employment, (NIH, 1998; U.S. Department of Veterans Affairs, 2009; MSKTC, 2010; State of Colorado Department of Labor and Employment, 2012), as well as content expert opinion.

CHBRP found the guidelines recommend numerous approaches to TBI rehabilitation. In the guidelines, CHBRP found discussion of the most appropriate post-acute rehabilitation service being dependent on the person's needs following inpatient hospital rehabilitation, as well as proximity and availability of services, family dynamics, and projected long-term outcomes. However CHBRP did not find recommendations in the guidelines that recommend PARTRS over other services CHBRP also consulted a content expert, a physician who provides acute rehabilitation services to persons with ABI and who recommends forms of post-acute rehabilitation services. The content expert indicated that she would recommend PARTRS when appropriate for particular patients (citing similar issues as are mentioned in the guidelines, such as whether the patient can be treated more effectively in a residential setting, or may not have access to appropriate or adequate hospital or sub-acute rehabilitation in a long-term acute hospital or SNF). The content expert, indicated that PARTRS may provide better comprehensive rehabilitation services for ABI patients than post-acute SNF-based rehabilitation. However, the content expert was not surprised to by CHBRP's conclusion that there is insufficient evidence, based on the literature and on available guidelines, to conclude whether PARTRS is more effective than other forms of post-acute rehabilitation services...

Studies of PARTRS without control groups

Because there is no literature that compares PARTRS to post-acute non-residential multidisciplinary rehabilitation, CHBRP examined the impact of PARTRS with no control groups. Seven studies examined the impact of PARTRs for persons with moderate to severe ABI (Agrawal, 2014; Foy, 2014; Dahdah,

2014; Greisbach et al., 2015; Jorge et al., 2015; Lewis and Horn, 2013; Oddy and da Silva Ramos, 2013). These studies found significant improvements in functioning at discharge for persons treated at a residential rehabilitation setting compared to their functioning at admission. This meets criteria for a difference that clinicians or patients would agree made a difference in their functioning. Hayden et al. (2013) found that 69% of both residential and non-residential patients demonstrated clinically meaningful functional gains as measured by the PERPOS. Because the studies lacked control groups for comparison, it is not possible to state with a high level of confidence that this form of intervention is more effective than potential alternatives. However, experts agree that it is unlikely that patient improvement is due to spontaneous healing alone (Oddy and da Silva Ramos, 2013).

Studies on post-acute non-residential multidisciplinary rehabilitation

Because the literature on PARTRS is limited, CHBRP examined SNF-based rehabilitation and outpatient rehabilitation services because this literature may provide information about the relative effectiveness of services typically provided in PARTRS settings other than the isolated effect of providing such multidisciplinary care in a residential setting. It is uncertain how generalizable the comparisons with no intervention, minimal intervention, more vs. less intensive interventions, and different types of interventions within the same setting are to SB 190 because the bill does not specifically enumerate the medically necessary rehabilitation treatments.

Studies on non-residential multidisciplinary rehabilitation without control groups

One study found that community stroke rehabilitation teams, a type of outpatient rehabilitation service, were effective at improving the functional and psychosocial recovery of patients after stroke. It is important to note that this study did not compare one setting to another. Rather, it compared clinically meaningful changes from admission to discharge of those in community rehabilitation, a type of outpatient nonresidential multidisciplinary rehabilitation. Community stroke rehabilitation teams provide an individualized, home-based, stroke-specific, and multidisciplinary rehabilitation service to patients recovering from stroke. (Allen et al., 2014).

More intensive versus less intensive interventions in non-residential multidisciplinary rehabilitation

CHBRP's 2013 report on SB 320[34] compared evidence from five randomized controlled trials (RCTs) to evaluate whether outcomes of multidisciplinary rehabilitation for ABI are associated with the intensity of treatment. Evidence shows that more intensive multidisciplinary rehabilitation is more effective than less intensive is ambiguous (CHBRP; 2013). Two more recent studies examined if outcomes were associated with the intensity of treatment. The first, a comparative study by Vestri et al. (2014) found that group rehabilitation integrated with individual treatments is more effective than individual treatments alone in improving independence (shown by greater improvement in the FIM scale for those in combined individual and group treatment). A study of persons with stroke found that providing higher-intensity "comprehensive" rehabilitation treatment compared to lower-intensity "consultative" rehabilitation treatment is associated with greater recovery of physical and cognitive independence, improved home discharge likelihood, and improved one year survival (Stineman et al., 2014).

[34] For more information about evidence on multidisciplinary rehabilitation for ABI, see CHBRP's previous report: *Analysis of Senate Bill 320: Acquired Brain Injury.* Available at: www.chbrp.org/completed_analyses/index.php.

Although the studies are similar to SNF-based rehabilitation and outpatient rehabilitation services as discussed in the Cost section, differences in the treatments provided to the intervention and comparison groups make it difficult to generalize findings across these studies.

BENEFIT COVERAGE, UTILIZATION, AND COST IMPACTS

SB 190 would require DMHC-regulated health plans and CDI-regulated policies(excepting Medi-Cal Managed Care) to cover post-acute residential transitional rehabilitation services (PARTRS) for acquired brain injury (ABI), which includes (but is not limited to) brain injury resulting from a stroke or traumatic brain injury (TBI). SB 190 would require that coverage for ABI PARTRS have the same terms/conditions (including deductibles, copayments, coinsurance, annual/lifetime maximum payment limits) as other coverage. The following definition of "post-acute residential translational rehabilitation services" is used for CHBRP's analysis of SB 190:

PARTRS utilizes an interdisciplinary, coordinated team approach in a residential facility. The treatment approach includes physical therapy, occupational therapy, speech therapy, rehabilitation nursing, respiratory therapy, neuropsychology and psychology services, prosthetic/orthotic services, or a combination thereof.

This section reports the potential incremental impact of SB 190 on estimated baseline benefit coverage, utilization, and overall cost. For further details on the underlying data sources and methods, please see *Appendix C.*

Benefit Coverage

Premandate (Baseline) and Postmandate Benefit Coverage

Currently, CHBRP estimates that 17% of 17.1 million enrollees in DMHC-regulated plans or CDI-regulated policies subject to SB 190 have coverage for PARTRS. However, 100% of these enrollees have coverage for other forms of post-acute rehabilitation services, including SNF-based rehabilitation services and outpatient rehabilitation services. SNF-based rehabilitation provides a wide range of rehabilitative services, including 24-hour nursing care, physical therapy, and medical supervision that resembles PARTRS. However, not all SNF-based rehabilitation provides PARTRS,[35] which SB 190 defines as an interdisciplinary, coordinated team approach that includes physical therapy, occupational therapy, speech therapy, rehabilitation nursing, respiratory therapy, neuropsychology and psychology services, and prosthetic/orthotic services.

Current coverage of PARTRS was determined by a survey of the largest providers of health insurance in California. Responses to this survey represent:

1. 91% of enrollees in the privately funded, DMHC-regulated market;
2. 65% of enrollees in the CDI-regulated market; and
3. 87% of enrollees in the privately funded market subject to state mandates.

If SB 190 were enacted, CHBRP estimates that the percent of enrollees with benefits coverage for PARTRS would increase to 100%. Estimates are found in Table 1.

SB 190 would also make a number of requirements regarding the terms and conditions of benefit coverage for ABI PARTRS: that PARTRS coverage not be subject to acute care treatment lifetime days

[35] Personal communication, C. Spalding-Dias, MD, medical director, Adult Acute Rehabilitation Unit at the University of California, Davis, Medical Center. March 2015

limits; that any limit on ABI PARTRS coverage be separately stated in the plan contract/policy; that coverage for ABI PARTRS have the same terms/conditions (including deductibles, copayments, coinsurance, annual/lifetime maximum payment limits) as other coverage. CHBRP found no evidence of PARTRS-specific benefit terms or coverage or any policy of making PARTRS subject to acute care treatment lifetime day limits. Therefore, it appears that enrollees in plans and policies subject to SB 190 already have health insurance compliant with these aspects of SB 190, and so CHBRP would expect no impact due to these aspects of the mandate.

The remainder of this section will focus on SB 190's requirement for coverage of PARTRS, which CHBRP would expect to change benefit coverage for some enrollees.

Utilization

Premandate (Baseline) and Postmandate Utilization

CHBRP assumes that all moderate-to-severe ABI patients will use post-acute rehabilitation services. That results in about 8,800 enrollees with health insurance subject to SB 190 annually needing post-acute rehabilitation services as a result of moderate-to-severe ABI. This is an upper bound estimate, as some persons with moderate-to-severe ABI would not be injured badly enough to need rehabilitation and some would be comatose or otherwise too badly hurt to benefit from rehabilitation. These enrollees can receive post-acute rehabilitation services through: 1) PARTRS; 2) SNF-based rehabilitation; or 3) Outpatient rehabilitation. SB 190 defines PARTRS as "provided in a medically supervised, structured residential facility that is not an acute hospital setting." For this reason, CHBRP has not included any hospital-based rehabilitation services (neither short- nor long-term acute hospital services) in the estimates included in this analysis. SNF-based rehabilitation services could be viewed as a type of PARTRS, but CHBRP estimates it separately because 1) the full PARTRS set of services, especially rehabilitation nursing and neuropsychology are not generally available through SNFs,[36] and 2) SNF-based rehabilitation services are generally covered by health insurance. The percentage of persons with ABI receiving PARTRS will vary depending on both the severity of ABI and coverage for PARTRS. Based on content expert opinion, CHBRP estimates about 25% of moderate to severe ABI patients with the PARTRS coverage will use the PARTRS.[37] After the mandate, there will be some shifts of utilizations from post-acute SNF-based rehabilitation services and outpatient rehabilitation services to PARTRS. The detailed shifts by ABI severity are estimated as follows:

For persons with moderate ABI and new benefit coverage, we assume:

- 20% previously receiving post-acute SNF-based rehabilitation services now receive PARTRS.
- 10% previously receiving post-acute outpatient rehabilitation services now receive PARTRS.

For persons with severe ABI and new benefit coverage, we assume:

- 50% previously receiving post-acute SNF-based rehabilitation services now receive PARTRS.
- 50% previously receiving post-acute outpatient rehabilitation services now receive PARTRS.

[36] Personal communication, C. Spalding-Dias, MD, medical director, Adult Acute Rehabilitation Unit at the University of California, Davis, Medical Center. March 2015.
[37] Personal communication, C. Spalding-Dias, MD, medical director, Adult Acute Rehabilitation Unit at the University of California, Davis, Medical Center. March 2015.

CHBRP estimates that the average length of stay for PARTRS or a post-acute SNF-based rehabilitation is 60 days based on a review article(Malec and Basford, 1996) and responses from facilities accredited by the Commission on Accreditation of Rehabilitation Facilities (CARF). For a person using post-acute outpatient rehabilitation services, CHBRP also estimates that services will last at least 60 consecutive days(Malec and Basford, 1996).

CHBRP assumes no changes in length of stay for PARTRs or SNF-based rehabilitation or days of using post-acute outpatient rehabilitation services or days of additional outpatient services following the post-acute phase because, as noted in *Medical Effectiveness,* page 22, there is lack of evidence supporting expedited recovery through PARTRS compared to other post-acute rehabilitation services. Also, no evidence indicates that the coverage will affect the length of rehabilitation.

Impact on access and health treatment/service availability

CHBRP assumes that the mandate will increase access to PARTRS for those who, premandate, were without coverage for PARTRS. Though there are no existing data to verify the sufficiency of PARTRS providers in California, CHBRP does not anticipate any impacts on the service availability after the mandate because the number of persons with moderate-to-severe ABI annually qualifying for PARTRS is limited and because facilities that are PARTRS-ready or near-PARTRS-ready exist, CHBRP expects that persons with new benefit coverage would find a facility providing PARTRS.

