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## Report to California Legislature

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Analysis of Senate Bill 320: Acquired Brain Injury

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# California Health Benefits Review Program

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## Analysis of Senate Bill 320: Acquired Brain Injury

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A Report to the 2013-2014 California Legislature

April 19, 2013

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

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

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<sup>1</sup> Available at: [www.chbrp.org/documents/authorizing\\_statute.pdf](http://www.chbrp.org/documents/authorizing_statute.pdf).

# **A Report to the 2013–2014 California State Legislature**

## **Analysis of Senate Bill 320 Acquired Brain Injury**

**April 19, 2013**

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## PREFACE

This report provides an analysis of the medical, financial, and public health impacts of Senate Bill 320. In response to a request from the California Senate Committee on Health on February 20, 2013, the California Health Benefits Review Program (CHBRP) undertook this analysis pursuant to the program's authorizing statute.

Janet Coffman, MPP, PhD, Gina Evans-Young, and Margaret Fix, MPH, all 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. Diana Cassady, DrPH, and Dominique Ritley, MPH, all of the University of California, Davis, prepared the public health impact analysis. Shana Lavarreda, PhD, MPP, of the University of California, Los Angeles, prepared the cost impact analysis. Robert Cosway, FSA, MAAA, Scott McEachern, and Tim Wilder, FSA, MAAA, of Milliman, provided actuarial analysis. Content experts Gary Abrams, MD, of the University of California, San Francisco, and Cassie Spalding-Dias, MD, of the University of California, Davis, provided technical assistance with the literature review and expert input on the analytic approach. Hanh Kim Quach of CHBRP staff prepared the *Introduction* and synthesized the individual sections into a single report. A subcommittee of CHBRP's National Advisory Council (see final pages of this report) 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.

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

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All CHBRP bill analyses and other publications are available on the CHBRP website, [www.chbrp.org](http://www.chbrp.org).

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Director

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# EXECUTIVE SUMMARY

## California Health Benefits Review Program Analysis of Senate Bill 320

The California Senate Committee on Health requested on February 20, 2013, that the California Health Benefits Review Program (CHBRP) conduct an evidence-based assessment of the medical, financial, and public health impacts of Senate Bill (SB) 320 (Beall) on acquired brain injury (ABI). In response to this request, CHBRP undertook this analysis pursuant to the provisions of the program's authorizing statute.<sup>2</sup>

In 2014, CHBRP estimates that approximately 25.9 million Californians (67%) will have health insurance that may be subject to a health benefit mandate law passed at the state level.<sup>3</sup> Of the rest of the state's population, a portion is uninsured (and so 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.

Uniquely, California has a bifurcated system of regulation for health insurance subject to state benefit mandates. The California Department of Managed Health Care (DMHC)<sup>4</sup> regulates health care service plans, which offer benefit coverage to their enrollees through health plan contracts. The California Department of Insurance (CDI) regulates health insurers,<sup>5</sup> which offer benefit coverage to their enrollees through health insurance policies.

All DMHC-regulated plans and CDI-regulated policies would be subject to SB 320. Therefore, the mandate would affect the health insurance of approximately 25.9 million enrollees (67% of all Californians).

### Developing Estimates for 2014 and the Effects of the Affordable Care Act

The Affordable Care Act (ACA)<sup>6</sup> is expected to dramatically affect health insurance and its regulatory environment in California, with many changes becoming effective in 2014. It is important to note that CHBRP's analysis of proposed benefit mandate bills typically address the marginal effects of the proposed bills—specifically, how the proposed mandate would impact benefit coverage, utilization, costs, and public health, holding all other factors constant. CHBRP's estimates of these marginal effects are presented in this report. Because expanded enrollment will not occur until January 2014, CHBRP relies on projections from the California

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<sup>2</sup> Available at: [www.chbrp.org/docs/authorizing\\_statute.pdf](http://www.chbrp.org/docs/authorizing_statute.pdf).

<sup>3</sup> CHBRP's estimates are available at: [www.chbrp.org/other\\_publications/index.php](http://www.chbrp.org/other_publications/index.php).

<sup>4</sup> The California Department of Managed Health Care (DMHC) was established in 2000 to enforce the Knox-Keene Health Care Service Plan of 1975; see Health and Safety Code (H&SC) Section 1340.

<sup>5</sup> The California Department of Insurance (CDI) licenses "disability insurers." Disability insurers may offer forms of insurance that are not health insurance. This report considers only the impact of the benefit mandate on health insurance policies, as defined in Insurance Code (IC) Section 106(b) or subdivision (a) of Section 10198.6.

<sup>6</sup> The federal "Patient Protection and Affordable Care Act" (P.L.111-148) and the "Health Care and Education Reconciliation Act" (P.L. 111-152) were enacted in March 2010. Together, these laws are referred to as the Affordable Care Act (ACA).

Simulation of Insurance Markets (CalSIM) model<sup>7</sup> to help set baseline enrollment for 2014. From this projected baseline, CHBRP estimates the marginal impact of benefit mandates proposed that could be in effect after January 2014.

## Bill-Specific Analysis of SB 320

The full text of SB 320 can be found in Appendix A.

SB 320 would prohibit DMHC-regulated plans and CDI-regulated policies from denying coverage for medically necessary medical or rehabilitation treatment for ABI at specified facilities, including:

- Hospitals;
- Acute rehabilitation hospitals;
- Long-term acute care hospitals;
- Medical offices;
- Commission on Accreditation of Rehabilitation Facilities (CARF)-accredited postacute residential transitional rehabilitation facilities;<sup>8</sup> and
- Another “analogous facility” at which appropriate services may be provided.

Additionally, coverage may not be denied because “the treating facility is not near the enrollee’s home.”

The bill would apply to DMHC-regulated plans and CDI-regulated policies amended, renewed, or delivered after January 1, 2014. As introduced, SB 320 appears to prohibit the use of limited panels of providers and institutions by health plans—often referred to as in-network care—for treatment of ABI. SB 320 also appears to allow enrollees to seek facilities outside their service area.

SB 320 approaches coverage by emphasizing (1) a condition—ABI—which itself is a broad category of injuries, and (2) facilities, listing six categories of facilities. The bill does not define specific treatments to be covered, only noting that insurers may not deny coverage for “medically necessary medical and rehabilitative treatments for an aquired brain injury.”

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<sup>7</sup> CalSIM was developed jointly and is operated by the University of California, Los Angeles, Center for Health Policy Research and the University of California, Berkeley, Center for Labor Research. The model estimates the impact of provisions in the ACA on employer decisions to offer, and individual decisions to obtain, health insurance.

<sup>8</sup> The Commission on Accreditation of Rehabilitation Facilities (CARF) is an international organization that has approved and established a common set of “field-driven” standards for rehabilitation facilities, according to their website. To be accredited, facilities need to undergo a “consultative peer-review process,” which is an external review that includes on-site visits by peers. In addition to site observation, the accreditation team will also survey clients and staff, and review documentation. Once accredited, a facility must submit an “Annual Conformance to Quality Report.” As of April 2013, there are 26 CARF-accredited brain injury programs in California, <http://www.carf.org/home/>. Accessed April 2013.

CHBRP focuses this analysis on rehabilitation treatments because CHBRP assumes DMHC-regulated plans and CDI-regulated policies already cover medically necessary medical care.

SB 320's focus on facilities, rather than treatments, presented analytical challenges: first, because coverage of facilities does not necessarily equate to coverage for the treatments and services that are available at that facility, or what an enrollee with ABI may require; second, CHBRP was unable to determine the level of unmet demand for ABI-related rehabilitative treatments and services due to lack of data. These data would allow CHBRP to estimate how utilization would change if benefit coverage were offered.

### **Background on ABI**

CHBRP defines acquired brain injury (ABI) as acute (rapid onset) brain injury of any cause sustained any time after birth. Severity of ABI ranges from a mild concussion—requiring little to no treatment—to coma or death. ABI may result in short-term or long-term impairments that affect physical 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).<sup>9</sup>

There is no formal clinical diagnosis that exists for ABI, thus there is no corresponding single data source that captures the incidence or prevalence of ABI. However, CHBRP presents the most recent data available for stroke (a type of brain injury) and traumatic brain injury (TBI), which account for the majority of ABIs that would likely require rehabilitation treatments and services.

#### *TBI incidence*

- **US.** Nationally, of the 1.7 million TBIs that occur annually, 1.36 million result in emergency department visits (80%), 275,000 hospitalizations (16%), and 52,000 deaths (3%).<sup>10</sup> It is estimated that about 9% of hospitalized TBI patients were discharged to residential (skilled nursing) facilities, and almost 8% percent were discharged to inpatient rehabilitation.<sup>11</sup>
- **California.** The California Department of Public Health reported that Californians experienced 19,164 nonfatal TBI hospitalizations in 2011; 15,515 of those patients were treated and released, 1,144 were transferred to an acute care hospital, and 2,044 transferred to a nonacute care hospital (the remainder were classified as unknown).<sup>12</sup> About 350,000 Californians are living with TBI.<sup>13</sup>

#### *Stroke incidence*

- **US.** Nationally and in California, stroke is a leading cause of death and disability. The prevalence rate of stroke increases as a person ages; national data show those over age 65

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<sup>9</sup> NINDS, 2013

<sup>10</sup> CDC, 2013

<sup>11</sup> Coronado et al., 2007

<sup>12</sup> CDPH, 2013 EPIC

<sup>13</sup> CDMH, 2010

have the highest stroke prevalence rate (8.3%), followed by those aged 45 to 64 years and those aged 18 to 44 years (2.9% and 0.7%, respectively).

- **California.** In California, there are about 200,000 stroke-related hospital discharges per year (1 in 20 hospital discharges) or 5.9 discharges/1,000 population.<sup>14</sup> The number of California stroke patients admitted to postacute rehabilitation facilities or programs is unknown.

Data regarding utilization by type of rehabilitation treatment for ABI, and the intensity and duration is not available, nor is there an accounting of those who might not receive rehabilitation treatment because of a lack of coverage, denied coverage (see *Introduction* for details on coverage appeals through the independent medical review (IMR) process), or lack of ability to pay.

Because of data limitations and the lack of specificity in SB 320 regarding specific treatments covered, CHBRP could only draw limited definitive conclusions on the medical effectiveness of multidisciplinary rehabilitation treatment for ABI. In addition, CHBRP found the impact of SB 320 on benefit coverage, utilization, cost, as well as public health, to be unknown.