Per-Unit Cost

Premandate (Baseline) and Postmandate Per-Unit Cost

CHBRP determined the average cost-per-day of post-acute SNF-based rehabilitation and outpatient rehabilitation cost-per-procedure (Table 1) by analyzing MarketScan claims data for over 6,000 Californians diagnosed with ABI using ICD-9 codes. CHBRP has estimated unit cost for PARTRS as being between acute hospital- and SNF-based services, the estimate is confirmed by content expert opinion and responses from questions fielded to CARF-certified California facilities. . Please see details in *Appendix C*. Since PARTRS utilizes an interdisciplinary, coordinated team approach in a residential facility and provides direct medical and goal-oriented treatment for a complex range of medical, physical, communicative, cognitive, neurobehavioral and psychological conditions, CHBRP estimates that PARTRS costs could be more expensive than SNF-based rehabilitation or out-patient rehabilitation, but less expensive than acute hospital rehabilitation based on the content expert opinions[38]. The detailed unit cost per professional visit and unit cost per day by settings are in Table 1.

CHBRP assumed that the unit cost will not change postmandate due to limited number of enrollees with ABI that will need PARTRS, which was 3,000 patients per year (a figure which includes both enrollees with new benefit coverage and those who had PARTRS coverage premandate). We have assumed that patients who now receive PARTRS will typically have more severe complications and have higher costs than patients that continue to receive SNF-based or outpatient-based post-acute rehab services once PARTRS is fully covered. Because of that, we assume that overall average SNF-based and outpatient-based cost per day will be reduced once these individuals no longer receive these services, as the remaining patients will need less costly procedures.

[38] Personal communication, C. Spalding-Dias, MD, medical director, Adult Acute Rehabilitation Unit at the University of California, Davis, Medical Center. March 2015.

Premiums and Expenditures

Premandate (Baseline) and Postmandate Premiums and Expenditures

Table 3 and Table 4 present the premandate (baseline) and postmandate per member per month (PMPM) estimates for premiums and expenditures by market segment for DMHC-regulated plans and CDI-regulated policies.

Premandate (baseline) PMPM by market segment is as follows for DMHC-regulated plans and CDI-regulated policies, respectively:

a. Large group: $574.58 and $746.55;

b. Small group: $540.97 and $725.28; and

c. Individual market: $563.87 and $440.03.

Total current annual expenditures for all DMHC-regulated plans and CDI-regulated policies are $135.99 billion.

Changes in total expenditures

SB 190 would increase total net annual expenditures by about $216.2 million, 0.16% for enrollees with DMHC-regulated plans and CDI-regulated policies. This is due to a $210.8 million increase in total health insurance premiums paid by employers and enrollees for newly covered benefits, partially offset by an increase in enrollee expenditures for previously noncovered benefits ($5.4 million).

Postmandate premium expenditures and PMPM amounts per category of payer

Increases in insurance premiums as a result of SB 190 would vary by market segment. Note that the total population in Table 3, page 34, and Table 4, page 36, reflects the full 17.1 million enrollees in DMHC-regulated plans and CDI-regulated policies subject to SB 190.

The mandate is estimated to increase premiums by about $216.2 million. The distribution of the impact on premiums is as follows:

- Private employer premium expenditures increase by $109,796,000, or 0.19%.
- Total employer premium expenditures for CalPERS HMOs are estimated to increase by $9,596,000, or 0.22%. Of the increase in CalPERS employer expenditures, about 55.4%, or $5,312,000, would be state expenditures for CalPERS members who are state employees or their dependents.
- Enrollee contributions toward premiums for group insurance are estimated to increase by $36,128,000, or 0.19%.
- Total premiums for purchasers of individual market health insurance–Outside Exchange are estimated to increase by $$27,237,000, or 0.32%.
- Total premiums for purchasers of individual market health insurance–Covered California are estimated to increase by $$28,067,000, or 0.22%.

- State expenditures for Medi-Cal Managed Care Plans are estimated to increase by $0 since this mandate is not applicable to Medi-Cal managed plans.

Prior to the mandate, CHBRP assumes that enrollees without coverage for PARTRS would not use PARTRS due to the high cost of PARTRS and the existence of coverage for alternative post-acute rehabilitation services, such as SNF-based rehabilitation and outpatient rehabilitation services. Postmandate, a portion of these enrollees would switch to PARTRS from SNF-based rehabilitation and outpatient rehabilitation. Enrollees switching to PARTRS would incur an additional $5,419,000 in cost sharing (through deductibles, co-payments, co-insurance, etc.) for use of the newly covered benefits.

Postmandate administrative expenses and other expenses

CHBRP estimates that the increase in administrative costs of DMHC-regulated plans and/or CDI-regulated policies will remain proportional to the increase in premiums. CHBRP assumes that if health care costs increase as a result of increased utilization or changes in unit costs, there will be a corresponding proportional increase in administrative costs. CHBRP assumes that the administrative cost portion of premiums is unchanged. All health plans and insurers include a component for administration and profit in their premiums.

Related Considerations for Policymakers

Postmandate Changes in Uninsured and Public Program Enrollment

Changes in the number of uninsured persons

CHBRP estimates premium increases of less than 1% for each market segment; this premium increase would not have a measurable impact on the number of persons who are uninsured. CHBRP does not anticipate loss of health insurance, changes in availability of the benefit beyond those subject to the mandate, changes in offer rates of health insurance, changes in employer contribution rates, changes in take-up of health insurance by employees, or purchase of individual market policies, due to the small size of the increase in premiums after the mandate.

Changes in public program enrollment

CHBRP estimates that the mandate would produce no measurable impact on enrollment in publicly funded insurance programs or on utilization of covered benefits in the publicly funded insurance market.

How Lack of Coverage Results in Cost Shifts to Other Payers

CHBRP estimates that the mandate would produce no measurable impact on enrollment in publicly funded insurance programs or on utilization of covered benefits in the publicly funded insurance market.

SB 190 and Actuarial Value

Actuarial values are calculated using benefit plan designs for EHBs, so benefit mandates that are EHBs can affect actuarial value (AV).[39] Because the per member per month (PMPM) allowed cost for this benefit is very small compared to the total allowed PMPM for all current EHBs, and because SB 190

[39] See *Criteria and Methods for Estimating the Impact of Benefit Mandates on Actuarial Value*, Available at: http://www.chbrp.org/analysis_methodology/cost_impact_analysis.php.

requires plans to cover PARTRS under the same terms/conditions as other similar coverage, CHBRP estimates that this mandate would have an immaterial impact on AV for plans and policies associated with Covered California.

Table 3. Baseline (Premandate) Per Member Per Month Premiums and Total Expenditures by Market Segment, California, 2016

	DMHC-Regulated						CDI-Regulated			
	Privately Funded Plans (by Market)[a]			**Publicly Funded Plans**			**Privately Funded Plans (by Market)[a]**			
	Large Group	*Small Group*	*Individual*	*CalPERS HMOs[b]*	*MCMC (Under 65)[c]*	*MCMC (65+)[d]*	*Large Group*	*Small Group*	*Individual*	**Total**
Enrollee counts										
Total enrollees in plans/policies subject to state mandates[e]	8,651,000	2,094,000	3,757,000	836,000	6,891,000	533,000	534,000	690,000	571,000	24,557,000
Total enrollees in plans/policies subject to SB 190	8,651,000	2,094,000	3,757,000	836,000	-	-	534,000	690,000	571,000	17,133,000
Premium Costs										
Average portion of premium paid by employer	$423.58	$304.59	$0.00	$437.75	$179.24	$445.00	$511.84	$421.06	$0.00	$80,452,488,000
Average portion of premium paid by employee	$114.05	$147.22	$422.03	$109.44	$0.76	$0.00	$134.80	$137.71	$334.65	$40,023,653,000
Total premium	**$537.63**	**$451.81**	**$422.03**	**$547.19**	**$180.00**	**$445.00**	**$646.64**	**$558.76**	**$334.65**	**$120,476,140,000**
Enrollee expenses										
Enrollee expenses for covered benefits (deductibles, copays, etc.)	$36.95	$89.15	$141.84	$29.78	$0.00	$0.00	$99.91	$166.51	$105.38	$15,510,004,000
Enrollee expenses for benefits not covered[f]	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0
Total expenditures	**$574.58**	**$540.97**	**$563.87**	**$576.98**	**$180.00**	**$445.00**	**$746.55**	**$725.28**	**$440.03**	**$135,986,144,000**

Source: California Health Benefits Review Program, 2015.

Notes: (a) Includes enrollees with grandfathered and nongrandfathered health insurance, inside and outside the exchange.

(b) As of September 30, 2013, 57.5%, or 462,580 CalPERS members were state retirees, state employees, or their dependents. CHBRP assumes the same ratio for 2015.

(c) Includes children formerly in Health Families, which was moved into Medi-Cal Managed Care in 2013 as part of the 2012-13 state budget.

(d) Medi-Cal Managed Care Plan expenditures for members over 65 include those who also have Medicare coverage.

(e) This population includes both persons who obtain health insurance using private funds (group and individual) and through public funds (e.g., CalPERS HMOs, Medi-Cal Managed Care Plans). Only those enrolled in health plans or policies regulated by the DMHC or CDI are included. Population includes all enrollees in state-regulated plans or policies aged 0 to 64 years, and enrollees 65 years or older covered by employer-sponsored health insurance.

(f) Includes only those expenses that are paid directly by enrollees or other sources to providers for services related to the mandated benefit that are not currently covered by insurance. This only includes those expenses that will be newly covered, postmandate. Other components of expenditures in this table include all health care services covered by insurance.

Key: CalPERS HMOs=California Public Employees' Retirement System Health Maintenance Organizations; CDI=California Department of Insurance; DMHC=Department of Managed Health Care; MCMC=Medi-Cal Managed Care.

Table 4. Postmandate Impacts on Per Member Per Month Premiums and Total Expenditures by Market Segment, California, 2016

.	DMHC-Regulated						CDI-Regulated			
	Commercial Plans (by Market) (a)			Publicly Funded Plans			Commercial Plans (by Market) (a)			
	Large Group	*Small Group*	*Individual*	*CalPERS HMOs (b)*	*MCMC (Under 65) (c)*	*MCMC (65+) (c)*	*Large Group*	*Small Group*	*Individual*	**TOTAL**
Enrollee Counts										
Total enrollees in plans/policies subject to state Mandates (d)	8,651,000	2,094,000	3,757,000	836,000	6,891,000	533,000	534,000	690,000	571,000	24,557,000
Total enrollees in plans/policies subject to SB 190	8,651,000	2,094,000	3,757,000	836,000	—	—	534,000	690,000	571,000	17,133,000
Premium Costs										
Average portion of premium paid by Employer	$0.82	$0.71	$0.00	$0.96	$0.00	$0.00	$0.07	$0.76	$0.00	$119,392,000
Average portion of premium paid by Employee	$0.22	$0.34	$1.08	$0.24	$0.00	$0.00	$0.02	$0.25	$0.97	$91,432,000
Total Premium	$1.04	$1.05	$1.08	$1.20	$0.00	$0.00	$0.09	$1.00	$0.97	**$210,823,000**
Enrollee Expenses										
Enrollee expenses for covered benefits (Deductibles, copays, etc.)	$0.04	$0.01	$0.01	$0.05	$0.00	$0.00	$0.00	$0.01	$0.01	$5,419,000
Enrollee expenses for benefits not covered (f)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0
Total Expenditures	$1.08	$1.06	$1.09	$1.25	$0.00	$0.00	$0.09	$1.01	$0.98	**$216,242,000**
Postmandate Percent Change										

.

	DMHC-Regulated						CDI-Regulated			
	Commercial Plans (by Market) (a)			Publicly Funded Plans			Commercial Plans (by Market) (a)			
	Large Group	*Small Group*	*Individual*	*CalPERS HMOs (b)*	*MCMC (Under 65) (c)*	*MCMC (65+) (c)*	*Large Group*	*Small Group*	*Individual*	**TOTAL**
Percent change insured premiums	0.1940%	0.2324%	0.2558%	0.2185%	0.0000%	0.0000%	0.0139%	0.1796%	0.2896%	0.1750%
Percent Change total expenditures	0.1884%	1.1962%	0.1929%	0.2164%	0.0000%	0.0000%	0.0122%	0.1396%	0.2221%	0.1590%

Source: California Health Benefits Review Program, 2015.