### **Medical Effectiveness**

SB 320 addresses coverage for both medical care and rehabilitation for ABI. The medical effectiveness review focuses on evidence of the effectiveness of multidisciplinary rehabilitation treatments because CHBRP assumes that DMHC-regulated plans and CDI-regulated policies provide coverage for all medically necessary medical treatments for ABI. In addition, the medical effectiveness review summarizes findings from studies of the impact of utilizing packages of multidisciplinary rehabilitation treatments and not on the effects of specific types of treatments. Findings from studies of individual types of treatments are difficult to generalize to the whole population of persons with ABI because specific needs differ depending on the type and severity of injury.

### **Study Findings**

#### *CHBRP terminology for grading evidence of medical effectiveness*

CHBRP uses the following terms to characterize the strength of the evidence it identifies regarding the medical effectiveness of a treatment for which a bill would mandate coverage.

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

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<sup>14</sup> CDPH, 2007

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.

#### *Characteristics of populations and treatments studied*

- Studies of multidisciplinary rehabilitation for ABI have compared these interventions to:
  - Minimal intervention (e.g., written information, occasional telephone call)
  - Similar interventions delivered in different settings (e.g., outpatient clinic vs. home)
  - Different interventions delivered in the same setting (e.g., two interventions delivered in inpatient settings that place differing degrees of emphasis on cognitive rehabilitation)
  - More or less intensive interventions (e.g., more vs. fewer hours of rehabilitation)
- Most persons enrolled in studies of multidisciplinary rehabilitation for ABI had a TBI. A few studies also enrolled persons whose ABI was due to stroke or another cause. The extent to which findings from these studies generalize to populations that consist primarily of persons with encephalitis or other types of ABIs is unknown.

#### *Findings from studies of persons with mild ABI*

- The preponderance of evidence suggests that among persons with mild TBI, only persons with injuries that require hospitalization benefit from multidisciplinary postacute rehabilitation.
- Evidence from randomized controlled trials (RCTs) suggests that providing all persons who have had a mild TBI with education about symptoms and expectations for recovery reduces the likelihood of persistent symptoms.
- There is also evidence that vestibular rehabilitation is an effective treatment for persistent balance disorders associated with mild TBI and that psychotherapy is an effective treatment for comorbid mental health conditions.

### *Findings from studies of persons with moderate to severe ABI*

- The preponderance of evidence from the three RCTs that have compared multidisciplinary postacute rehabilitation to a minimal intervention or no specific intervention suggests that these multidisciplinary interventions improve functional status and increase participation in everyday activities.
- Evidence from the five RCTs that have compared more intensive to less intensive multidisciplinary rehabilitation is ambiguous. Differences in the treatments provided to the intervention and comparison groups make it difficult to generalize findings across these studies.
- Findings from studies that compared the delivery of inpatient rehabilitation in specialized versus unspecialized settings are ambiguous.
- The preponderance of evidence from studies that compared outpatient rehabilitation that emphasizes cognitive rehabilitation to standard outpatient rehabilitation regarding the likelihood of obtaining employment or pursuing education was ambiguous.
- There is insufficient evidence to determine whether the setting in which multidisciplinary rehabilitation interventions occurs affects patients' outcomes because findings are confounded by differences in intensity of treatment across settings.

### **Benefit Coverage, Utilization, and Cost Impacts**

CHBRP finds that the impact of SB 320 is unknown. Despite CHBRP's efforts to ascertain the level of coverage for ABI, it is unknown how many ABI patients are eligible to receive multidisciplinary rehabilitation treatment at the facilities specified in SB 320. This is due to the wide range of potential rehabilitation treatments that regulators may or may not determine to be "medically necessary," as specified in SB 320. Additionally, there may be differences in treatments offered among facility types, or benefit coverage limitations on number of days or visits covered.

#### *Coverage impacts*

- Currently, enrollees appear to have nearly full coverage at the facilities required by SB 320:
  - Carriers reported 100% coverage of facilities specified in SB 320, except for coverage for adult residential or postacute residential transitional rehabilitation facilities, at which carriers reported 58% coverage of facilities.
- Coverage of facilities does not necessarily mean coverage for all treatments and services provided at the facility. Because facilities also vary in the treatments they provide, CHBRP cannot determine current coverage for rehabilitation treatments and services.
- Benefit coverage may include limitations on number of visits or inpatient days or number of treatments. Some enrollees with ABI may reach these limits depending on the extent of their rehabilitation needs.
- CHBRP finds that coverage for treatments at adult residential or postacute residential transitional rehabilitation facilities would increase from 58% to 100%, but it is unknown

which treatments or services would be included in the coverage and whether there would be any limitations on the utilization of those treatments or services.

- CHBRP is unable to estimate SB 320's overall impact on coverage because it is unknown:
  - Which ABI-related treatments and services an enrollee may receive at specified facilities;
  - The intensity of those treatments;
  - Their duration; or
  - Whether regulators will deem these treatments to be medically necessary.

#### *Utilization impacts*

- Premandate, CHBRP estimates that approximately 129,700 enrollees with health insurance subject to SB 320 (0.5% of people enrolled in DMHC-regulated plans and/or CDI-regulated policies) have been diagnosed with and treated for ABI.
- Of these enrollees, approximately 4,500 were admitted to a facility that would be subject to SB 320 during the past year; 2,900 patients were seen at medical offices, 1,400 at general acute care hospitals, and the rest at other facilities. These 4,500 patients used approximately 68,200 different treatments.
- The impact of SB 320 on utilization is unknown because:
  - It is not clear whether benefit coverage for treatments administered in these facilities would change postmandate.
  - The current level of unmet demand is unclear. CHBRP could not find a data source or research literature that addressed unmet demand for ABI-related treatments and services. Therefore, CHBRP cannot estimate potential changes in utilization due to the mandate.

#### *Cost impacts*

- Because of the uncertainty in the impact of SB 320 on benefit coverage and utilization, CHBRP finds that SB 320 has an unknown impact on costs.

### **Public Health Impacts**

#### *Overall public health impact*

- The preponderance of evidence shows that persons with moderate to severe ABI benefit from multidisciplinary postacute rehabilitation treatment as compared to those who receive little or no intervention (see *Medical Effectiveness*). However, CHBRP is unable to estimate a change in coverage or utilization of these rehabilitation treatments at the specified facilities for two reasons: (1) the bill's focus on facilities precludes capturing premandate coverage or utilization of treatments, and (2) CHBRP is unable to estimate the unmet demand for these treatments. Therefore, CHBRP concludes that the overall public health impact of SB 320 is unknown.

### *Financial burden*

- Without literature or data regarding unmet demand as well as an absence of regulator interpretation of SB 320's scope of coverage, CHBRP cannot estimate the possible reduction in financial burden from uncovered expenses that SB 320 might produce for insured Californians who, premandate, pay out of pocket for covered treatments or who pay for uncovered expenses related to rehabilitation treatments.

### *Disparities*

- Although there appear to be gender differences in certain aspects of recovery from ABI, the impact of SB 320 on reducing gender disparities is unknown. Studies of potential racial and ethnic disparities vary considerably in their methodology, outcomes measured, and type of injury; however, the preponderance of evidence indicates disparities in some postacute ABI rehabilitation outcomes by race/ethnicity. Despite the evidence, CHBRP concludes that SB 320 would have an unknown impact on coverage and utilization; therefore, the proposed mandate's impact on reducing racial/ethnic disparities is unknown.

### *Economic loss*

- Although ABI causes economic loss, the impact of SB 320 on economic loss is unknown because evidence of the rehabilitation treatment(s) effectiveness on employment is ambiguous and because CHBRP is unable to estimate a change in coverage or utilization of multidisciplinary rehabilitation treatments.

### *Premature death*

- Although research shows that persons with ABI are at elevated risk for premature death, CHBRP concludes that the impact of SB 320 on premature death is unknown due to a lack of evidence regarding the effectiveness of multidisciplinary rehabilitation on mortality as well as an unknown impact on coverage and utilization for these treatments.

### *Long-term impacts*

- The long-term public health impact attributable to SB 320 is unknown because CHBRP is unable to estimate a change in the coverage or utilization of multidisciplinary rehabilitation treatments.

## **Interaction With the Federal Affordable Care Act**

Below is an analysis of how this proposed benefit mandate may interact with the ACA's requirement for certain health insurance to cover "essential health benefits"<sup>15</sup> (EHBs), as well as other ACA requirements that may interact with this proposed benefit mandate.

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<sup>15</sup> Resources on EHBs and other ACA impacts are available on the CHBRP website: [www.chbrp.org/other\\_publications/index.php](http://www.chbrp.org/other_publications/index.php).



### *SB 320 and essential health benefits*

It is unknown whether SB 320 exceeds or falls within essential health benefits, because of ambiguity in the bill language. As written, SB 320 does not specify which benefits an enrollee would receive, but rather, it designates: (1) the condition—ABI; (2) the general category of treatments, of which CHBRP is focusing on rehabilitation; and (3) the facility—listing the types of facilities permitted.

The ACA’s essential health benefits explicitly include “rehabilitative and habilitative services and devices.” In addition, both proposed rules<sup>16</sup> and final rules<sup>17</sup> on EHBs have specified that mandates relating to provider types (such as facilities) do not fall under the ACA’s interpretation of state-required benefits.

However, rehabilitation treatments and services offered at facilities mentioned in SB 320 may differ from the specific treatments outlined in California’s EHB package, as defined by the Kaiser HMO 30 plan. Additionally, the medical necessity of such treatments may also be in dispute, and contested through the state’s existing independent medical review (IMR) process at each state health insurance regulatory agency, DMHC or CDI.

As such, state regulators would first need to determine whether each type of ABI rehabilitation service provided at a listed facility—which range from a hospital to an “analogous facility”—is medically necessary. Then, the regulators need to determine if those treatments differ from California’s EHB package. To the extent that those treatments exceed EHBs as defined in the Kaiser HMO 30 plan, the state would be required to defray the additional cost for Qualified Health Plans (QHPs) purchased in Covered California.

Therefore, it is unknown whether SB 320 falls within essential health benefits, or exceeds EHBs because regulator guidance is required to make determinations on as-yet undefined treatments.

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<sup>16</sup> Department of Health and Human Services, “Proposed Rule: Patient Protection and Affordable Care Act; Standards Related to Essential Health Benefits, Actuarial Value, and Accreditation,” *Federal Register*, Vol 77, No. 277, November 26, 2012, at <http://www.gpo.gov/fdsys/pkg/FR-2012-11-26/pdf/2012-28362.pdf>.

<sup>17</sup> Department of Health and Human Services, “Final Rule: Proposed Rule: Patient Protection and Affordable Care Act; Standards Related to Essential Health Benefits, Actuarial Value, and Accreditation,” *Federal Register*, Vol. 78, No. 37, February 25, 2013, at <http://www.gpo.gov/fdsys/pkg/FR-2013-02-25/pdf/2013-04084.pdf>.

# INTRODUCTION

The California Senate Committee on Health requested on February 20, 2013, that the California Health Benefits Review Program (CHBRP) conduct an evidence-based assessment of the medical, financial, and public health impacts of Senate Bill (SB) 320 (Beall) on acquired brain injury (ABI). In response to this request, CHBRP undertook this analysis pursuant to the provisions of the program's authorizing statute.<sup>18</sup>

In 2014, CHBRP estimates that approximately 25.9 million Californians (67%) will have health insurance that may be subject to a health benefit mandate law passed at the state level.<sup>19</sup> Of the rest of the state's population, a portion is uninsured (and so has no health insurance subject to any benefit mandate), and another portion has health insurance subject to other state laws or only to federal laws.

Uniquely, California has a bifurcated system of regulation for health insurance subject to state benefit mandates. The California Department of Managed Health Care (DMHC)<sup>20</sup> regulates health care service plans, which offer benefit coverage to their enrollees through health plan contracts. The California Department of Insurance (CDI) regulates health insurers,<sup>21</sup> which offer benefit coverage to their enrollees through health insurance policies.

All DMHC-regulated plans and CDI-regulated policies would be subject to SB 320. Therefore, the mandate would affect the health insurance of approximately 25.9 million enrollees (67% of all Californians).

## Developing Estimates for 2014 and the Effects of the Affordable Care Act

The Affordable Care Act (ACA)<sup>22</sup> is expected to dramatically affect health insurance and its regulatory environment in California, with many changes becoming effective in 2014. Beginning in 2014, an expansion of the Medicaid program to cover people up to 133% of the federal poverty level (FPL)<sup>23</sup> and the availability of subsidized and unsubsidized health insurance coverage purchased through newly established state health insurance exchanges are expected to significantly increase the number of people with health insurance in the United States.

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<sup>18</sup> Available at: [www.chbrp.org/docs/authorizing\\_statute.pdf](http://www.chbrp.org/docs/authorizing_statute.pdf).

<sup>19</sup> CHBRP's estimates are available at: [www.chbrp.org/other\\_publications/index.php](http://www.chbrp.org/other_publications/index.php).

<sup>20</sup> The California Department of Managed Care (DMHC) was established in 2000 to enforce the Knox-Keene Health Care Service Plan of 1975; see Health and Safety Code (H&SC) Section 1340.

<sup>21</sup> The California Department of Insurance (CDI) licenses "disability insurers." Disability insurers may offer forms of insurance that are not health insurance. This report considers only the impact of the benefit mandate on health insurance policies, as defined in Insurance Code (IC) Section 106(b) or subdivision (a) of Section 10198.6.

<sup>22</sup> The federal "Patient Protection and Affordable Care Act" (P.L.111-148) and the "Health Care and Education Reconciliation Act" (P.L. 111-152) were enacted in March 2010. Together, these laws are referred to as the Affordable Care Act (ACA).

<sup>23</sup> The Medicaid expansion, which California will pursue, is to 133% of the federal poverty level (FPL)—138% with a 5% income disregard.

State exchanges will sell health insurance in the small-group and individual markets<sup>24</sup> through qualified health plans (QHPs), which will be certified by and sold in a state’s exchange. QHPs sold through California’s state exchange, Covered California,<sup>25</sup> will be DMHC-regulated plans or CDI-regulated policies, and as such will be subject to California state benefit mandates.

It is important to note that CHBRP’s analysis of proposed benefit mandate bills typically address the marginal effects of the proposed bills—specifically, how the proposed mandate would impact benefit coverage, utilization, costs, and public health, holding all other factors constant. CHBRP’s estimates of these marginal effects are presented in this report. Because expanded enrollment will not occur until January 2014, CHBRP relies on projections from the California Simulation of Insurance Markets (CalSIM) model<sup>26</sup> to help set baseline enrollment for 2014. From this projected baseline, CHBRP estimates the marginal impact of proposed benefit mandates that could be in effect after January 2014. CHBRP’s methods for estimating baseline 2014 enrollment from CalSIM projections are provided in further detail in Appendix D.

## Bill-Specific Analysis of SB 320

### **Bill Language**

The full text of SB 320 can be found in Appendix A.

SB 320 would prohibit DMHC-regulated plans and CDI-regulated policies from denying coverage for medically necessary medical or rehabilitation treatment for acquired brain injuries at specified facilities, including:

- Hospitals;
- Acute rehabilitation hospitals;
- Long-term acute care hospitals;
- Medical offices;
- Postacute residential transitional rehabilitation facilities, accredited by the Commission on Accreditation of Rehabilitation Facilities (CARF);<sup>27</sup> and

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<sup>24</sup> Effective 2017, states may allow large-group purchasing through the exchange, which may make some large-group plans and policies subject to EHB requirements [ACA Section 1312(f)(2)(B)].

<sup>25</sup> The California Health Benefits Exchange Authorizing Statute is available here:

<http://www.healthexchange.ca.gov/Documents/California%20Codes%20Governing%20the%20Health%20Benefit%20Exchange.pdf>

<sup>26</sup> CalSIM was developed jointly and is operated by the University of California, Los Angeles, Center for Health Policy Research and the University of California, Berkeley, Center for Labor Research. The model estimates the impact of provisions in the ACA on employer decisions to offer, and individual decisions to obtain, health insurance.

<sup>27</sup> The Commission on Accreditation of Rehabilitation Facilities (CARF) is an international organization that has approved and established a common set of “field-driven” standards for rehabilitation facilities, according to their website. To be accredited, facilities need to undergo a “consultative peer-review process,” which is an external review that includes on-site visits by peers. In addition to site observation, the accreditation team will also survey clients and staff, and review documentation. Once accredited, a facility must submit an “Annual Conformance to

- Another “analogous facility” at which appropriate treatments may be provided.

Additionally, coverage may not be denied because “the treating facility is not near the enrollee’s home.”

SB 320 would apply to DMHC-regulated plans and CDI-regulated policies amended, renewed, or delivered after January 1, 2014. As introduced, SB 320 appears to prohibit the use of limited panels of providers and institutions by health plans—often referred to as in-network care—for treatment of ABI. SB 320 also appears to allow enrollees to seek facilities outside their service area.

### **Analytic Approach and Key Assumptions**

SB 320 approaches coverage by emphasizing (1) a condition—ABI—which itself is a broad category of injuries, and (2) facilities, listing six categories of facilities. The bill does not define specific treatments to be covered. Thus, the broad language in SB 320 posed analytical challenges for CHBRP.

SB 320’s emphasis on facilities, rather than treatments, presented challenges because coverage of facilities does not necessarily equate to coverage for the treatments and services that are available at that facility, or what an enrollee with ABI may require. Furthermore, there is a wide array of treatments for ABI, as discussed below, so assessing coverage for the myriad variations of treatments was not possible during CHBRP’s 60-day timeframe. What follows is a discussion of how CHBRP approached analysis of SB 320.

#### *Medically necessary medical vs. medically necessary rehabilitation treatment.*

SB 320 prohibits denial of coverage of both medically necessary *medical* treatment (acute) as well as medically necessary *rehabilitation* treatment (postacute), but does not define which treatments should be included. A person with ABI would need (1) medical services, to treat the injury clinically, and (2) rehabilitation treatments, with the goal of restoring the patient’s previous level of functioning. CHBRP assumes the various medical treatments 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 rehabilitation at the facilities specified in SB 320.**

#### *Coverage at facilities vs. coverage for treatments*

As previously mentioned, SB 320’s emphasis on *facilities*, rather than *treatments*, presented analytical challenges because benefit coverage for *facilities* may not translate to an enrollee having coverage for a specific *treatment* offered at that facility, and/or that the coverage may be subject to limitations. Therefore, a carrier could report 100% coverage for a facility, but it would not be clear whether an enrollee would have benefit coverage for all treatments available at that facility, and that enrollee may require. As a result, **while CHBRP was able to determine the**

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Quality Report.” As of April 2013, there are 26 CARF-accredited brain injury programs in California, <http://www.carf.org/home/>. Accessed April 2013.

**levels of benefit coverage at facilities, the bill language precluded review of gaps in benefit coverage for specific treatments related to ABI.<sup>28</sup>**

*Unmet demand*

Also critical to CHBRP estimates is an understanding of unmet demand; CHBRP found no data or literature regarding the use of uncovered rehabilitation treatments. Therefore, it is unknown to what extent there is pent-up demand for such treatments, or whether enrollees are seeking treatments and services in other venues. Without understanding to what extent enrollees are currently paying for or utilizing ABI-related treatments, CHBRP cannot estimate how that could change postmandate.

*Variation in rehabilitative treatments and services*

Rehabilitative treatment of postacute ABI varies significantly depending on the severity of injury, patient age, where and how the enrollee was injured, what deficits have resulted from the injury, what treatments are available at the facility where the enrollee seeks treatment, and comorbidities among other factors. Table 1 displays the range of the rehabilitation treatments and services that enrollees with ABI may require, and which:

- May or may not be recommended by providers;
- May or not be provided at a variety of inpatient and outpatient facilities;
- May vary in duration, intensity, and repeat over time (Adams et al., 2004); and/or
- May or may not be covered by health insurance.

**Table 1.** Rehabilitative treatments and services often used by patients with ABI

• Behavioral management training	• Physical therapy
• Bladder and bowel retraining	• Psychotherapy
• Cognitive rehabilitation	• Speech therapy
• Electrical stimulation of limbs	• Neuropsychological evaluations and therapy
• Memory rehabilitation	• Training in the performance of activities of daily living and instrumental activities of daily living
• Movement therapy	
• Occupational therapy	

Source: California Health Benefits Review Program, 2013

**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 two reasons.** First, while many persons with moderate to severe ABI may need some combination of treatments listed in Table 1, the specific mix of types, duration, and intensity of rehabilitation varies depending on the type of brain injury and the severity of the injury. Second, SB 320 focuses on coverage of facilities where multidisciplinary rehabilitation programs are more likely to be administered.

<sup>28</sup> Both coverage for treatments and limitations on treatments are currently subject to medical necessity and may be contested in the Independent Medical Review process.

### *Identifying rehabilitation facilities treating postacute ABI*

SB 320 specified six types of facilities at which DMHC-regulated plans and CDI-regulated policies could not deny coverage. In order to determine current utilization, CHBRP identified facilities at which ABI-related rehabilitation occurred using Medicare Place of Service codes, and matched those facilities to the facilities listed in SB 320. Facilities associated with ABI in commercial claims data, by Medicare code, did not always align with the names of facilities provided by SB 320, requiring CHBRP to make assumptions about how to match actual facilities with SB 320 categories of facilities (*see Appendix D for more details*).