Notes: (a) Includes enrollees with grandfathered and nongrandfathered health insurance, inside and outside the exchange.

(b) As of September 30, 2013, 57.5%, or 462,580 CalPERS members were state retirees, state employees, or their dependents. CHBRP assumes the same ratio for 2015.

(c) Includes children formerly in Health Families, which was moved into Medi-Cal Managed Care in 2013 as part of the 2012-13 state budget.

(d) Medi-Cal Managed Care Plan expenditures for members over 65 include those who also have Medicare coverage.

(e) This population includes both persons who obtain health insurance using private funds (group and individual) and through public funds (e.g., CalPERS HMOs, Medi-Cal Managed Care Plans). Only those enrolled in health plans or policies regulated by the DMHC or CDI are included. Population includes all enrollees in state-regulated plans or policies aged 0 to 64 years, and enrollees 65 years or older covered by employer-sponsored health insurance.

(f) Includes only those expenses that are paid directly by enrollees or other sources to providers for services related to the mandated benefit that are not currently covered by insurance. This only includes those expenses that will be newly covered, postmandate. Other components of expenditures in this table include all health care services covered by insurance.

Key: CalPERS HMOs=California Public Employees' Retirement System Health Maintenance Organizations; CDI=California Department of Insurance; DMHC=Department of Managed Health Care; MCMC=Medi-Cal Managed Care.

PUBLIC HEALTH IMPACTS

The public health impact analysis includes estimates on mandate-relevant health outcomes, potential treatment harms, gender and racial disparities, financial burden, premature death, and economic loss in the short and long term. This section estimates the short-term impact[40] of SB 190 See *Long-Term Impact of SB 190*, page 41, for discussion of health outcomes, premature death, economic loss, and beyond the first 12 months of the bill implementation.

Estimated Public Health Outcomes

Measurable health outcomes relevant to SB 190 include functional status and independence (i.e., activities of daily living), cognitive function, depression, quality of life, social interaction, and work status. .

As presented in the *Medical Effectiveness section* (page 22), CHBRP found a preponderance of evidence suggesting that pre-/post-treatment comparisons of post-acute residential transitional rehabilitation services (PARTRS) show improvement in functional status and other outcomes for persons with moderate-to-severe acquired brain injury (ABI). When compared with other multidisciplinary post-acute rehabilitation services, CHBRP found insufficient evidence that PARTRS produces equivalent or better outcomes. *Please note that the absence of evidence is not "evidence of no effect"—positive or negative impacts could result, but current evidence is insufficient to ascertain outcome(s).*

As presented in the *Benefit Coverage, Utilization, and Cost Impacts* section (page 28), CHBRP estimates that coverage for SB 190 PARTRS would increase and patient utilization would shift from non-PARTRS in residential or outpatient settings, thus increasing utilization of PARTRS. This translates to 2,500 newly covered patients with moderate or severe ABI who would substitute other forms of post-acute rehabilitation services with the multidisciplinary PARTRS annually.

There is insufficient evidence that PARTRS produces a change in outcomes as compared with other multidisciplinary post-acute rehabilitation services (see *Medical Effectiveness*). Therefore, CHBRP concludes that the overall public health impact[41] of SB 190 on the 2,500 newly covered enrollees with ABI that could use PARTRS is unknown.

CHBRP finds insufficient evidence of medical effectiveness to suggest that multidisciplinary PARTRS as described in SB 190 produces changes to health outcomes as compared with other rehabilitation services. Therefore, the public health impact in the first year, postmandate, is unknown. Please note that the absence of evidence is not "evidence of no effect." It is possible that an impact—positive or negative—could result, but current evidence is insufficient to inform an estimate.

[40] CHBRP defines short-term impacts as changes occurring within 12 months of bill implementation.

[41] For CHBRP to quantify the public health impact of a proposed mandate the intervention must be medically effective and there must be a change in the insurance coverage and/or utilization of the intervention.

Impact on Gender and Racial Disparities

As presented in the *Background section*, there appear to be differences in the incidence of ABI by age, gender, and race/ethnicity as well as differences in utilization and outcomes of post-acute rehabilitation for minorities. The impact of SB 190 on reducing gender and racial/ethnic disparities in ABI recovery is unknown due to insufficient evidence that the effectiveness of PARTRS produces changes in health outcomes as compared other multidisciplinary rehabilitation services.

Estimated Impact on Financial Burden

An enrollee's *expenses for uncovered*[43] treatments/services and *out-of-pocket*[42] costs for covered treatments/services comprise CHBRP's definition of financial burden. There was an absence of evidence of unmet demand due to broad current coverage for other forms of post-acute rehabilitation services. Therefore, CHBRP assumes that those who were previously uncovered for PARTRS would not have used those services due to the high cost, and would have substituted other covered rehabilitation services instead. *Thus, there are no enrollee expenses for uncovered PARTRS pre- or post-mandate* (Table 1),

CHBRP estimates that, post-mandate, *out-of-pocket costs* (cost sharing) for the ABI patients using use newly covered PARTRS will increase by $5.4 million (Table 1). The out-of-pocket costs will vary by ABI patient depending on (1) the cost sharing provisions of the patient's plan, such as copays, coinsurance, deductibles, and maximum out-of-pocket; and (2) whether the patient would have received skilled nursing facility-based (SNF) or outpatient-based post-acute rehab services in the absence of PARTRS coverage. Post-mandate, patients who receive PARTRS in place of SNF-based (non-PARTRS) rehabilitation services will face less of a change in cost sharing than patients who received outpatient rehabilitation services.

SNF-Based Facility Costs Versus PARTRS Cost for Enrollees

CHBRP estimates that the difference in cost-sharing between SNF-based rehabilitation services and PARTRS is likely to be limited or zero for most patients post-mandate. Most enrollees with ABI will reach their out-of-pocket maximum due to acute medical care expenses and long stays in SNFs or PARTRS facilities. For patients who are not subject to deductibles and coinsurance, the cost sharing for SNF and PARTRS stays is typically a fixed dollar copay, often with a limit on the number of days that are subject to the copay.

Outpatient Rehabilitation Service Costs Versus PARTRS Cost for Enrollees

The difference in cost sharing between outpatient-based rehab services and PARTRS will be quite significant for many patients. Outpatient services are much less costly and typically have lower cost sharing than other more intensive services, leading to lower cost sharing of outpatient-based services than PARTRS.

[42] CHBRP defines "out-of-pocket enrollee expenses" as those related to deductibles, copayments, or coinsurance for services covered by insurance, whereas "enrollee expenses for uncovered treatments/services" refer to enrollees paying the full cost of care because the treatment/service is not covered by insurance. The term "uncovered expenses" refers to a combination of the two aforementioned categories.

Thus, the $5.4 million increase in out-of-pocket expenses postmandate is primarily attributable to a shift from outpatient rehabilitation services to intensive, multidisciplinary PARTRS.

CHBRP estimates that there is no unmet demand for PARTRS due to the presence of alternative covered rehabilitation services. In the first year, postmandate, out-of-pocket costs for enrollees using PARTRS would increase by $5.4 million. CHBRP estimates that 2,500 newly covered ABI patients who are clinically eligible for PARTRS would meet their out-of-pocket maximum as they shift from other rehabilitation services to PARTRS.

LONG-TERM IMPACT OF SB 190

In this section, CHBRP estimates the long-term impact of SB 190, defined as impacts occurring beyond the first 12 months of implementation. These estimates are qualitative and based on the existing evidence available in the literature. CHBRP does not provide quantitative estimates of long-term impacts because of unknown improvements in clinical care, changes in prices, implementation of other complementary or conflicting policies, and other unexpected factors.

Long-Term Utilization and Cost Impacts

Utilization Impacts

In the 12 months following enactment, CHBRP estimates a shift of utilization among these persons with moderate-to-severe acquired brain injury ABI who gain post-acute residential transitional services (PARTRS) coverage—greater use of PARTRS and less use of post-acute outpatient rehabilitation and skilled nursing facility (SNF)-based rehabilitation services—but not greater overall use of post-acute rehabilitation services. In later years, it is unknown whether there might be an increase in utilization of PARTRS. Even if the demand for PARTRS increases, insurers and employers could respond in a variety of ways, including increasing the copayments or engaging in additional utilization management strategies.

Cost Impacts

Long-term cost impacts attributable to SB 190 are unknown due to insufficient evidence regarding whether the rehabilitation through PARTRS reduces health care cost in the long run. Please note that the absence of evidence is not “evidence of no effect.” It is possible that an impact—desirable or undesirable—could result, but current evidence is insufficient to inform an estimate.

Long-Term Public Health Impacts

Some interventions in proposed mandates provide immediate measurable impacts (e.g., maternity service coverage or acute care treatments) while other interventions may take years to make a measurable impact (e.g., coverage for tobacco cessation or vaccinations). When possible, CHBRP estimates the long-term effects of a proposed mandate (beyond CHBRP’s 12-month analytic timeframe) to capture possible impacts to the public’s health that would be attributable to the mandate, including impacts on premature death and economic loss.

The long-term public health impact on health outcomes (i.e., cognitive or motor function, functional status, quality of life, etc.) attributable to SB 190 is unknown due to insufficient evidence regarding whether the effectiveness of PARTRS produces changes in health outcomes as compared with other multidisciplinary rehabilitation. Please note that the absence of evidence is not “evidence of no effect.” It is possible that an impact—positive or negative—could result, but current evidence is insufficient to inform an estimate.

Impacts on Premature Death and Economic Loss

Premature death is often defined as death before the age of 75 years (Cox, 2006). The overall impact of premature death due to a particular disease can be measured in years of potential life lost prior to age 75 and summed for the population (generally referred to as “YPLL”) (Cox, 2006; Gardner and Sanborn, 1990). In California, it is estimated that there are nearly 102,000 premature deaths each year, accounting

for more than two million YPLL (CDPH, 2011; Cox, 2006). In order to measure the impact of premature mortality across the population impacted by a proposed mandate, CHBRP first collects baseline mortality rates. Next, the literature is examined to determine whether the proposed mandated benefit impacts mortality and whether YPLL have been established for the given condition. Some diseases and conditions do not result in death, and therefore a mortality outcome is not relevant.

Economic loss associated with disease is generally presented in the literature as an estimation of the value of the YPLL in dollar amounts (i.e., valuation of a population's lost years of work over a lifetime). For CHBRP analyses, a literature review is conducted to determine whether lost productivity has been established in the literature. In addition, morbidity associated with the disease or condition of interest can also result in lost productivity; either by causing the worker to miss days of work due to their illness or due to their role as a caregiver for someone else who is ill.

Premature Death

Research shows that survivors of ABI are at elevated risk for premature death (Shavelle et al., 2001; Harrison-Felix et al., 2004; Harrison-Felix et al., 2009); however, CHBRP found no literature addressing the effectiveness of rehabilitative treatments in preventing premature death.

Although research shows that persons with ABI are at elevated risk for premature death, CHBRP concludes that the impact of SB 190 on premature death is unknown due lack of evidence regarding the effectiveness of PARTRS on mortality.

Economic Loss

Moderate to severe ABI frequently results in costly medical care (direct costs for acute and post-acute care) and lost productivity (indirect costs such as lost wages or schooling for patients with ABI and/or their caregivers). The Centers for Disease Control and Prevention estimates the economic burden across the U.S. for just TBI to be about $76.5 billion (CDC, 2013a).

The Traumatic Brain Injury Model Systems National Database examines the recovery and outcomes of acute brain injury care and post-acute, in-hospital rehabilitation among 19 centers nationally (TBINDSC, 2014). They report that within their population, 62% are employed at injury and 13% are unemployed (the remainder are students, retired or "other"). One-year post injury, employment decreases to 28% and unemployment increases to 30%. Similar rates persist at two years post injury. The percent of retirees increases from 15% pre-injury to 34% two years post-injury (TBINDSC, 2014). Although economic loss is associated with ABI, evidence regarding multidisciplinary rehabilitation treatments on employment was ambiguous (see *Medical Effectiveness*).