### *Other key assumptions*

- **Definition of ABI.** SB 320 did not define the term ABI; however, it is usually defined as a brain injury that is sustained after birth. Causes range from a fall to a stroke to brain cancer. CHBRP is unaware of an existing common legal or medical definition of ABI in the U.S. Clinical research and different states have defined conditions that are subsets of ABI—notably traumatic brain injury (TBI). To define the parameters of ABI, CHBRP adopted the United Kingdom’s Royal College of Physicians’<sup>29</sup> definition of “acquired brain injury,” which defines the condition as acute (rapid onset) brain injury of any cause, including:
  - Trauma due to head injury or postsurgical damage (e.g., following tumor removal);
  - Vascular accident (e.g., stroke or subarachnoid hemorrhage);
  - Cerebral anoxia;
  - Other toxic or metabolic insult (e.g., hypoglycemia);
  - Infection (e.g. meningitis, encephalitis) or other inflammation (e.g. vasculitis).
- **Population focus.** CHBRP modeled the impact of SB 320 on the state-regulated managed care population under age 65, because those enrollees would be most affected by the bill. The bill applies to all state-regulated DMHC-plans and CDI-regulated policies.

Additionally, while the goal of rehabilitation may include assisting working-age individuals to return to the workplace, CHBRP did not include vocational rehabilitation as part of services and treatments for ABI because vocational rehabilitation is generally a workers’ compensation benefit.<sup>30,31</sup>

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<sup>29</sup> Royal College of Physicians and British Society of Rehabilitation Medicine. *Rehabilitation following acquired brain injury: national clinical guidelines* (Turner-Stokes L, ed). London: RCP, BSRM, 2003.

<sup>30</sup> California Department of Industrial Relations, Division of Workers’ Compensation “Glossary of workers’ compensation terms for injured workers.” Accessed March 27, 2013, at <http://www.dir.ca.gov/dwc/wcglossary.htm>.

<sup>31</sup> Workers’ compensation benefits apply only when injuries are work-related. The Department of Rehabilitation also provides vocational rehabilitation.

## **Interaction with Other California Requirements**

### *Basic health care services*

DMHC-regulated health plans are required to cover medically necessary basic health care services, as defined in the Knox-Keene Health Care Service Plan Act of 1975, including:

- Physician services;
- Hospital inpatient services and ambulatory care services;
- Diagnostic laboratory and diagnostic and therapeutic radiologic services;
- Home health services;
- Preventive health services;
- Emergency health care services, including ambulance and ambulance transport services, out-of-area coverage, and ambulance transport services provided through the 911 emergency response system; and
- Hospice care.

Grandfathered<sup>32</sup> CDI-regulated policies are not subject to basic health care services. However, nongrandfathered CDI-regulated policies beginning in 2014 will also be required to provide benefit coverage for basic health care services as a result of the ACA and essential health benefits (EHBs).

In addition, both DMHC-regulated plans and CDI-regulated policies are subject to the Independent Medical Review (IMR) process for covered benefits. CHBRP examined IMR complaints from 2011 through March 2013 for both DMHC and CDI. During that period, there were 33 complaints—25 at DMHC and 8 at CDI—related to ABI (e.g., traumatic brain injury, stroke, aneurysm, brain cancer). CHBRP excluded pharmacy- and diagnostic-related IMR complaints.

The IMR complaints concerned coverage for both inpatient and outpatient multidisciplinary rehabilitation programs, as well as single therapies, such as speech therapy, occupational therapy, or cognitive rehabilitation therapy. Of these complaints, one-third of all carriers' decisions were overturned—6 at DMHC and 5 at CDI.

## **Requirements in Other States**

### *Current laws*

CHBRP is unaware of a requirement similar to SB 320 in other states, though laws seeking to increase access to rehabilitation treatments passed in two states in 2012. Utah set up a Traumatic

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<sup>32</sup> A grandfathered health plan is defined as “A group health plan that was created—or an individual health insurance policy that was purchased—on or before March 23, 2010. Grandfathered plans are exempted from many changes required under the ACA. Plans or policies may lose their ‘grandfathered’ status if they make certain significant changes that reduce benefits or increase costs to consumers” (<http://www.healthcare.gov/glossary/g/grandfathered-health.html>).

Spinal Cord and Brain Injury Rehabilitation Trust Fund to support clinics that provide rehabilitation and postacute care for patients with brain injuries. Indiana required the state to explore options for starting a rehabilitation program for individuals with brain injuries.<sup>33</sup>

Meanwhile, the issue of traumatic brain injury has received much attention nationally. The majority of *existing* laws refer to TBI, and largely seek to ensure that authorities at school athletic facilities can recognize TBI symptoms in student athletes, and that they provide education to student athletes and their parents regarding the risks of concussion/mild TBI. Some states also provide support for returning war veterans.<sup>34</sup>

### *Proposed laws*

CHBRP is aware of five states with similar bills in 2013 related to access to rehabilitative treatments for ABI, outlined in Table 2.

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<sup>33</sup> National Conference of State Legislatures, “Traumatic Brain Injury Legislation, 2009-2012: Updated March 2013.” Accessed March 18, 2013, at <http://www.ncsl.org/issues-research/health/traumatic-brain-injury-legislation.aspx>.

<sup>34</sup> War veterans who return home with moderate to severe TBI that is connected to their service would be eligible for VA benefits, according to the Veteran’s Administration, [http://www.va.gov/healthbenefits/resources/priority\\_groups.asp](http://www.va.gov/healthbenefits/resources/priority_groups.asp). Accessed April 2013. Individuals with health care coverage provided by the federal VA are outside CHBRP’s purview and would not be reflected in this analysis.



**Table 2. Brain Injury Mandate Bills Introduced in 2013**

State	Summary of Proposed Legislation
Kentucky (a)	<ul style="list-style-type: none"> <li>Expands benefit coverage to include “treatment of a postacute acquired brain injury” treatment, which includes medical, physical, cognitive, and affective behavior rehabilitation treatment.</li> <li>Lists covered facilities, similar to facilities listed in SB 320 (Beall).</li> <li>Defines the term “acquired brain injury” and outcomes. Limits treatment coverage to 45 visits per calendar year.</li> </ul>
Hawaii (b)	<ul style="list-style-type: none"> <li>Expands benefit coverage to include specific treatments, such as cognitive rehabilitation therapy; cognitive communication therapy; neurocognitive therapy and rehabilitation; neurobehavioral, neurophysical, neuropsychological, and psychophysiological testing or treatment; neurofeedback therapy, remediation, and treatments to help a brain-injured patient reintegrate into the community.</li> <li>Limits benefit coverage for these treatments to \$300,000 per enrollee, up to 20 years from the date the injury occurred.</li> </ul>
Pennsylvania (c)	<ul style="list-style-type: none"> <li>Requires insurance companies to explicitly describe coverage for treatments related to ABI, including cognitive rehabilitation therapy, case management, neurobehavioral testing, and postacute transition treatments. Insurers must also describe limits and exclusions, and prior authorizations.</li> <li>Defines “acquired brain injury.”</li> </ul>
Indiana (d)	<ul style="list-style-type: none"> <li>Creates a state division of brain injury and cognitive rehabilitation treatments, which would establish a network of treatments for persons with brain injury.</li> <li>Defines ABI.</li> <li>Lists services and treatments that network providers would provide.</li> </ul>
Texas (e)	<ul style="list-style-type: none"> <li>Imposes limits on health insurance carriers who wish to limit therapy, treatment, or remediation related to ABI.</li> <li>Requires plans to provide coverage for custodial care.</li> </ul>

Source: California Health Benefits Review Program

- (a) Kentucky Legislature, SB 205 <http://www.lrc.ky.gov/record/13RS/SB205.htm>, Accessed March 2013.
- (b) Hawaii Legislature, SB 1227 <http://legiscan.com/HI/research/SB1227/2013>, Accessed March 2013.
- (c) Pennsylvania Legislature HB 648 [http://www.legis.state.pa.us/cfdocs/billInfo/bill\\_history.cfm?year=2013&sind=0&body=H&type=B&bn=648](http://www.legis.state.pa.us/cfdocs/billInfo/bill_history.cfm?year=2013&sind=0&body=H&type=B&bn=648), Accessed March 2013.
- (d) Indiana Legislature, SB 597, <http://www.in.gov/legislative/bills/2013/IN/IN0597.1.html>, Accessed March 2013; HB 1428 <http://legiscan.com/IN/research/HB1428/2013>, Accessed March 2013.
- (e) Texas Legislature, SB 996, <http://www.legis.state.tx.us/BillLookup/History.aspx?LegSess=83R&Bill=SB996>, Accessed March 2013.

## Interaction with the Affordable Care Act

A number of ACA provisions have the potential to or do interact with state benefit mandates. Below is an analysis of how this proposed benefit mandate may interact with requirements in the ACA, including the requirement for certain health insurance to cover “essential health benefits” (EHBs).<sup>35</sup>

<sup>35</sup> Resources on EHBs and other ACA impacts are available on the CHBRP website: [www.chbrp.org/other\\_publications/index.php](http://www.chbrp.org/other_publications/index.php).

## **Essential Health Benefits**

Effective 2014, the ACA requires nongrandfathered small-group and individual market health insurance—including but not limited to QHPs that will be sold in Covered California—to cover 10 specified categories of EHBs.<sup>36</sup> The U.S. Department of Health and Human Services (HHS) has allowed each state to define its own EHBs for 2014 and 2015 by selecting one of a set of specified benchmark plan options.<sup>37</sup> California has selected the Kaiser Foundation Health Plan Small Group Health Maintenance Organization (HMO) 30 plan as its benchmark plan.<sup>38</sup>

The ACA allows a state to “require that a qualified health plan offered in [an exchange] offer benefits in addition to the essential health benefits.”<sup>39</sup> If the state does so, the state must make payments to defray the cost of those additionally mandated benefits, either by paying the purchaser directly or by paying the QHP. However, as laid out in the Final Rule on EHBs HHS released in February 2013,<sup>40</sup> state benefit mandates enacted on or before December 31, 2011, would be included in the state’s EHBs for 2014 and 2015 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. State benefit mandates that could exceed EHBs would “be specific to the care, treatment, and services that a state requires issuers to offer to its enrollees,” whereas “state rules related to provider types, cost-sharing, or reimbursement methods” would not meet the definition of state benefit mandates that could exceed EHBs. A state’s exchange 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.<sup>41</sup>

### *SB 320 and essential health benefits*

It is unknown whether SB 320 exceeds or falls within EHBs, because of ambiguity in the bill language. As written, SB 320 does not specify which benefits an enrollee would receive, but rather, it designates three things: (1) the condition—ABI; (2) the general category of treatments, of which CHBRP is focusing on rehabilitation; and (3) the facility—listing the types of facilities permitted.