Although ABI causes economic loss, the long term impact of SB 190 on economic loss is unknown because evidence of PARTRS effectiveness on return-to-employment is ambiguous.

APPENDIX A TEXT OF BILL ANALYZED

On February 11, 2015, the California Assembly Committee on Health requested that CHBRP analyze SB 190.

As of February 20, 2015, the Senate Health Committee asked CHBRP to analyze SB 190 including amending language. In the introduced language, below, the amending language is called out in *blue italics*.

SENATE BILL No. 190

Introduced by Senator Beall

February 10, 2015

An act to add Section 1367.81 to the Health and Safety Code, and to add Section 10123.65 to the Insurance Code, relating to health care coverage.

LEGISLATIVE COUNSEL'S DIGEST

SB 190, as introduced, Beall. Health care coverage: acquired brain injury.

Existing law, the Knox-Keene Health Care Service Plan Act of 1975, provides for the licensure and regulation of health care service plans by the Department of Managed Health Care and makes a willful violation of the act a crime. Existing law also provides for the regulation of health insurers by the Department of Insurance. Existing law requires health care service plan contracts and health insurance policies to provide coverage for specified benefits.

This bill would require health care service plan contracts and health insurance policies issued, amended, renewed, or delivered on or after January 1, 2016, to include coverage for post-acute residential transitional rehabilitation services made necessary as a result of and related to an acquired brain injury. The bill would prohibit the plan contract or policy from including any acquired brain injury post-acute care treatment covered under the plan contract or policy in any lifetime limitation on the number of days of covered acute care treatment, and would require the plan contract or policy to provide the post-acute residential transitional rehabilitation services under the same terms and conditions, including, but not limited to, deductibles and copayments, as are applicable to similar coverage provided under the plan contract or policy. The bill would also prohibit a health care service plan or health insurer that contracts with or approves admission to a service provider pursuant to these requirements from refusing to contract with or approve admission to that facility to provide services that meet specified criteria solely because a facility is licensed by this state as an adult residential facility. Because a willful violation of the bill's provisions by a health care service plan would be a crime, it would impose a state-mandated local program.

The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

Vote: majority. Appropriation: no. Fiscal committee: yes. State-mandated local program: yes.

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

SECTION 1.

Section 1367.81 is added to the *Health and Safety Code*, to read:

1367.81.

(a) A health care service plan contract issued, amended, renewed, or delivered on or after January 1, 2016, shall include coverage for post-acute residential transitional rehabilitation services made necessary as a result of and related to an acquired brain injury.

(1) The health care service plan contract shall not include any acquired brain injury post-acute care treatment covered under the plan contract in any lifetime limitation on the number of days of covered acute care treatment. Any limitation imposed under the plan contract on days of acquired brain injury post-acute care treatment shall be separately stated in the plan contract.

(2)

(A) The health care service plan contract shall provide the services described in this section under the same terms and conditions as are applicable to similar coverage provided under the plan contract.

(B) Those terms and conditions include, but are not limited to, 19all of the following:

(i) Deductibles.

(ii) Copayments.

(iii) Coinsurance.

(iv) Annual or lifetime maximum payment limits.

(b) A health care service plan that contracts with or approves admission to a service provider under this section shall not, solely because a facility is licensed by this state as an adult residential facility, refuse to contract with or approve admission to that facility to provide services that are all of the following:

(1) Required by this section.

(2) Within the scope of its license as an adult residential facility.

(3) Within the scope of the services of an adult residential facility or post-acute residential rehabilitation facility that has a specialty in brain injury rehabilitation, which may include accreditation by the Commission on Accreditation of Rehabilitation Facilities or other state licensed or nationally recognized or accredited rehabilitation program for brain injury.

As used in this section, "post-acute residential transitional rehabilitation" means physician-prescribed rehabilitation indicated for the individuals specified below that utilizes an interdisciplinary, coordinated team approach in a residential facility and provides direct medical and goal-oriented treatment for a complex range of medical, physical, communicative, cognitive, neurobehavioral and psychological conditions arising from or associated with acquired brain injury.

As used in this subdivision "interdisciplinary, coordinated team approach" means a treatment approach that includes physical therapy, occupational therapy, speech therapy, rehabilitation nursing, respiratory therapy, neuropsychology and psychology services, prosthetic/orthotic services, or a combination thereof.

As used in this subdivision, "goal oriented treatment" means treatment that has the goal of minimizing or eliminating medical complications, reducing disability, and returning the person to self-sufficiency and/or maximal possible functional independence.

Post-acute residential transitional rehabilitation may be indicated for individuals who can be treated more effectively in a residential setting, or may not have had access to appropriate or adequate hospital or sub-acute rehabilitation in a long-term acute hospital or skilled nursing facility and who have any combination of the following conditions and factors due to ABI:

- *Have continuing medical complexity;*
- *Have significant functional deficits;*
- *Are deemed unsafe to be discharged to his or her personal residence;*
- *Require continued neurobehavioral treatment; or*
- *Have a deteriorated medical, physical, communicative, cognitive, neurobehavioral and psychological status.*

(c) This section shall not apply to accident-only, specified disease, hospital indemnity, Medicare supplement, dental-only, or vision-only health care service plan contracts *or a health care service plan issued, sold, renewed or offered for health care services or coverage provided in the Medi-Cal program (Chapter 7(commencing with Section 14000) of Part 3 of Division 9 of the Welfare and Institutions Code).*

SEC. 2.

Section 10123.65 is added to the *Insurance Code*, to read:

10123.65.

(a) A health insurance policy issued, amended, renewed, or delivered on or after January 1, 2016, shall include coverage for post-acute residential transitional rehabilitation services made necessary as a result of and related to an acquired brain injury.

(1) The health insurance policy shall not include any acquired brain injury post-acute care treatment covered under the policy in any lifetime limitation on the number of days of covered acute care treatment. Any limitation imposed under the policy on days of acquired brain injury post-acute care treatment shall be separately stated in the policy.

(2)

(A) The health insurance policy shall provide the services described in this section under the same terms and conditions as are applicable to similar coverage provided under the policy.

(B) Those terms and conditions include, but are not limited to, all of the following:

(i) Deductibles.

(ii) Copayments.

(iii) Coinsurance.

(iv) Annual or lifetime maximum payment limits.

(b) An insurer that contracts with or approves admission to a service provider under this section shall not, solely because a facility is licensed by this state as an adult residential facility, refuse to contract with or approve admission to that facility to provide services that are all of the following:

(1) Required by this section.

(2) Within the scope of its license as an adult residential facility.

(3) Within the scope of the services of an adult residential facility or post-acute residential rehabilitation facility that has a specialty in brain injury rehabilitation, which may include accreditation by the Commission on Accreditation of Rehabilitation Facilities or other state licensed or nationally recognized or accredited rehabilitation program for brain injury.

As used in this section, "post-acute residential transitional rehabilitation" means physician-prescribed rehabilitation indicated for the individuals specified below that utilizes an interdisciplinary, coordinated team approach in a residential facility and provides direct medical and goal-oriented treatment for a complex range of medical, physical, communicative, cognitive, neurobehavioral and psychological conditions arising from or associated with acquired brain injury.

As used in this subdivision "interdisciplinary, coordinated team approach" means a treatment approach that includes physical therapy, occupational therapy, speech therapy, rehabilitation nursing, respiratory therapy, neuropsychology and psychology services, prosthetic/orthotic services, or a combination thereof.

As used in this subdivision, "goal oriented treatment" means treatment that has the goal of minimizing or eliminating medical complications, reducing disability, and returning the person to self-sufficiency and/or maximal possible functional independence.

Post-acute residential transitional rehabilitation may be indicated for individuals who can be treated more effectively in a residential setting, or may not have had access to appropriate or adequate hospital or sub-acute rehabilitation in a long-term acute hospital or skilled nursing facility and who have any combination of the following conditions and factors due to ABI:

- *Have continuing medical complexity;*
- *Have significant functional deficits;*
- *Are deemed unsafe to be discharged to his or her personal residence;*
- *Require continued neurobehavioral treatment; or*
- *Have a deteriorated medical, physical, communicative, cognitive, neurobehavioral and psychological status.*

(c) This section shall not apply to accident-only, specified disease, hospital indemnity, Medicare supplement, dental-only, or vision-only health insurance policies.

SEC. 3.

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

APPENDIX B LITERATURE REVIEW METHODS

Appendix B describes methods used in the medical effectiveness literature review for SB 190, a bill that would prohibit all DMHC-regulated health plan contracts and all CDI regulated policies from denying coverage for medically necessary post-acute residential transitional rehabilitation for ABI at a facility that is properly licensed and accredited and at which appropriate services may be provided.

The literature search included studies published in English from 2012 to the present. The following databases of peer-reviewed literature were searched: MEDLINE (PubMed), the Cochrane Database of Systematic Reviews, the Cochrane Register of Controlled Clinical Trials, the Cumulative Index of Nursing and Allied Health Literature (CINAHL), PsycInfo, Web of Science, Business Source Complete, EconLit, and PEDro (an Evidence-Based Physical Therapy database). In addition, Web sites maintained by the following organizations that index or publish systematic reviews and evidence-based guidelines were searched: the Agency for Healthcare Research and Quality (AHRQ), International Network of Agencies for Health Technology Assessment, National Health Service Centre for Reviews and Dissemination, National Institute for Health and Clinical Excellence, and the Scottish Intercollegiate Guideline Network. Additional websites searched were The Brain Trauma Foundation, Brain Injury Association of America, and North American Brain Injury Society.

CHBRP reviewed the evidence about the effectiveness of rehabilitation for ABI in a report on SB 320 in 2013. In the SB 320 report in 2013 (CHBRP; 2013), the medical effectiveness review relied heavily on two systematic reviews that assessed findings from 30 articles and that presented findings from a total of 24 RCTs and quasi-experimental studies of multidisciplinary rehabilitation programs (Brasure et al., 2012; Turner-Stokes et al., 2005).

The present search was limited to abstracts of studies published in English after CHBRP completed the report on SB 320, from 2013 to the present. The literature review conducted for the present report identified 85 studies, of which 11 were deemed relevant to the medical effectiveness analysis.

Because SB 190 addresses a wide variety of treatments, CHBRP's medical effectiveness review focused on identifying studies of the effectiveness of multidisciplinary rehabilitation program for ABI. Studies of persons with any diagnosis that is classified as an ABI were included. The analysis was limited to studies that primarily enrolled persons under age 65 because most persons whose health insurance coverage would be affected by SB 190 are in that age group.

Two reviewers screened the title and abstract of each citation retrieved by the literature search to determine eligibility for inclusion. The reviewers acquired the full text of articles that were deemed eligible for inclusion in the review. Of the 278 abstracts found in the literature review, 85 were reviewed for potential inclusion in this report on SB 190. The medical effectiveness review relied heavily on one systematic review that assessed findings from 8 articles that presented findings from a total of 8 randomized controlled trials (RCTs) and quasi-experimental studies of multidisciplinary rehabilitation programs[43] (Brasure et al., 2013). The other articles were eliminated because the studies they presented did not focus on ABI, were not well-designed (that is, they were not ranked as highly in CHBRP's hierarchy of research designs as those CHBRP did include), did not report findings from clinical research studies, or did not address outcomes of multidisciplinary rehabilitation programs. In making a "call" for each outcome measure, the team and the content expert consider the number of studies as well the strength of the evidence. Further information about the criteria CHBRP uses to evaluate evidence of

[43] Quasi-experimental studies are nonrandomized studies with comparison groups that are designed prospectively to maximize similarities between the intervention and comparison groups at baseline.

medical effectiveness can be found in CHBRP's *Medical Effectiveness Analysis Research Approach.*[44] To grade the evidence for each outcome measured, the team uses a grading system that has the following categories:

- Research design;
- Statistical significance;
- Direction of effect;
- Size of effect; and
- Generalizability of findings.

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

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

A grade of *clear and convincing evidence* indicates that there are multiple studies of a treatment and that the large majority of studies are of high quality and consistently find that the treatment is either effective or not effective.

A grade of *preponderance of evidence* indicates that the majority of the studies reviewed are consistent in their findings that treatment is either effective or not effective.

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

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

Search Terms

The search terms used to locate studies relevant to SB 190 Traumatic Brain Injury were as follows:

MeSH Terms Used to Search PubMed

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

Activities of Daily Living
Aphasia/therapy
Automobile Driving
Behavior Therapy
Brain Injuries/rehabilitation
Caregivers/psychology
Cognition
  Disorders/rehabilitation
Cognitive Therapy
Community Health Services
Continuity of Patient
  Care/economics
Cost of Illness
Cost–Benefit Analysis
Craniocerebral Trauma
Encephalitis/rehabilitation
Electric
  Stimulation Therapy/methods*
Ethnic Groups
Exercise Therapy
Health Care Costs
Healthcare Disparities
Home Care Services
Hospital
Hospital Units
Hospitalization
Hypoglycemia
Hypoxia, Brain
Incidence
Interdisciplinary communication
Language Therapy
Length of Stay
Memory Disorders/rehabilitation
Meningitis/rehabilitation
Mental Disorders / rehabilitation
Morbidity
Mortality
Mortality, Premature
Motion Therapy, Continuous Passive
Motor Skills
Movement Disorders/rehabilitation
Occupational Therapy
Outpatient Clinics
Patient Satisfaction
Postural Balance
Prevalence
Psychotherapy
Quality of Life
Recovery of Function
Rehabilitation/economics/utilization
Rehabilitation Centers
Residential Facilities
Return to Work
Severity of Illness Index
Skilled Nursing Facilities
Social Adjustment
Specialization
Speech Therapy
Stroke/rehabilitation
Subarachnoid Hemorrhage
Treatment Outcome

Keywords

Acquired brain injury
Acquired brain injuries
ADL
Behavioral management
Bladder and bowel retraining
Brain injuries
Brain injury
Caregiver*
Cerebral anoxia
Cognitive rehabilitation
Community-based
Community integration
Comprehensive brain injury rehabilitation
Cost effective*
Disparit*
Economic burden
Economic loss
Ethnic
Electrical stimulation
Encephalitis
Financial burden
Functional status
Functional recovery
Head injuries
Head injury
Hypoglycemia
Intensive Brain Injury Rehabilitation
Intensive specialist rehabilitation
Interdisciplinary community rehabilitation
Language therapy
Memory Rehabilitation
Meningitis
Morbidity
Mortality
Movement therapy
Multidisciplinary
Occupational therapy
Outpatient rehabilitation
Physical therapy
Post-acute residential rehabilitation
Psychotherapy
Quality of life
Racial
Self help
Severe
Skilled nursing rehabilitation
Specialist inpatient rehabilitation
Specialist post-acute rehabilitation
Specialized brain injury rehabilitation
Specialized interdisciplinary treatment
Speech therapy
Stroke
Stroke unit
Subarachnoid hemorrhage
Traumatic brain injuries
Traumatic brain injury
Vasculitis/rehabilitation
Vocational rehabilitation

* Indicates that truncation of the keyword

Publication Types:

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

APPENDIX C COST IMPACT ANALYSIS: DATA SOURCES, CAVEATS, AND ASSUMPTIONS

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

The cost analysis in this report was prepared by the members of the cost team, which consists of CHBRP task force members and contributors from the University of California, Los Angeles, and the University of California, Davis, as well as the contracted actuarial firm, Milliman, Inc.[45]

Data Sources

This subsection discusses the variety of data sources CHBRP uses. Key sources and data items are listed in the Table, below.

Table 5. Data for 2016 Projections

Data Source	Items
California Department of Health Care Services (DHCS) administrative data for the Medi-Cal program, data available as of end of December 2014	Distribution of enrollees by managed care or FFS distribution by age: 0–17; 18–64; 65+ Medi-Cal Managed Care premiums
California Department of Managed Health Care (DMHC) data from the interactive website "Health Plan Financial Summary Report," August–October, 2014	Distribution of DMHC-regulated plans by market segment*
California Department of Insurance (CDI) Statistical Analysis Division data; data as of December 31, 2013	Distribution of CDI-regulated policies by market segment
California Health Benefits Review Program (CHBRP) Annual Enrollment and Premium Survey of California's largest (by enrollment) health care service plans and health insurers; data as of September 30, 2014; responders' data represent approximately 97.3% of persons not associated with CalPERS or Medi-Cal with health insurance subject to state mandates—98.0% of full-service (nonspecialty) DMHC-regulated plan enrollees and 97.0% of full-service (nonspecialty) CDI-regulated policy enrollees.	Enrollment by: • Size of firm (2–50 as small group and 51+ as large group) • DMHC vs. CDI regulated • Grandfathered vs. nongrandfathered Premiums for individual policies by: • DMHC vs. CDI regulated • Grandfathered vs. nongrandfathered

[45] CHBRP's authorizing legislation requires that CHBRP use a certified actuary or "other person with relevant knowledge and expertise" to determine financial impact (www.chbrp.org/docs/authorizing_statute.pdf).

Data Source	Items
California Employer Health Benefits Survey, 2014 (conducted by NORC and funded by CHCF)	Enrollment by HMO/POS, PPO/indemnity self-insured, fully insured, Premiums (not self-insured) by: • Size of firm (3–25 as small group and 25+ as large group) • Family vs. single • HMO/POS vs. PPO/indemnity vs. HDHP employer vs. employer premium share
California Health Interview Survey (CHIS) 2012/2013/T7 ("T7" representing the first 6 months of 2014)	Uninsured, age: 65+ Medi-Cal (non-Medicare), age: 65+ Other public, age: 65+ Employer-sponsored insurance, age: 65+
California Public Employees' Retirement System (CalPERS) data, enrollment as of October 1, 2014	CalPERS HMO and PPO enrollment • Age: 0–17; 18–64; 65+ HMO premiums
California Simulation of Insurance Markets (CalSIM) Version 1.9.1 (projections for 2016)	Uninsured, age: 0–17; 18–64 Medi-Cal (non-Medicare) (a), age: 0–17; 18–64 Other public (b), age: 0–64 Individual market, age: 0–17; 18–64 Small group, age: 0–17; 18–64 Large group, age: 0–17; 18–64
Centers for Medicare and Medicaid (CMS) administrative data for the Medicare program, annually (if available) as of end of September	HMO vs. FFS distribution for those 65+ (noninstitutionalized)
Milliman estimate	Medical trend influencing annual premium increases

Notes: *CHBRP assumes DMHC-regulated PPO group enrollees and POS enrollees are in the large-group segment.
Key: CDI=California Department of Insurance; CHCF=California HealthCare Foundation; CHIS=California Health Interview Survey; CMS=Centers for Medicare & Medicaid Services; DHCS=Department of Health Care Services; DMHC=Department of Managed Health Care; FFS=fee-for-service; HMO=health maintenance organization; NORC=National Opinion Research Center; POS=point of service; PPO=preferred provider organization.

Further discussion of external and internal data follows.

Internal data

1. CHBRP's Annual Enrollment and Premium Survey collects data from the seven largest providers of health insurance in California (including Aetna, Anthem Blue Cross of California, Blue Shield of California, CIGNA, Health Net, Kaiser Foundation Health Plan, and United Healthcare/PacifiCare) to obtain estimates of enrollment not associated with CalPERS or Medi-Cal by purchaser (i.e., large and small group and individual), state regulator (DMHC or CDI), grandfathered and nongrandfathered status, and average premiums. CalSIM and market trends were applied to project 2016 health insurance enrollment in DMHC-regulated plans and CDI-regulated policies.

2. CHBRP's other surveys of the largest plans/insurers collect information on benefit coverage relevant to proposed benefit mandates CHBRP has been asked to analyze. In each report, CHBRP indicates the proportion of enrollees—statewide and by market segment—represented

by responses to CHBRP's bill-specific coverage surveys. The proportions are derived from data provided by CDI and DMHC.

3. External sources

4. California Department of Health Care Services (DHCS) data are used to estimate enrollment in Medi-Cal Managed Care (beneficiaries enrolled in Two-Plan Model, Geographic Managed Care, and County Operated Health System plans), which may be subject to state benefit mandates, as well as enrollment in Medi-Cal Fee For Service (FFS), which is not. The data are available at: www.dhcs.ca.gov/dataandstats/statistics/Pages/Monthly_Trend_Report.aspx. Medi-Cal enrollment is projected to 2016 based on CalSIM's estimate of the continuing impact of the Medi-Cal expansion implemented in 2014.

5. California Employer Health Benefits Survey data are used to make a number of estimates, including: premiums for employment-based enrollment in DMHC-regulated health care service plans (primarily health maintenance organizations [HMOs] and point of service [POS] plans) and premiums for employment-based enrollment in CDI-regulated health insurance policies regulated by the (primarily preferred provider organizations [PPOs]). Premiums for fee-for-service (FFS) policies are no longer available due to scarcity of these policies in California. This annual survey is currently released by the California Health Care Foundation/National Opinion Research Center (CHCF/NORC) and is similar to the national employer survey released annually by the Kaiser Family Foundation and the Health Research and Educational Trust. More information on the CHCF/NORC data is available at: www.chcf.org/publications/2014/01/employer-health-benefits.

6. California Health Interview Survey (CHIS) data are used to estimate the number of Californians aged 65 and older, and the number of Californians dually eligible for both Medi-Cal and Medicare coverage. CHIS data are also used to determine the number of Californians with incomes below 400% of the federal poverty level. CHIS is a continuous survey that provides detailed information on demographics, health insurance coverage, health status, and access to care. More information on CHIS is available at: www.chis.ucla.edu.

7. California Public Employees Retirement System (CalPERS) data are used to estimate premiums and enrollment in DMHC-regulated plans, which may be subject to state benefit mandates, as well as enrollment in CalPERS' self-insured plans, which is not. CalPERS does not currently offer enrollment in CDI-regulated policies. Data are provided for DMHC-regulated plans enrolling non-Medicare beneficiaries. In addition, CHBRP obtains information on current scope of benefits from evidence of coverage (EOC) documents publicly available at: www.calpers.ca.gov. CHBRP assumes CalPERS's enrollment in 2016 will not be affected by continuing shifts in the health insurance market as a result of the ACA.

8. California Simulation of Insurance Markets (CalSIM) estimates are used to project health insurance status of Californians aged 64 and under. CalSIM is a microsimulation model that projects the effects of the Affordable Care Act on firms and individuals. More information on CalSIM is available at: http://healthpolicy.ucla.edu/programs/health-economics/projects/CalSIM/Pages/default.aspx.

9. Milliman data sources are relied on to estimate the premium impact of mandates. Milliman's projections derive from the Milliman Health Cost Guidelines (HCGs). The HCGs are a health care pricing tool used by many of the major health plans in the United States. Most of the data sources underlying the HCGs are claims databases from commercial health insurance plans. The data are supplied by health insurance companies, HMOs, self-funded employers, and private data vendors. The data are mostly from loosely managed health care plans, generally those characterized as PPO plans. More information on the Milliman HCGs is available at:

http://us.milliman.com/Solutions/Products/Resources/Health-Cost-Guidelines/Health-Cost-Guidelines---Commercial/.

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

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

Projecting 2016

This subsection discusses adjustments made to CHBRP's Cost and Coverage Model to project 2016, the period when mandates proposed in 2015 would, if enacted, generally take effect. It is important to emphasize that CHBRP's analysis of specific mandate bills typically addresses the incremental effects of a mandate—specifically, how the proposed mandate would impact benefit coverage, utilization, costs, and public health, *holding all other factors constant*. CHBRP's estimates of these incremental effects are presented in the *Benefit Coverage, Utilization, and Cost Impacts* section of this report.

Baseline premium rate development methodology

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

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

For each market segment, we first obtained an estimate of the insurance premium PMPM by taking the 2014 reported premium from the abovementioned data sources and trending that value to 2016. CHBRP uses trend rates published in the Milliman HCGs to estimate the health care costs for each market segment in 2016.