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<sup>36</sup> The 10 specified categories of essential health benefits (EHBs) are ambulatory patient services; emergency services; hospitalization; maternity and newborn care; mental health and substance use disorder services, including behavioral health treatment; prescription drugs; rehabilitative and habilitative services and devices; laboratory services; preventive and wellness services and chronic disease management; and pediatric services, including oral and vision care. [ACA Section 1302(b)].

<sup>37</sup> CCIIO, Essential Health Benefits Bulletin. Available at: [http://cciio.cms.gov/resources/files/Files2/12162011/essential\\_health\\_benefits\\_bulletin.pdf](http://cciio.cms.gov/resources/files/Files2/12162011/essential_health_benefits_bulletin.pdf). Accessed December 16, 2011.

<sup>38</sup> H&SC Section 1367.005; IC Section 10112.27.

<sup>39</sup> ACA Section 1311(d)(3).

<sup>40</sup> Department of Health and Human Services. 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. 12843. Available at: [www.gpo.gov/fdsys/pkg/FR-2013-02-25/pdf/2013-04084.pdf](http://www.gpo.gov/fdsys/pkg/FR-2013-02-25/pdf/2013-04084.pdf).

<sup>41</sup> Essential Health Benefits. Final Rule. 12843.

As previously mentioned, EHBs explicitly include “rehabilitative and habilitative services and devices.” In addition, both proposed rules<sup>42</sup> and final rules<sup>43</sup> on EHBs have specified that mandates relating to provider types (such as facilities) do not fall under the ACA’s interpretation of state-required benefits.

However, rehabilitation treatments and services offered at facilities mentioned in SB 320 may differ from the specific treatments outlined in California’s EHB package, as defined by the Kaiser HMO 30 plan. Additionally, the medical necessity of such treatments may also be in dispute, and contested through the state’s existing IMR process at each state health insurance regulatory agency, DMHC or CDI.

As such, state regulators would first need to determine whether each type of ABI rehabilitation service provided at a listed facility—which range from a hospital to an “analogous facility”—is medically necessary. Then, the regulators need to determine if those treatments differ from California’s EHB package. To the extent that those treatments exceed EHBs as defined in the Kaiser HMO 30 plan, the state would be required to defray the additional cost for QHPs purchased in Covered California.

Therefore, it is unknown whether SB 320 falls within or exceeds EHBs because regulator guidance is required to make determinations on as-yet undefined treatments.

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<sup>42</sup> Department of Health and Human Services, “Proposed Rule: Patient Protection and Affordable Care Act; Standards Related to Essential Health Benefits, Actuarial Value, and Accreditation,” *Federal Register*, Vol 77. No. 277, November 26, 2012 at <http://www.gpo.gov/fdsys/pkg/FR-2012-11-26/pdf/2012-28362.pdf>.

<sup>43</sup> Essential Health Benefits. Final Rule. 12843.

## BACKGROUND ON ACQUIRED BRAIN INJURY

CHBRP defines acquired brain injury (ABI) as acute (rapid onset) brain injury of any cause sustained any time after birth. Severity of ABI ranges from a mild concussion—requiring little to no treatment—to coma or death. ABI may result in short-term or long-term impairments that affect physical 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, 2013).

### ABI: Prevalence in the U.S. and California

As no formal, clinical diagnosis exists for ABI, there is no corresponding single data source that captures the incidence or prevalence of ABI; however, CHBRP presents the most recent California data available for TBI and stroke, which account for the majority of ABI that would likely require rehabilitation treatments.<sup>44</sup>

#### Traumatic Brain Injury (TBI)

##### *U.S.*

Nationally, of the 1.7 million TBIs that occur annually, 1.36 million result in emergency department visits (80%), 275,000 hospitalizations (16%), and 52,000 deaths (3%) (CDC, 2010). Nationally, it is estimated that about 9% of hospitalized TBI patients were discharged to a residential (skilled nursing facility) and about 8% were transferred to inpatient rehabilitation facilities (Coronado et al., 2007).

##### *California*

The California Department of Mental Health reported that, of the 29,354 TBI patients hospitalized in 2007, 7% died and 25% were sent to another facility for follow-up care (CDMH, 2010). More recent data obtained from California's online TBI surveillance program shows that there were 19,164 nonfatal TBI hospitalizations in 2011; 15,515 of those patients were treated and released from the hospital; 1,144 were transferred to an acute care hospital; and 2,044 transferred to a nonacute care hospital<sup>45</sup> (the remainder were classified as unknown) (CDPH, 2013).

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<sup>44</sup> Personal communication, Abrams, G., March 2013.

<sup>45</sup> 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. 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 distinct part until 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.

## **Stroke**

### *U.S.*

Annually, about 795,000 persons experience a stroke in the U.S. making it a leading cause of death and disability. Age and severity are strong indicators of mortality and morbidity. The stroke prevalence rate for those aged 18 to 44 years was 0.7%, and 2.9% for those aged 45 to 64 years (as compared with 8.3% for those over 65 years (CDC, 2011). Stroke affects about 6 in 100,000 children (National Stroke Association, 2013). Of the 700,000 annual survivors, about 15% to 30% become permanently disabled (CDC, 2011). One study reported that 48% (male) to 58% (female) of strokes were classified as moderate to severe—levels of severity that indicate a likely need for rehabilitation treatments (Carandang et al, 2006).

### *California*

In California in 2005, the most recent year for which stroke data are available from the California Health Interview Survey, approximately 195,000 persons aged 0 to 64 years who were insured reported ever experiencing stroke (CHIS, 2013). The CDC reports California's stroke prevalence rate decreased from 2.8% to 2.4% between 2006 and 2010 (Fang et al., 2012). The severity of stroke is unreported in these data sources. In California, there are about 200,000 stroke-related hospital discharges per year (or 1 in 20 hospital discharges) or 5.9 discharges/1,000 population (CDPH, 2007).

## **Burden of ABI in California**

Depending on the severity of the brain injury, health outcomes for surviving ABI patients will range from fully recovered to severely disabled, both cognitively and physically. The California Department of Mental Health reports that TBI can result in numerous short- and long-term disabilities such as epilepsy, physical disabilities, depression, loss of self-control, and increases the risk for Alzheimer's and Parkinson's diseases (CDMH, 2010). Additionally, cognitive speech and sensory deficits may occur.

Of the 1.7 million TBIs occurring in the U.S. yearly, 80,000 to 90,000 patients become permanently disabled (CDC, 2010; Langlois et al., 2006). Cumulatively, about 5 million Americans have long-term disability associated with TBI (Langlois et al., 2009) and about 350,000 Californians are living with TBI (CDMH, 2010).

## **ABI and Special Populations**

### **Gender**

#### *TBI*

In California, men had the highest proportion of nonfatal hospitalizations from TBI. For instance, of the 19,164 TBI nonfatal hospitalizations among people under 65 in California in 2011, 72%

were male and 28% were female (CDPH, 2013).<sup>46</sup> This gender gap is consistent with national data that finds men at higher risk for fatal and nonfatal hospitalizations from TBI (Coronado et al., 2007).

### *Stroke*

The incidence of stroke appears to affect females and males similarly. Nationally, the 2010 age-adjusted prevalence rates for females were 2.7% and 2.6% for males (Fang et al., 2012). Data from 2004 shows that California men have a slightly higher stroke morbidity rate of 6.4 hospital discharges/1,000 population than California women whose rate is 5.5 discharges/1,000 population.

## **Age**

### *TBI*

National data shows some differences in moderate to severe TBI by age with higher rates of TBI requiring hospitalization in persons aged 15 to 34 years than other groups under age 65 (Langlois et al., 2006). Approximately 91% of children ages 0 to 14 years with TBI are seen in the emergency department and 8% are hospitalized; whereas the likelihood of hospitalization increases consistently with age (e.g., 20.2% of adults with TBI ages 45 to 54 years and 26.9% of those aged 55 to 64 are hospitalized) (Langlois et al., 2006). In California, about half (49%) of the 19,164 TBI-related hospitalizations in 2011 were for adults between the ages of 35 to 64, compared to 16% among ages 25 to 34 and 22% among ages 15 to 24 (CDPH, 2013).

### *Stroke*

In contrast to TBI, stroke disproportionately affects older people. For example, the age-adjusted prevalence of stroke for persons aged 65 and older is 8.3%, but 2.9% for persons aged 45 to 64 years and 0.7% for those aged 18 to 44 years (Fang et al., 2012).

## **Race/ethnicity**

### *TBI*

National data shows some disparities by race and ethnicity where African Americans have the highest death rate due to TBI. In California, nearly half of hospitalizations occurred among whites (47%), 32% among Hispanics, 8% among African Americans, 6% among Asian/Pacific Islanders, and less than 1% among American Indians (CDPH, 2013).

### *Stroke*

Using data from the Behavioral Risk Factor Surveillance System, Fang et al. (2012) reported that, nationally, the age-adjusted stroke prevalence was higher for American Indians/Alaskan Natives and blacks (5.9% and 3.0%, respectively) than for whites, Hispanics and Asians (2.4%, 2.5%, and 1.5%, respectively). California data show that, although whites comprise 65% of stroke-related hospital discharges, African Americans have the highest rate of stroke morbidity

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<sup>46</sup> Includes TBI as principal or secondary diagnosis. Approximately 60% of TBI diagnoses are principal (indicating the most serious diagnosis) and 40% are secondary. (CDPH, 2013).

(12.1 hospital discharges/1,000 population) and American Indians have the lowest (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).

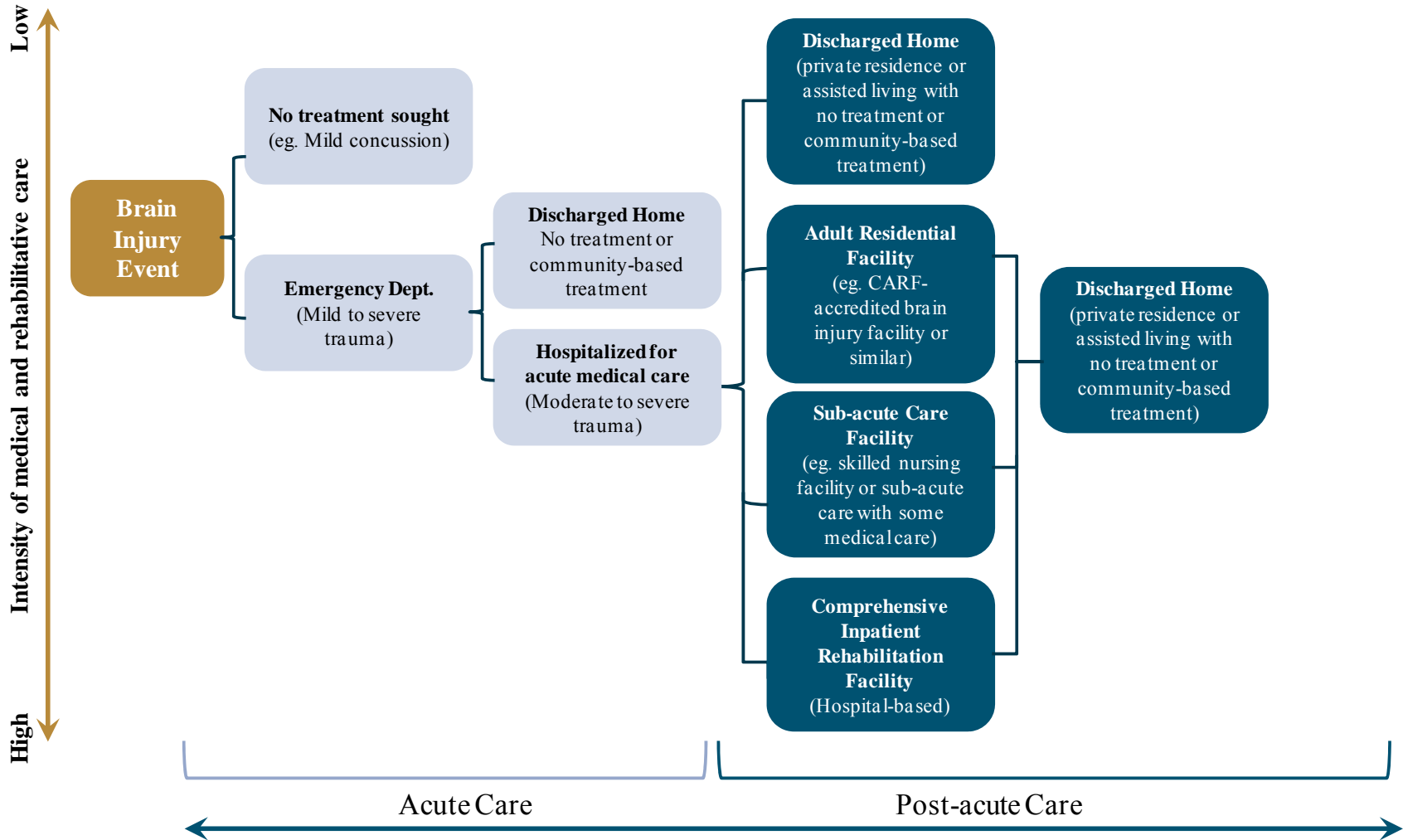
## **Types of Facilities that Provide Postacute Care Rehabilitation**

Medical and rehabilitative treatment outcomes for ABI range from complete restoration of pre-injury function to permanent, severe disability. In addition to acute medical care treatment (emergency department and hospitalization), postacute rehabilitation treatments for ABI are prescribed in accordance with the severity and location of the brain injury among other factors (Figure 1).

Those diagnosed with moderate to severe brain injuries are the most likely patients to be prescribed rehabilitation that involves multidisciplinary treatment programs. Treatments may include physical therapy, occupational therapy, speech/language therapy, psychology/psychiatry, and social support provided at an array of inpatient and outpatient facilities or programs (NINDS, 2013). Additionally, neuropsychology, cognitive behavioral therapy, and vocational rehabilitation are other treatments that may be recommended.

The number of California patients with moderate to severe ABI who require postacute rehabilitation treatments is difficult to gauge as there is no data source that records injury severity and medically necessary 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 community-based rehabilitation [Figure 1]) to determine the injury outcome. Capturing the full continuum of care is necessary to estimate the impact rehabilitative care might have.

**Figure 1.** Overview of Acquired Brain Injury Continuum of Care



Note: This diagram is an approximation of the rehabilitative process. Patients may move back and forth between the facilities at any given time depending on their needs and access.

Source: California Health Benefits Review Program, 2013



## MEDICAL EFFECTIVENESS

As discussed in the *Introduction*, SB 320 would mandate coverage for medically necessary medical care and rehabilitation for ABI. The medical effectiveness review summarizes evidence from two systematic reviews of studies of the effectiveness of multidisciplinary rehabilitation treatments (Brasure et al., 2012; Turner-Stokes et al., 2005) plus two individual studies of similar quality to those included in the systematic review (Ghaffar et al., 2006; Hopman et al., 2012).

### Research Approach and Methods

Studies of rehabilitation for ABI were identified through searches of PubMed, the Cochrane Library, Web of Science, EconLit, Business Source Complete, and PsycInfo. Websites maintained by the following organizations that produce and/or index meta-analyses and systematic reviews were also searched: the Agency for Healthcare Research and Quality, the International Network of Agencies for Health Technology Assessment (INAHTA), the National Guideline Clearinghouse, the National Health Service (NHS) Centre for Reviews and Dissemination, the National Institute for Health and Clinical Excellence (NICE), and the Scottish Intercollegiate Guideline Network.

The search was limited to abstracts of studies published in English from 2000 to present. Of the 659 abstracts found in the literature review, 83 were reviewed for potential inclusion in this report on SB 320. The medical effectiveness review relied heavily on two systematic reviews that assessed findings from 30 articles that presented findings from a total of 24 randomized controlled trials (RCTs) and quasi-experimental studies of multidisciplinary rehabilitation programs<sup>47</sup> (Brasure et al., 2012; Turner-Stokes et al., 2005). Fifteen of the 30 articles included in the two systematic reviews were among the 83 articles for which abstracts were reviewed. Two individual articles that summarized findings from quasi-experimental studies that were not included in the two systematic reviews were also included (Ghaffar et al., 2006; Hopman et al., 2012). The other 64 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. A more thorough description of the methods used to conduct the medical effectiveness review and the process used to grade the evidence for each outcome measure is presented in Appendix B: Literature Review Methods. Findings from the literature review are summarized in Table 2, which appears at the end of the *Medical Effectiveness* section. Appendix C includes a table describing the studies that CHBRP reviewed (Table C-1) and a table summarizing evidence of effectiveness (Table C-2).

The medical effectiveness review focuses on rehabilitation treatments because CHBRP assumes that DMHC-regulated plans and CDI-regulated policies provide coverage for all medically necessary medical treatments for ABI other than rehabilitation treatments.

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<sup>47</sup> Quasi-experimental studies are nonrandomized studies with comparison groups that are designed prospectively to maximize similarities between the intervention and comparison groups at baseline.

In addition, the medical effectiveness review summarizes findings from studies of the impact of utilizing packages of multidisciplinary rehabilitation treatments. Findings from studies of individual types of treatments are not discussed because generalizing findings from studies of specific services to the whole population of persons with ABI is difficult due to the heterogeneity of such injuries. Although most persons with moderate to severe ABI need some combination of cognitive rehabilitation, neurological rehabilitation, occupational therapy, physical therapy, and speech therapy, the specific mix of types and amounts of rehabilitation needed varies depending on the type of brain injury and severity of the injury. Persons who have had a TBI, for example, often have greater need for cognitive rehabilitation than persons who have had a stroke, whereas persons who have had a stroke often have greater need for rehabilitation to restore physical functioning.<sup>48</sup>

Finally, the medical effectiveness review is limited to findings from studies that primarily enrolled persons under age 65 because most of the persons whose health insurance coverage would be affected by SB 320 are in this age group.

## Methodological Considerations

The medical effectiveness review assessed the subset of studies on multidisciplinary rehabilitation for ABI that present the strongest evidence regarding the effectiveness of these treatments. 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 the 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. For this reason, CHBRP only examined findings from RCTs and quasi-experimental, nonrandomized studies in which efforts were made to ensure that the intervention and comparison groups were similar at baseline.

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. Some studies enrolled unselected populations of persons with ABI. Others limited enrollment to persons with moderate to severe injuries. With regard to research design, 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. Still others compared similar interventions delivered in different settings. A fourth group of studies compared different multidisciplinary rehabilitation interventions delivered in the same type of setting.<sup>49</sup>

The facilities in which the studies were conducted are similar to those listed in SB 320. Thus, 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 320 because the bill does

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<sup>48</sup> Personal communication, Gary Abrams, MD, March 18, 2013.

<sup>49</sup> For example, one study compared home-based rehabilitation to rehabilitation delivered in a transitional living facility (Hopman et al., 2012).

not specifically enumerate the medically necessary rehabilitation treatments that DMHC-regulated plans and CDI-regulated policies would be required to cover.

Finally, **most of the persons enrolled in the studies included in the medical effectiveness review had TBI and/or stroke**. The extent to which findings from these studies generalize to populations that consist primarily of persons with other types of ABI (such as those consequent to infection or autoimmune disorders) is unknown.

## Outcomes Assessed

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<sup>50</sup> 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, physical ability (e.g., dexterity, ability to walk).

## Study Findings

### **Studies of Persons with Mild ABI**

Six studies (five RCTs and one quasi-experimental study) examined the impact of multidisciplinary postacute rehabilitation interventions delivered to non-elderly adults with mild TBI (Elgmark et al., 2007; Ghaffar et al., 2006; Paniak et al., 1998, 2000; Salazar et al., 2000; Wade et al., 1997, 1998). These interventions were compared to no specific intervention or a minimal intervention, such as a single session of education and advice.

The overall conclusion of these six studies is that multidisciplinary rehabilitation interventions are not effective in unselected patients with mild TBI. No statistically significant differences were found in cognitive function, health status, impairment, participation, psychological distress, social disability, symptoms, and work status. However, a post-hoc analysis of data from one of these studies identified a subgroup of patients who benefited from multidisciplinary rehabilitation. Wade and colleagues (1997) found that persons with mild TBI who were admitted to a hospital or had at least one hour of posttraumatic amnesia who received multidisciplinary rehabilitation had less difficulty engaging in everyday activities (i.e., had increased participation). This research team conducted a subsequent trial that enrolled only persons with mild TBI who were hospitalized (Wade et al., 1998). This study found that multidisciplinary rehabilitation was associated with less difficulty engaging in everyday activities and fewer postconcussive symptoms.

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<sup>50</sup> 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.