The large-group market segments for each regulator (CDI and DMHC) are split into grandfathered and nongrandfathered status. For the small-group and individual markets, further splits are made to indicate association with Covered California, the state's health insurance marketplace. Doing so allows CHBRP to separately calculate the impact of ACA and of specific mandates, both of which may apply differently among these subgroups. The premium rate data received from the CHCF/NORC California Employer Health Benefits survey did not split the premiums based on grandfathered or exchange status. However, CHBRP's Annual Enrollment and Premium (AEP) survey asked California's largest health care service plans and health insurers to provide their average premium rates separately for grandfathered and nongrandfathered plans. The ratios from the CHBRP survey data were then applied to the CHCH/NORC aggregate premium rates for large and small group, to estimate premium rates for grandfathered and

nongrandfathered plans that were consistent with the NORC results. For the individual market, the premium rates received from CHBRP's AEP survey were used directly.

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

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

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

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

General Caveats and Assumptions

This subsection discusses the general caveats and assumptions relevant to all CHBRP reports. The projected costs are estimates of costs that would result if a certain set of assumptions were exactly realized. Actual costs will differ from these estimates for a wide variety of reasons, including:

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

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

- Cost impacts are shown only for plans and policies subject to state benefit mandate laws.
- Cost impacts are only for the first year after enactment of the proposed mandate.
- Employers and employees will share proportionately (on a percentage basis) in premium rate increases resulting from the mandate. In other words, the distribution of the premium paid by the subscriber (or employee) and the employer will be unaffected by the mandate.
- For state-sponsored programs for the uninsured, the state share will continue to be equal to the absolute dollar amount of funds dedicated to the program.

- When cost savings are estimated, they reflect savings realized for 1 year. Potential long-term cost savings or impacts are estimated if existing data and literature sources are available and provide adequate detail for estimating long-term impacts. For more information on CHBRP's criteria for estimating long-term impacts, please see: www.chbrp.org/analysis_methodology/docs/longterm_impacts08.pdf.

- Several studies have examined the effect of private insurance premium increases on the number of uninsured (Chernew et al., 2005; Glied and Jack, 2003; Hadley, 2006). Chernew et al. (2005) estimate that a 10% increase in private premiums results in a 0.74 to 0.92 percentage point decrease in the number of insured, whereas Hadley (2006) and Glied and Jack (2003) estimate that a 10% increase in private premiums produces a 0.88 and a 0.84 percentage point decrease in the number of insured, respectively. Because each of these studies reported results for the large-group, small-group, and individual insurance markets combined, CHBRP employs the simplifying assumption that the elasticity is the same across different types of markets. For more information on CHBRP's criteria for estimating impacts on the uninsured, please see *Criteria and Methods for Estimating the Impact of Mandates on the Number of Individuals Who Become Uninsured in Response to Premium Increases*, available at: www.chbrp.org/analysis_methodology/cost_impact_analysis.php.

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

- Population shifts by type of health insurance: If a mandate increases health insurance costs, some employer groups and individuals may elect to drop their health insurance. Employers may also switch to self-funding to avoid having to comply with the mandate.

- Changes in benefits: To help offset the premium increase resulting from a mandate, deductibles or copayments may be increased. Such changes would have a direct impact on the distribution of costs between health plans/insurers and enrollees, and may also result in utilization reductions (i.e., high levels of cost sharing result in lower utilization of health care services). CHBRP did not include the effects of such potential benefit changes in its analysis.

- Adverse selection: Theoretically, persons or employer groups who had previously foregone health insurance may elect, postmandate, to enroll in a health plan or policy because they perceive that it is now to their economic benefit to do so.

- Medical management: Health plans/insurers may react to the mandate by tightening medical management of the mandated benefit. This would tend to dampen the CHBRP cost estimates. The dampening would be more pronounced on the plan/policy types that previously had the least effective medical management (i.e., PPO plans).

- Geographic and delivery systems variation: Variation exists in existing utilization and costs, and in the impact of the mandate, by geographic area and by delivery system models. Even within the health insurance plan/policy types CHBRP modeled (HMO, including HMO and POS plans, and non-HMO, including PPO and FFS policies), there are likely variations in utilization and costs. Utilization also differs within California due to differences in the health status of the local population, provider practice patterns, and the level of managed care available in each community. The average cost per service would also vary due to different underlying cost levels experienced by providers throughout California and the market dynamic in negotiations between providers and health plans/insurers. Both the baseline costs prior to the mandate and the estimated cost impact of the mandate could vary within the state due to geographic and delivery system differences. For purposes of this analysis, however, CHBRP has estimated the impact on a statewide level.

- Compliance with the mandate: For estimating the postmandate impacts, CHBRP typically assumes that plans and policies subject to the mandate will be in compliance with the benefit coverage requirements of the bill. Therefore, the typical postmandate coverage rates for persons enrolled in health insurance plans/policies subject to the mandate are assumed to be 100%.

Analysis Specific Caveats and Assumptions

For this analysis, CHBRP estimates the number of persons per 100,000 diagnosed with moderate to severe ABI varies by age as shown in the table, below. See *Appendix D* for a more detailed explanation of the source of these estimates.

Table 6**.** Acquired Brain Injury: Age-Related Variation in Incidence

Age Category (a)	Incidence of Moderate-to-Severe ABI Annually per 100,000
Age 0–64	47
Age 65+	295

Source: CHBRP 2015.

Nonrehabilitation Services During the First 60 Post-Acute Days

Our analysis considers only post-acute rehabilitation services within 60 days of a discharge for moderate or severe ABI. The patients may receive other medical services not described above, for instance ambulance transportation, specialist visits, and pharmacy services. CHBRP assumes the use of these services stays the same.

Unit cost of SNF services

Some skilled nursing facilities (SNFs) may provide PARTR services, but most currently do not provide comprehensive PARTR services based on CHBRP content expert's opinions. We assume that for a patient receiving post-acute rehab at a SNF, the services provided by the SNF encompass the full range of rehab services received by that patient. That is, the patient does not receive any post-acute rehab services outside the SNF. We determined the average facility cost per day, professional services cost per procedure, and procedures per day of SNFs by analyzing MarketScan claims data for over 6,000 Californians diagnosed with ABI using ICD-9 codes. We included all costs associated with a SNF place-of-service code.

Unit cost of home/outpatient-based rehabilitation services

Patients receiving rehabilitation in a home or outpatient setting may receive a wide variety of services. We assume services that may be replaced by PARTRS include physical therapy, outpatient physical therapy, occupational therapy, and speech therapy (PT/OT/ST) programs, and any services occurring at home, such as home health visits. We determined the average cost-per-service and services-per-day of these services by analyzing MarketScan claims data for over 6,000 Californians using ICD-9 codes. We combined outpatient facility fees and professional charges for this category.

Unit Cost of PARTR Services

Patients receiving PARTRS receive integrated professional services at a residential facility that provides a level of care approximately halfway between a skilled nursing facility (SNF) and a comprehensive inpatient rehabilitation facility. Because there are no billing codes, place of service codes, or revenue codes for PARTRS, CHBRP assumed the unit cost of PARTRS to be half-way between SNF and acute hospitals. Content expert opinion and responses from facilities certified by the Commission on Accreditation of Rehabilitation Facilities (CARF) agreed with this assumption. CHBRP determined the average unit cost for PARTRS by analyzing MarketScan claims data for over 6,000 Californians diagnosed with ABI using ICD-9 codes.

Cost-Sharing
CHBRP assumed that for newly-covered patients who now receive PARTRS and previously received SNF services or home or outpatient rehabilitation services, rehabilitation within the first 60 days will be replaced by PARTRS. Enrollee cost sharing for PARTRS was estimated as a percentage of the total allowed cost for the services received by the enrollee. This percentage was 100% minus the average percentage paid for all covered services by health insurance. The percentage was further reduced due to approximate the impact of maximum out-of-pocket provisions.

Determining Public Demand for the Proposed Mandate

This subsection discusses public demand for the benefits SB 190 would mandate. Considering the criteria specified by CHBRP's authorizing statute, CHBRP reviews public demand for benefits relevant to a proposed mandate in two ways. CHBRP:

- Considers the bargaining history of organized labor; and
- Compares the benefits provided by self-insured health plans or policies (which are not regulated by the DMHC or CDI and therefore not subject to state-level mandates) with the benefits that are provided by plans or policies that would be subject to the mandate.

On the basis of conversations with the largest collective bargaining agents in California, CHBRP concluded that unions currently do not include coverage for PARTRS in their health insurance negotiations. In general, unions negotiate for broader contract provisions such as coverage for dependents, premiums, deductibles, and broad coinsurance levels.

Among publicly funded self-insured health insurance policies, the Preferred Provider Organization (PPO) plans offered by CalPERS *currently* have the largest number of enrollees. The CalPERS PPOs currently provide benefit coverage similar to what is available through group health insurance plans and policies that would be subject to the mandate.

To further investigate public demand, CHBRP used the bill-specific coverage survey to ask carriers who act as third-party administrators for (non-CalPERS) self-insured group health insurance programs whether the relevant benefit coverage differed from what is offered in group market plans or policies that would be subject to the mandate. The responses indicated that there were no substantive differences.

APPENDIX D PUBLIC HEALTH CALCULATIONS

This appendix presents the data, assumptions, and calculations CHBRP used to estimate the number of moderate and severe patients with acquired brain injury (ABI) who might be clinically eligible to use the SB 190 PARTRS. These numbers inform the cost model described in *Appendix C*.

Approach and Assumptions

In the absence of specific ABI incidence and severity, CHBRP uses baseline incidence data from the California Office of Statewide Planning and the Department of Public Health and applies findings from the literature to estimate those ABI patients most likely to use PARTRS.

CHBRP assumes that all patients with moderate-to-severe ABI were hospitalized for acute care and would receive some rehabilitation services or related services during their post-acute care phase. These post-acute rehabilitation services range from a single therapy (i.e., physical therapy a few times per week for those discharged home) to intensive, multidisciplinary therapies and services performed in a residential transitional setting. Cases are divided between those under age 65 and those aged 65 and over. CHBRP notes that other diseases and conditions (e.g., meningitis, encephalitis, hypoxia, brain cancer, etc.) may result in brain injury and require PARTRS; however, these incidence data are unavailable. Expert opinion and literature indicate that stroke and TBI constitute the vast majority of ABI cases.

Summary of Calculations Informing the Estimates

Table 8 summarizes the following calculations used to estimate number of patients under age 65 years with moderate-to-severe stroke and traumatic brain injury (TBI) whose insurance could be subject to SB 190. (Estimates for those over age 65 and the total population experiencing ABI are shown only for context.)

These estimates may be considered an upper bound for TBI and stroke as *all* sources of payment and dispositions at discharge are included; some cases may have insurance not subject to SB 190 and some cases may be medically ineligible for PARTRS. Conversely, these estimates could be a lower bound because CHBRP does not include other diseases and conditions that could result in ABI that requires post-acute rehabilitation. See *Appendix B* for further details about cost and utilization assumptions and calculations.

Table 7. Estimated Incidence of ABI in California (excluding deaths and low-frequency causes of ABI)

	Stroke [a]		Traumatic Brain Injury [b]		Total ABI	
Age	All Nonfatal Cases	Moderate - Severe	All Nonfatal Hospitalization	Moderate - Severe	All ABI Nonfatal Cases	Moderate - Severe
<65 years [c]	16,970	5,940 to 11,879	19,093	3,995	36,063	9,935 to 15,874
≥65 years	32,941	11,529 to 23,058	12,400	444	45,341	11,973 to 23,502
Total	49,911	17,469 to 34,937	31,493	4,439	81,404	21,908 to 39,376

Source: California Health Benefits Review Program, 2015.

Note: These cases reflect all payers and the uninsured.

(a) Baseline incidence includes all ages and insurance types in 2012 (OSHPD, 2015). See *Appendix D*: *Public Health Calculations* for detail.

(b) Includes primary and secondary diagnosis of TBI in California, 2013. Approximately 60% of TBI diagnoses are principal (indicating the most serious diagnosis) and 40% are secondary (CDPH, EpiCenter, California Injury Data Online, 2015).

(c) Under age 65 is the category of persons most likely to have insurance subject to SB 190, which is the focus of this report. The grey font describing those 65 and older and the total population is provided for context only.