Two recent evidence-based guidelines for management of mild TBI suggest that other types of treatments for mild TBI are effective (MTBI Guidelines Development Team, 2010; VA/DoD, 2009). The authors of both guidelines concluded that there is evidence from RCTs that providing persons who have had a mild TBI with education about symptoms and expectations for recovery reduces the likelihood that these persons will experience persistent symptoms. The guidelines also state that studies have found that certain treatments focused on specific symptoms of TBI and comorbid conditions are effective. One guideline cites a systematic review that found that vestibular rehabilitation exercises are effective treatments for dizziness, vision, and balance problems associated with mild TBI and other conditions (Hillier and Hollohan, 2007). Both guidelines conclude that psychotherapy is an effective treatment for persons with TBI who have comorbid mental health conditions.

The preponderance of evidence suggests that among persons with mild TBI, only persons with injuries that require hospitalization benefit from multidisciplinary rehabilitation. Evidence from RCTs suggests that providing all persons who have had a mild TBI with education about symptoms and expectations for recovery reduces the likelihood of persistent symptoms. There is also evidence that vestibular rehabilitation is an effective treatment for persistent balance disorders associated with mild TBI and that psychotherapy is an effective treatment for comorbid mental health conditions.

### **Studies of Persons with Moderate to Severe ABI**

Eighteen studies assessed the impact of multidisciplinary rehabilitation interventions provided to persons with moderate or severe ABI. Most persons enrolled in these studies had TBI, although some had injuries due to stroke or other conditions.

#### *Multidisciplinary rehabilitation vs. minimal intervention*

Three RCTs compared multidisciplinary postacute rehabilitation to a minimal intervention or no specific intervention (Powell et al., 2002; Smith et al., 1981; Werner and Kessler, 1996).

Two studies examined the impact of multidisciplinary postacute outpatient rehabilitation on persons with stroke (Smith et al., 1981; Werner and Kessler, 1996). These outpatient rehabilitation programs emphasized occupational therapy and physical therapy. One RCT found that persons who received outpatient rehabilitation had higher scores on measures of functional status and engagement in everyday activities than persons who received no specific intervention, but that the intervention did not affect symptoms of depression (Werner and Kessler, 1996). The other RCT found that receipt of outpatient rehabilitation was associated with less dependence on others to perform activities of daily living (Smith et al., 1981).

One RCT compared the effects of a community-based multidisciplinary postacute rehabilitation intervention to receipt of written information alone among persons with moderate to severe TBI (Powell et al., 2002). Persons in the intervention group received treatment in their homes for two to six hours per week for a mean duration of six months. There were statistically significant differences in the percentages of persons in the intervention and comparison groups who experienced a reduction in disability and an increase in engagement in everyday activities.

The preponderance of evidence from the three RCTs that have compared multidisciplinary postacute rehabilitation to a minimal intervention or no specific intervention for treatment of moderate to severe ABI suggests that these interventions improve functional status and increase participation in everyday activities.

#### *More intensive vs. less intensive interventions*

Five RCTs have evaluated whether outcomes of multidisciplinary rehabilitation for ABI are associated with the intensity of treatment (Greenwood et al., 1994; Kwakkel et al., 1999; Shiel et al., 2001; Slade et al., 2002; Zhu et al., 2001). One RCT enrolled persons with stroke (Kwakkel et al., 1999), three enrolled persons with TBI (Greenwood et al., 1994; Shiel et al., 2001; Zhu et al., 2001), and one enrolled a mixed population of persons with stroke or TBI (Slade et al., 2002). Four studies examined inpatient rehabilitation (Kwakkel et al., 1999; Shiel et al., 2001; Slade et al., 2002; Zhu et al., 2001) and one addressed home-based rehabilitation (Greenwood et al., 1994).

The study of persons with stroke found that providing intensive arm or leg training (30 minutes per day, five days per week for 20 weeks) in addition to standard inpatient multidisciplinary postacute rehabilitation was associated with greater dexterity (arm) or mobility (leg) and better ability to perform ADLs (Kwakkel et al., 1999). One study of persons with traumatic brain injury compared receipt of multidisciplinary postacute inpatient rehabilitation two days per week versus four days per week (Zhu et al., 2001). The authors found that more intensive treatment was associated with higher (i.e., better) scores on a measure of global functioning but not with a measure of activity. Another study of persons with traumatic brain injury compared routine postacute inpatient rehabilitation alone to routine care plus access to an additional experienced health care professional. This study found persons who received more intensive treatment functioned more independently (Shiel et al., 2001). The study of the mixed population of stroke and TBI patients also compared patients who received more versus less therapy while in a postacute inpatient rehabilitation facility. The authors found that more intensive rehabilitation was associated with a shorter length of stay but did not affect ability to perform ADLs at discharge, perhaps because the intervention and comparison facilities used similar criteria to determine when a patient was ready to be discharged (Slade et al., 2002). An RCT that examined the impact of adding case management to a standard home-based multidisciplinary postacute rehabilitation program for persons with TBI found that adding case management had no effect on a patient's level of impairment or the likelihood of having employment (Greenwood et al., 1994).

Evidence from the five RCTs that have compared more intensive to less intensive multidisciplinary rehabilitation for moderate to severe ABI is ambiguous. However, differences in the treatments provided to the intervention and comparison groups make it difficult to generalize findings across these studies.

#### *Different multidisciplinary rehabilitation interventions delivered in the same setting*

Seven studies have compared the delivery of different types of multidisciplinary postacute rehabilitation for moderate to severe TBI in similar clinical settings (Cicerone, 2004; Cicerone et al., 2008; Prigatano et al., 1984; Rattok et al., 1992; Sarajuuri et al., 2005; Semlyen et al., 1998;

Vanderploeg et al., 2008). The goal of these studies is to assess whether some types of multidisciplinary rehabilitation are more effective than others.

Three studies have compared different types of postacute inpatient multidisciplinary rehabilitation for TBI. Semlyen and colleagues (1998) compared persons with traumatic brain injury who received inpatient rehabilitation at a specialized rehabilitation hospital or at a general hospital. Persons treated at the specialized hospital experienced greater gains in functioning than persons treated at general hospitals but this finding is difficult to interpret because persons treated at the specialized hospital had a higher level of disability at admission and, thus, may have had more potential for improvement than the group treated in general hospitals. (Turner-Stokes, 2005). Persons admitted to general hospitals may not have improved as much because they had less disability to overcome. Sarajuuri and colleagues (2005) also compared multidisciplinary rehabilitation delivered at a specialized hospital and at general hospitals. The authors found that persons treated in the specialized hospital were more likely to be working, studying, or engaged in volunteer work following treatment and that the difference was statistically significant (89% vs. 55%). Vanderploeg and colleagues (2008) compared inpatient multidisciplinary rehabilitation that emphasized cognitive rehabilitation to inpatient rehabilitation that emphasized functional experiential therapy. The authors found no difference in disability, quality of life, or likelihood of working, studying, or engaging in volunteer work following treatment when they included all patients in their analysis. However, when they limited their analysis to patients age 30 years or younger, patients in the group that received cognitive rehabilitation were more likely to be working, studying, or engaged in volunteer work.

Four studies that enrolled persons with TBI evaluated intensive multidisciplinary postacute outpatient rehabilitation programs that focused on improving neuropsychological functioning. Three studies compared outpatient rehabilitation focused on cognitive neuropsychological functioning to standard outpatient rehabilitation (Cicerone, 2004; Cicerone et al., 2008; Prigatano et al., 1984). Another study compared three groups of persons with TBI who received different combinations of cognitive rehabilitation and small-group training in interpersonal communications in an outpatient setting (Rattok et al., 1992). Three of these studies compared the percentages of persons in intervention and comparison groups who were working or pursuing education (Cicerone et al., 2008; Prigatano et al., 1984; Rattok et al., 1992). Only one found a statistically significant difference in this outcome (Cicerone et al., 2008). However, the three studies had such small numbers of persons in the treatment groups (14 to 34 persons) that they may have lacked statistical power to detect an effect on this outcome. One of the studies (Cicerone et al., 2008) reported that persons who received outpatient rehabilitation focused on cognitive functioning reported better quality of life. Another study found that persons who received outpatient rehabilitation focused on cognitive functioning were also better integrated into their communities and more satisfied with their ability to function in their communities (Cicerone, 2004). Findings regarding neuropsychological functioning and participation in activities of everyday life were inconsistent across studies.

Findings from studies that compared the delivery of inpatient rehabilitation in specialized versus unspecialized settings are ambiguous. Findings from studies that compared outpatient rehabilitation that emphasized cognitive rehabilitation to standard outpatient rehabilitation regarding likelihood of obtaining employment or pursuing education were ambiguous.

### *Similar multidisciplinary rehabilitation interventions delivered in different settings*

Three studies have investigated whether the setting in which a multidisciplinary rehabilitation intervention is delivered affects outcomes (Björkdahl et al., 2006; Hopman et al., 2012; Ozdemir et al., 2001). One study compared the provision of multidisciplinary postacute rehabilitation to persons with stroke in outpatient clinic and home-based settings (Björkdahl et al., 2006). Persons in both the outpatient clinic and home-based group received nine hours of rehabilitation per week for three weeks. The two groups experienced similar improvements in functional status and similar reductions in impairment.

Another study compared persons with stroke who received treatment in an acute inpatient rehabilitation unit and persons who received similar but less intense treatment in their homes (Ozdemir et al., 2001). The authors found that persons who received more intensive rehabilitation in an inpatient setting had greater improvements in overall functioning and in functioning of their arms and legs than persons who received less intensive rehabilitation in their homes. Because the intensity of treatment varied between inpatient and home settings, one cannot determine whether the difference is due to the difference in setting or the difference in intensity of treatment.

A third study compared persons with TBI treated in residential, transitional living programs to persons treated in home-based community rehabilitation programs (Hopman et al., 2012). Persons in the residential, transitional living programs received therapy five days per week for seven weeks. Persons in the home-based community rehabilitation programs received similar treatments at a lower level of intensity (1 to 2 hours per week). This study found no statistically significant difference in measures of physical functioning, work status, and ability to perform instrumental ADLs. The home-based group had greater productivity than the transitional living group but the transitional living group had greater social integration.

<p>There is insufficient evidence to determine whether the setting in which multidisciplinary rehabilitation interventions occurs affects patients' outcomes because findings are confounded by differences in intensity of treatment across settings.</p>
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# BENEFIT COVERAGE, UTILIZATION, AND COST IMPACTS

SB 320 would prohibit DMHC-regulated health plans and CDI-regulated policies from denying coverage for ABI-related medically necessary medical or rehabilitation treatments at specified medical facilities (see *Introduction* for a complete list). The language of the bill does not specify what kinds of treatments would be covered, focusing instead on the types of facilities at which treatment may occur and that the treatment be medically necessary. The bill does not explicitly indicate whether carriers could establish limitations on coverage, such as limits on the number of treatments, or number of inpatient days.