Key: ABI=acquired brain injury.

CHBRP Estimates of Moderate and Severe Stroke in California

Stroke Incidence Estimates for California in Table D-1: **The estimated range of California patients under age 65 with moderate/severe stroke annually is 5,949 to 11,879. This estimated range is based on OSHPD data informing the total number of California strokes and several literature sources that estimate the proportions of stroke severity.** (For context, the number of cases for Californians aged 65 and older is 11,529 to 23,058.) The incidence range is based on the following sources and calculations:

54,983 [1] – 5,072 [2] =49,911 estimated acute stroke hospital discharges

1. 54,983 acute stroke cases OSHPD Inpatient Mortality Indicators for California, 2013--Acute Stroke—Total cases
2. 5,072 acute stroke deaths, OSHPD Inpatient Mortality Indicators for California, 2013--Acute Stroke 2013—Deaths

Estimated number of strokes/year in California for patients under age 65: 16,970 (which informs the A-C Alternative Assumptions listed below)

49,911 x .34 [3, 4] (proportion under 65) = 16,970

3. Hall et al., 2012, NCHS Data Brief # 95, page 2, table: 34% of persons hospitalized for stroke under age 65.
4. Hall et al., 2012 NCHS Data Brief # 95, page 5, figure 4, national data from 2009.

Estimated number of strokes/year in California for patients who are 65 years or older: 32,941 (which informs the A-C Alternative Assumptions listed below)

49,911 x .66 [3, 4] (proportion over 65) = 32,941

3. Hall et al., 2012, NCHS Data Brief # 95, page 2, table: 34% of persons hospitalized for stroke under age 65.

(A) Hall et al.: Estimated number of California stroke patients annually under age 65 with moderate to severe stroke based on hospital discharge status: 5,940

a) **Estimated number of California stroke patients under 65 who are discharged to short-term hospital: 849**

16,970 x .05 [4] = 849

4. Hall et al., 2012 NCHS Data Brief # 95, page 5, figure 4, national data from 2009

b) **Estimated number of California stroke patients under 65 who are discharged to long term care institution: 3,055**

16,970 x .18 [4] = 3,055

4. Hall et al., 2012 NCHS Data Brief # 95, page 5, figure 4, national data from 2009

c) **Estimated number of California stroke patients under 65 who are discharged to uncategorized: 2,036**

16,970 x .12 [4] = 2,036

4. Hall et al., 2012 NCHS Data Brief # 95, page 5, figure 4, national data from 2009

Estimated number of California stroke patients annually who are 65 years or older with moderate to severe stroke based on hospital discharge status: 11,529

a) **Estimated number of California stroke patients over 65 who are discharged to short-term hospital: 1,647**

32,941 x .05 [4] = 1,647

4. Hall et al., 2012 NCHS Data Brief # 95, page 5, figure 4, national data from 2009

b) **Estimated number of California stroke patients over 65 who are discharged to long term care institution: 5,929**

32,941 x .18 [4] = 5,929

4. Hall et al., 2012 NCHS Data Brief # 95, page 5, figure 4, national data from 2009

c) Estimated number of California stroke patients over 65 who are discharged to uncategorized: 3,953
32,941 x .12 [4] = 3,953

4. Hall et al., 2012 NCHS Data Brief # 95, page 5, figure 4, national data from 2009

(B) Carandang et al.: Estimated number of California stroke patients annually under age 65 with moderate to severe stroke based on Carandang et al estimates: 8,994 (48% male strokes and 58% female strokes are moderate to severe. CHBRP calculates an average rate of 53% ([.48.58]/2=.53).)*

16,970 × 0.53 = 8,994 moderate-to-severe strokes in those under age 65 in California annually.

5. Carandang R, Seshadri S, Beiser A, et al. Trends in incidence, lifetime risk, severity and 30-day mortality of stroke over the past 50 years. *JAMA*. 2006;296;24.

Estimated number of California stroke patients annually who are 65 years or older with moderate to severe stroke based on Carandang et al. estimates: 17,459 *(48% male strokes and 58%[5] female strokes are moderate to severe. CHBRP calculates an average rate of 53% ([.48*.58]/2=.53).)*

32,941 × 0.53 = 17,459 moderate-to-severe strokes in those over age 65 in California annually.

5. Carandang R, Seshadri S, Beiser A, et al. Trends in incidence, lifetime risk, severity and 30-day mortality of stroke over the past 50 years. *JAMA*. 2006;296;24.

(C) Bates et al.: Estimated total number of California patients annually under age 65 with moderate to severe stroke using Bates et al assumption: 9,334 to 11,879 cases (Bates et al. reported that 40% of strokes are moderate and 15%–30% are severe.)

16,970 ×* 0.40 = 6,788 moderate strokes; and

16,970 × 0.15 = 2,546 (or 0.30 × 16,970 = 5,091) severe strokes in California annually.

6. Bates et al., Veterans Affairs/Department of Defense Clinical Practice Guideline for the Management of Adult Stroke Rehabilitation Care: Executive Summary. Stroke. 2005;36:2049-2056.

Estimated total number of California patients annually who are 65 years or older with moderate to severe stroke using Bates[6] et al assumption: 18,117 to 23,058 cases *(Bates et al reported that 40% of strokes are moderate and 15-30% are severe.)*

32,941 * .40=13,176 moderate strokes; and

32,941 * .15=4,941 (or .30*16,970 =9,882) severe strokes in California annually.

6. Bates et al., Veterans Affairs/Department of Defense Clinical Practice Guideline for the Management of Adult Stroke Rehabilitation Care: Executive Summary. Stroke. 2005;36:2049-2056.

CHBRP Estimates of Moderate-to-Severe TBI in California

TBI Incidence Estimates for California in Table D-1: **There are an estimated 3,995 moderate/severe TBI cases annually under age 65 (and 444 cases aged 65 and older).**[7]

Under Age 65

CHBRP selected the following parameters in the CDPH online Epic Traumatic Brain Injury system: non-fatal hospitalization; 2013; California; all races; ages 0-64; TBI as primary or secondary diagnosis; all injuries; detail=disposition on discharge. CHBRP excluded "Treated and Released" because CHBRP assumed this classification represents "mild' injury, which is not subject to SB 190.

Estimated annual moderate/severe TBI cases under age 65: 3,995

7. CDPH EPICenter Traumatic Brain Injury, 2013 data based on OSHPD Inpatient Discharge Data. Accessed March 7, 2015.

Over age 65

CHBRP selected the following parameters in the CDPH online Epic Traumatic Brain Injury system: non-fatal hospitalization; 2013; California; all races; ages 65-99; TBI as primary or secondary diagnosis; all injuries; and detail=disposition on discharge. CHBRP also excluded those "Treated and Released" because CHBRP assumed this classification represents "mild' injury, which is not subject to SB 190.

Estimated annual moderate/severe TBI cases aged 65 or older: 444.

7. CDPH EPICenter Traumatic Brain Injury, 2013 data based on OSHPD Inpatient Discharge Data. Accessed March 7, 2015.

REFERENCES

Agrawal M, Joshi M. Impact of rehabilitation on functional outcome during the first year of moderate and severe traumatic brain injury. *Brain Injury*. 2014;28:292-297.

Allen L, Richardson M, McIntyre A, et al. Community stroke rehabilitation teams: providing home-based stroke rehabilitation in Ontario, Canada. *Canadian Journal of Neurological Science.* 2014;41:697-703.

Arango-Lasprilla J, Ketchum J, Gary K, et al. Race ethnicity differences in satisfaction with life among persons with traumatic brain injury. *NeuroRehabilitation*. 2009; 24:5-14.

Arango-Lasprilla J, Rosenthal M, Deluca J, et al. Traumatic brain injury and functional outcomes: does minority status matter? *Brain Injury*. 2007 21:701-708.

Arango-Lasprilla JC, Ketchum JM, Williams K, et al. Racial differences in employment outcomes after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation.* 2008;89:988-995.

Bates B, Choi JY, Duncan PW, et al., US Department of Defense; Department of Veterans Affairs. Veterans Affairs/Department of Defense Clinical Practice Guideline for the Management of Adult Stroke Rehabilitation Care: executive summary. *Stroke*. 2005;36:2049-2056.

Brasure M, Lamberty GJ, Sayer NA, et al. Multidisciplinary Postacute Rehabilitation for Moderate to Severe Traumatic Brain Injury in Adults. Agency for Healthcare Research and Quality. AHRQ Publication No. 12-EHC101-EF. June 2012. Available at http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0047618/pdf/TOC.pdf. Accessed March 4, 2015.

Brasure M, Lamberty GJ, Sayer NA, et al. Participation after multidisciplinary rehabilitation for moderate to severe traumatic brain injury in adults: a systematic review. *Archives of Physical Medicine and Rehabilitation.* 2013;94:1398-1420.

Braveman P. Health disparities and health equity: concepts and measurement. *Annual Review of Public Health.* 2006;27:167-194.

California Department of Mental Health (CDMH). Advancing California's Traumatic Brain Injury Service System: Next Steps, Final Report. Sacramento, CA: California Department of Mental Health; May 2010.

California Department of Public Health (CDPH). California's Master Plan for Heart Disease and Stroke Prevention and Treatment: 2007-2015. July 2007. Available at www.cdph.ca.gov/programs/cvd/Documents/CHDSP-MasterPlan-LowRes.pdf. Accessed March 18, 2013.

California Department of Public Health (CDPH). Center for Health Statistics and Informatics Death Data Trend Summary: Premature Mortality Trends 2000-2007. Available at: www.cdph.ca.gov/programs/ohir/Pages/YPLL2007Main.aspx. Accessed December 2011.

California Department of Public Health (CDPH). EPICenter: California Injury Data Online, Traumatic Brain Injury. 2013. Available at: http://epicenter.cdph.ca.gov/ReportMenus/TraumaticBrainInjury.aspx. Accessed March 5, 2015.

California Health Benefits Review Program (CHBRP). *Analysis of Senate Bill 320: Acquired Brain Injury. Report to California State Legislature.* Oakland, CA: CHBRP; 2013.

California Office of Statewide Health Planning and Development (OSHPD). AHRQ Inpatient Quality Indicators: Hospital Inpatient Mortality Indicators for California, 2013. Available at: http://www.oshpd.ca.gov/HID/Products/PatDischargeData/AHRQ/iqi/2013/iqi-imi-2013.html. Accessed February 20, 2015.

Carandang R, Seshadri S, Beiser A, et al. Trends in incidence, lifetime risk, severity and 30-day mortality of stroke over the past 50 years. *JAMA*. 2006;296;24.

Catteloni R, Zettin M, Zoccolotti P. Rehabilitation treatments for adults with behavioral and psychosocial disorders following acquired brain injury: a systematic review. *Neuropsychology Review*. 2010;20:52-85.

Centers for Disease Control and Prevention (CDC 2013a). CDC grand rounds: reducing severe traumatic brain injury in the United States. *MMWR: Morbidity and Mortality Weekly Report*. 2013;62:549-552.

Centers for Disease Control and Prevention (CDC 2013b). Fact Sheet: State Heart Disease and Stroke Prevention Program Addresses Stroke. 2013. Available at: www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_state_stroke.htm. Accessed February 28, 2015.

Chevignard M, Toure H, Burgel DG, et al. A comprehensive model of care for rehabilitation of children with acquired brain injuries. *Child Care, Health and Development*. 2009;36;1:31-43.

Coronado VG, Xu L, Basavaraju SV, et al. Surveillance for traumatic brain injury–related deaths, United States 1997-2007. *Morbidity and Mortality Weekly Report.* May 6, 2011:60(SS05);1-32. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/ss6005a1.htm. Accessed March 1, 2015.

Cox DH. Premature mortality in California, 2004. Center for Health Statistics. December 2006. Available at: www.cdph.ca.gov/pubsforms/Pubs/OHIRprematuremortality2004.pdf. Accessed November 30, 2011.

Dahdah MN, Barisa MT, Schmidt K, et al., Comparative effectiveness of traumatic brain injury rehabilitation: differential outcomes across TBI model systems centers. *Journal of Head Trauma Rehabilitation.* 2014;29:451-459.

Fang MC, Singer DE, Chang Y, et al. Gender differences in risk of ischemic stroke and peripheral embolism in atrial fibrillation. *Circulation*. 2005;112:1687-1691.

Fonarow GC, Reeves MJ, Zhao, et al. Age-related differences in characteristics, performance measurement, treatment trends, outcomes in patients with ischemic stroke. *Circulation*. 2010;121:879-891.

Foy CML, Somers JS. Increase in functional abilities following a residential educational and neurorehabilitation programme in young adults with acquired brain injury. *NeuroRehabilitation.* 2013;32:671-678.

Freburger JK, Holmes GM, Ku LJ, Cutchin MP, Heatwole-Shank K, Edwards LJ. Disparities in postacute rehabilitation care for stroke: an analysis of the state inpatient databases. *Archives of Physical Medicine and Rehabilitation.* 2011;92:1220-1229.

Gardner JW, Sanborn JS. Years of potential life lost (YPLL)—what does it measure? *Epidemiology*. 1990;1:322-329.

Gary K, Arango-Lasprilla J, Stevens L. Do racial/ethnic differences exist in post-injury outcomes after TBI? A comprehensive review of the literature. *Brain Injury*. 2009;23:775-789.

Griesbach GS, Kreber LA. Harrington D, et al. Post-acute TBI rehabilitation: effects on outcome measures and life care costs. *Journal of Neurotrauma*. 2015;32:1-8.

Hall MJ, Levant S, DeFrances CJ. Hospitalization for Stroke in U.S. Hospitals, 1989-2009. National Center for Health Statistics. Data Brief, No. 95. May 2012.

Harrison-Felix C, Whiteneck G, DeVivo M, Hammond FM, Jha A. Mortality following rehabilitation in the Traumatic Brain Injury Model Systems of Care. *NeuroRehabilitation*. 2004;19:45-54.

Harrison-Felix C, Whiteneck G, Jha A, DeVivo MJ, Hammond FM, Hart DM. Mortality over four decades after traumatic brain injury rehabilitation: a retrospective cohort study. *Archives of Physical Medicine and Rehabilitation*. 2009;90:1506-1512.

Hayden ME, Plenger P, Bison K., Kowalske K, Masel B, Qualls D. Treatment effect versus pretreatment recovery in persons with traumatic brain injury: a study regarding the effectiveness of postacute rehabilitation. *PM & R*. 2013;5:319-327

Heffernan DS, Vera RM, Monaghan SF, et al. Impact of socioethnic factors on outcomes following traumatic brain injury. *Journal of Trauma*. 2011;70:527-534.

Hobart J, Lamping D, Freeman J, et al. Evidence-based measurement: which disability scale for neurologic rehabilitation? *Neurology*. 2001;57:639-644.

Jorge LL, Brito AM, Marchi FH, Hara AC, Battistella LR, Riberto M. New rehabilitation models for neurologic inpatients in Brazil. *Disability and Rehabilitation.* 2015;37:268-273.

Keith RA, Granger CV, Hamilton BB, Sherwin FS. The functional independence measure: a new tool for rehabilitation. *Advances in Clinical Rehabilitation*. 1987;1:6-18.

Kwon S, Hartzema AG, Duncan PW, Min-Lai S. Disability measures in stroke: relationship among the Barthel Index, the Functional Independence Measure, and the Modified Rankin Scale. *Stroke*. 2004;35:918-923.

Langlois JA, Rutland-Brown W, and Wald MM. The epidemiology and impact of traumatic brain injury: a brief overview. *J Head Trauma Rehabilitation.* 2006;21:375-378.

Lewis FD, Horn GJ. Traumatic brain injury: analysis of functional deficits and posthospital rehabilitation outcomes. *Journal of Special Operations Medicine.* 2013;13:56-61.

Malec JF, Basford JS. "Postacute brain injury rehabilitation." *Archives of Physical Medicine and Rehabilitation.* 1996;77:198-207.

Model Systems Knowledge Translation Center (MSKTC). Traumatic Brain Injury and Acute Inpatient Rehabilitation. Collection of Traumatic Brain Injury Factsheets Offered by the MSKTC. 2010. Available at: **http://www.msktc.org/lib/docs/Data_Sheets_/2014_TBIMS_National_Database_Facts_and_Figures.pdf.** Accessed March 16, 2015.

National Institutes of Health (NIH). *Rehabilitation of Persons With Traumatic Brain Injury. NIH Consensus Statement.* Bethesda, MD: NIH; 1998.

National Institute of Neurological Disorders and Stroke (NINDS). *Traumatic Brain Injury: Hope Through Research*. February 3, 2015. Available at: http://www.ninds.nih.gov/disorders/tbi/detail_tbi.htm. Accessed March 6, 2015.

Niemeier JP, Marwitz JH, Lesher K, Walker WC, Bushnik T. Gender differences in executive functions following traumatic brain injury. *Neuropsychological Rehabilitation*. 2007;17:293-313.

Oddy M, da Silva Ramos S. The clinical and cost-benefits of investing in neurobehavioural rehabilitation: a multi-centre study. *Brain Injury.* 2013;*27*:1500-1507.

Penna S, Novack TA, Carlson N, Grote M, Corrigan JD, Hart T. Residence following traumatic brain injury: a longitudinal study. *Journal of Head Trauma and Rehabilitation*. 2010;25:52-60.

Sandel E, Wang H, Terdiman J, et al. Disparities in stroke rehabilitation: results of a study in an integrated health system in northern California. *PM & R*. 2009;1:29-40.

Shavelle R, Strauss D, Whyte J, Day SM, Yu YL. Long-term causes of death after traumatic brain injury. *American Journal of Physical Medicine & Rehabilitation*. 2001;7:510-516.

State of Colorado Department of Labor and Employment, Division of Workers' Compensation. Traumatic Brain Injury Medical Treatment Guidelines. 2012. Available at: www.colorado.gov/pacific/sites/default/files/MTG_Ex10_TBI.pdf. Accessed March 25, 2015.

Stineman MG, Xie D, Kurichi JE, et al. Comprehensive versus consultative rehabilitation services postacute stroke: outcomes differ. *Journal of Rehabilitation Research and Development.* 2014;51:1143-1154.

Traumatic Brain Injury National Data and Statistical Center (TBINDSC). The Traumatic Brain Injury Model Systems. 2014. Available at: https://www.tbindsc.org/StaticFiles/Documents/2014%20TBIMS%20National%20Database%20Update.pdf. Accessed March 5, 2013.

Turner-Stokes L, Nair A, Sedki I, Disler PB, Wade DT. Multi-disciplinary rehabilitation for acquired brain injury in adults of working age. *Cochrane Database of Systematic Reviews*. 2005; 3.

U.S. Department of Veterans Affairs and U.S. Department of Defense (VA/DoD). *Management of Concussion/Mild Traumatic Brain Injury*. Washington DC: VA/DoD; 2009. Available at: www.healthquality.va.gov/guidelines/Rehab/mtbi/concussion_mtbi_sum_1_0.pdf. Accessed March 2015.

Vestri A, Peruch F, Marchi S, et al. Individual and group treatment for patients with acquired brain injury in comprehensive rehabilitation. *Brain Injury*. 2014;28:1102-1108.

CALIFORNIA HEALTH BENEFITS REVIEW PROGRAM COMMITTEES AND STAFF

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

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

Faculty Task Force

Joy Melnikow, MD, MPH, *Vice Chair for Public Health*, University of California, Davis
Ninez Ponce, PhD, *Vice Chair for Cost*, University of California, Los Angeles
Nadereh Pourat, PhD, *Vice Chair for Cost*, University of California, Los Angeles
Ed Yelin, PhD, *Vice Chair for Medical Effectiveness*, University of California, San Francisco
Susan L. Ettner, PhD, University of California, Los Angeles
Sheldon Greenfield, MD, University of California, Irvine
Sylvia Guendelman, PhD, LCSW, University of California, Berkeley
Sara McMenamin, PhD, University of California, San Diego

Task Force Contributors

Wade Aubry, MD, University of California, San Francisco
Diana Cassady, DrPH, University of California, Davis
Shana Charles, PhD, MPP, University of California, Los Angeles
Janet Coffman, MA, MPP, PhD, University of California, San Francisco
Shauna Durbin, MPH, University of California, Davis
Gina Evans-Young, University of California, San Francisco
Margaret Fix, MPH, University of California, San Francisco
Ronald Fong, MD, MPH, University of California, Davis
Brent Fulton, PhD, University of California, Berkeley
Erik Groessl, PhD, University of California, San Diego
Stephen McCurdy, MD, MPH, University of California, Davis
Ying-Ying Meng, PhD, University of California, Los Angeles
Jack Needleman, PhD, University of California, Los Angeles
Dominique Ritley, MPH, University of California, Davis
Dylan Roby, PhD, University of California, Los Angeles
AJ Scheitler, MEd, University of California, Los Angeles
Riti Shimkhada, PhD, University of California, Los Angeles
Meghan Soulsby Weyrich, MPH, University of California, Davis
Steven Tally, PhD, University of California, San Diego

National Advisory Council

CHBRP Staff

Garen Corbett, MS, Director
John Lewis, MPA, Associate Director
Laura Grossmann, MPH, Principal Policy Analyst
Hanh Kim Quach, MBA, Principal Policy Analyst
Karla Wood, Program Specialist

California Health Benefits Review Program
University of California
Office of the President
1111 Franklin Street, 11th Floor
Oakland, CA 94607
Tel: 510-287-3876 Fax: 510-763-4253
chbrpinfo@chbrp.org www.chbrp.org

The California Health Benefits Review Program is administered by the Division of Health Sciences and Services at the University of California, Office of the President. The Division is led by John D. Stobo, MD, Senior Vice President.

ACKNOWLEDGMENTS

Edward Yelin, PhD, and Margaret Fix, MPH, of the University of California, San Francisco, prepared the medical effectiveness analysis. Min-Lin Fang, MLIS, of the University of California, San Francisco, conducted the literature search. Dominique Ritley, MPH, and Diana Cassady, DrPH, of the University of California, Davis, prepared the public health impact analysis. Ying-Ying Meng, PhD, of the University of California, Los Angeles, prepared the cost impact analysis. Robert Cosway, FSA, MAAA, of Milliman, provided actuarial analysis. Cassie Spalding-Dias, MD, of the University of California, Davis, provided technical assistance with the literature review and expert input on the analytic approach. John Lewis, MPA, of CHBRP staff prepared the policy context and synthesized the individual sections into a single report. A subcommittee of CHBRP's National Advisory Council and a member of the CHBRP Faculty Task Force, Susan Ettner, PhD, of the University of California, Los Angeles, reviewed the analysis for its accuracy, completeness, clarity, and responsiveness to the Legislature's request.

Please direct any questions concerning this document to:

California Health Benefits Review Program
University of California, Office of the President
Division of Health Sciences and Services
1111 Franklin Street, 11th Floor
Oakland, CA 94607
Tel: 510-287-3876
Fax: 510-763-4253
www.chbrp.org

A group of faculty and staff undertakes most of the analysis that informs reports by the California Health Benefits Review Program (CHBRP). The CHBRP Faculty Task Force comprises rotating representatives from six University of California (UC) campuses. In addition to these representatives, there are other ongoing contributors to CHBRP from UC. This larger group provides advice to the CHBRP staff on the overall administration of the program and conducts much of the analysis.

CHBRP staff coordinates the efforts of the Faculty Task Force, works with Task Force members in preparing parts of the analysis, and coordinates all external communications, including those with the California Legislature.

CHBRP is also grateful for the valuable assistance of its National Advisory Council, who provide expert reviews of draft analyses and offer general guidance on the program. CHBRP is administered by the Division UC Health at the University of California, Office of the President, led by John D. Stobo, MD, Senior Vice President.

CHBRP assumes full responsibility for the report and the accuracy of its contents. All CHBRP bill analyses and other publications are available at www.chbrp.org.

Garen Corbett, MS
Director