CHBRP finds that the impact of SB 320 is unknown for the following reasons:

- SB 320 would require coverage for types of facilities but does not indicate the treatments and services health plans and health insurance policies would be required to cover. Requiring coverage for types of facilities does not guarantee coverage for all treatments and services provided at those facilities. SB 320 also does not address limitations on benefit coverage, such as limits on the numbers of days or treatments covered. The lack of specificity in the bill would require regulators to determine whether—for each enrollee—the treatment(s) received at a facility mentioned in SB 320 is medically necessary. Because it is unknown which ABI-related treatments and services an enrollee may receive, the intensity of those treatments, or their duration, the outcome of these regulatory determinations is unknown.
- CHBRP found no data or literature indicating use of uncovered ABI-related rehabilitation treatments. Therefore, CHBRP could not estimate the level of unmet demand for treatments.

This section will present first the current, or baseline, costs and coverage related to facilities that provide rehabilitations treatments for adults with ABI, and then will provide the estimated utilization, cost, and benefit coverage impacts of SB 320. For further details on the underlying data sources and methods, please see Appendix D at the end of this document.

## Current (Baseline) Benefit Coverage, Utilization, and Cost

### Current Coverage of the Mandated Benefit

Current coverage of treatments at facilities for ABI was determined by a survey of the seven largest providers of health insurance in California. CHBRP surveys the largest major health plans and insurers regarding coverage. Responses to this survey represented 39.2% of the privately funded CDI-regulated market and 72.8% of the privately funded DMHC-regulated market. Combined, responses to this survey represent 64.7% of the privately funded market subject to state mandates.

Currently, the majority of enrollees appear to have coverage at the facilities required by SB 320; 100% have insurance coverage for treatments at general acute care hospitals, acute rehabilitation



hospitals, long-term acute care hospitals, medical offices, or other settings; and 58% have insurance coverage for treatments at adult residential or postacute residential transitional rehabilitation facilities. This coverage could include limitations on number of visits or in-patient days, or have an annual limit on insurer payments. Some enrollees with ABI may reach these limits depending on the extent of their rehabilitation needs.

### **Current Utilization Levels**

Approximately 129,700 enrollees with health insurance subject to SB 320 (0.5% of people enrolled in DMHC-regulated plans and/or CDI-regulated policies) have been diagnosed with and treated for ABI. CHBRP analyzed MedStat<sup>51</sup> data to identify incidence of ICD-9 codes associated with ABI. The incidence rates were assumed to be consistent across all insured markets (see Appendix D).

Of the 129,700 enrollees with ABI, approximately 4,500 were admitted to a facility that would be subject to SB 320 during the past year. These 4,500 patients used approximately 68,200 different treatments under their current insurance coverage.

**Unmet demand for ABI-related rehabilitative treatments is unknown.** CHBRP can only identify the treatments administered at these facilities using commercial claims data that are generated when insurers reimburse a provider. As mentioned previously, CHBRP analyzed MedStat data to determine facility use for 68,000 unspecified treatments. Therefore, because data at the facility-level lacks specificity, CHBRP is unable to determine which treatments are currently used and which are not used. This detail would assist CHBRP to estimate current unmet demand for treatments. In addition, some enrollees with ABI are likely paying directly for treatments out-of-pocket due to lack of insurance coverage.<sup>52</sup> These treatments, for which enrollees are either paying for directly or foregoing, are not reflected in claims data for these specific facilities.

CHBRP was also unable to identify datasets or research literature that capture utilization for ABI-related rehabilitation treatments that are not covered, and that enrollees obtain elsewhere. Understanding the level of unmet demand is critical for CHBRP to estimate whether utilization—and noncovered expenditures associated with that utilization—would then shift to DMHC-regulated plans and CDI-regulated policies. Without this information, CHBRP is unable to estimate unmet demand for ABI rehabilitative treatments.

### **Current Average Cost of ABI Treatments**

As discussed in the *Medical Effectiveness* section of this report, treatments under multidisciplinary rehabilitation programs cover a wide range of treatments, including some combination of cognitive rehabilitation, neurological rehabilitation, occupational therapy, physical therapy, and speech therapy. CHBRP identified facilities that commercial insurers had

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<sup>51</sup> Milliman, CHBRP's actuaries, maintain a MedStat database produced using Thomson Reuters' MarketScan databases. MarketScan databases cull claims data from approximately 100 difference insurance companies, Blue Cross Blue Shield plans, and third-party administrators. For additional details, see Appendix D.

<sup>52</sup> Personal communication, Dr. Cassie Spalding-Diaz and Dr. Gary Abrams, March 2013.

paid to provide ABI-related rehabilitation treatments. CHBRP found that the average costs of ABI treatments as reported in these commercial insurance claims data varies by facility (see Table 3).<sup>53</sup>

**Table 3.** Average Cost of Rehabilitative Treatments for Enrollees with ABI by Type of Facility, 2010

Type of Facility	Average Cost of All Treatments per Enrollee
Inpatient Hospital	\$159,031
Outpatient Hospital	\$1,115
Comprehensive Inpatient Rehabilitation Facility	\$78,310
Skilled Nursing Facility and Other	\$14,257
Medical Office	\$ -
Long-Term Care Facility	\$ -
Adult Residential Facility	\$ -

*Source:* California Health Benefits Review Program, 2013 using MedStat data.

Note: Not all facilities specified by SB 320 had ABI rehabilitative treatment costs associated with them, although they likely have patients with ABI. For example, long-term care facilities provide indefinite daily medical care, rather than rehabilitative care, and therefore have no average cost per enrollee for rehabilitative treatments.

### **Current (Baseline) Premiums and Expenditures**

Table 4 (at the end of this section) presents per member per month (PMPM) premandate estimates for premiums and expenditures by market segment. Prior to the mandate, total expenditures PMPM in the DMHC-regulated private market average \$549 in large-group plans, \$530 in small-group plans, and \$656 in individual plans. Total expenditures PMPM in the CDI-regulated private market are \$706 in large-group policies, \$822 in small-group policies, and \$469 in individual policies. Enrollee expenditures for uncovered benefits is unknown, as CHBRP cannot quantify these costs. The final column in Table 4 gives the total annual premiums and overall expenditures for all DMHC-regulated plans and CDI-regulated policies.

### **The Extent to Which Costs Resulting From Lack of Coverage Are Shifted to Other Payers, Including Both Public and Private Entities**

CHBRP estimates an unknown shift in costs among private or public payers as a result of current coverage, given that the carriers reported 100% coverage for medically necessary rehabilitation care for ABI at nearly every bill-specified facility. Some carriers reported limits on coverage for some treatments, but it is unknown whether persons who have coverage through those carriers are obtaining coverage for all needed rehabilitation treatments.

### **Public Demand for Benefit Coverage**

Considering the criteria specified by CHBRP’s authorizing statute, CHBRP reviews public demand for benefits relevant to a proposed mandate in two ways. CHBRP:

<sup>53</sup> SB 320 specified six categories of facilities. Those categories did not align precisely with facility categories that returned ABI-related rehabilitation claims data. For more details about CHBRP’s methods for matching commercial claims data with SB 320’s categories of facilities, please see Appendix D.

- 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 so not subject to state-level mandates) with the benefits that are provided by plans or policies that would be subject to the mandate.

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 currently were no substantive differences.

Given the general match between health insurance that would be subject to the mandate and self-insured health insurance (not subject to state-level mandates), CHBRP concludes that public demand for coverage is essentially satisfied by the current state of the market.

## Impacts of Mandated Benefit Coverage

SB 320 would prohibit DMHC-regulated health plans and CDI-regulated policies from denying coverage for ABI-related medically necessary medical or rehabilitation treatments at specified medical facilities. The bill also does not explicitly indicate whether or not carriers could establish limitations on coverage, such as limits on the number of treatments, or number of inpatient days.

As previously mentioned, CHBRP finds that the impact of SB 320 is unknown for the following reasons:

- SB 320 would require coverage for types of facilities but does not indicate the treatments and services health plans and health insurance policies would be required to cover. Requiring coverage for types of facilities does not guarantee coverage for all treatments and services provided at those facilities. SB 320 also does not address limitations on benefit coverage, such as limits on the numbers of days or treatments covered. The lack of specificity in the bill would require regulators to determine whether, for each patient, the treatment(s) received at a facility mentioned in SB 320 is medically necessary. Because it is unknown which ABI-related treatments and services an enrollee may receive, the intensity of those treatments, or their duration, the outcome of these regulatory determinations is unknown.
- CHBRP found no data or literature indicating use of uncovered ABI-related rehabilitation treatments. Therefore, CHBRP could not estimate the level of unmet demand for treatments.

Postmandate, CHBRP finds that the impact of SB 320 is unknown. First, it is unknown which ABI-related treatments an enrollee may receive. In addition, the intensity of those treatments, their duration, and the outcome of regulatory determinations on medical necessity is unknown. Second, CHBRP found no data or literature to indicate the level of unmet demand for services. **Therefore, it is unknown how many ABI patients are eligible to receive coverage for multidisciplinary treatments at the facilities specified in SB 320, and the impact on costs and utilization.**

CHBRP generally assess the impact of a benefit mandate bill by analyzing:

- How the proposed mandate would change benefit coverage overall, and how it would impact access and health treatment/service availability as well as per-unit cost;
- How the proposed mandate would change utilization;
- What impact the proposed mandate would have on administrative and other expenses;
- What impact the mandate would have on total health care costs, including the change in total expenditures, potential cost offsets or savings in the first 12 months after enactment, and the impact on costs beyond the initial 12 months;
- What impact the proposed mandate would have on each category of payer; and
- What impact the proposed mandate would have on the uninsured and public programs.

Because the impact SB 320 would have is unknown, the impact of this proposed mandate in all of these areas is unknown at this time.

**Table 4.** Baseline (Premandate) Per Member Per Month Premiums and Total Expenditures by Market Segment, California, 2014

	DMHC-Regulated							CDI-Regulated			Total
	Privately Funded Plans (by Market) (a)			CalPERS HMOs (b)	Medi-Cal Managed Care Plans			Privately Funded Policies (by Market) (a)			
	Large Group	Small Group	Individual		65 and Over (c)	Under 65	Medi- Cal/Formerly Healthy Families Program (d)	Large Group	Small Group	Individual	
Total enrollees in plans/policies subject to state mandates (e)	11,289,000	2,479,000	1,029,000	854,000	688,000	5,203,000	626,000	539,000	1,315,000	1,877,000	25,899,000
Total enrollees in plans/policies subject to SB 320	11,289,000	2,479,000	1,029,000	854,000	688,000	5,203,000	626,000	539,000	1,315,000	1,877,000	25,899,000
Average portion of premium paid by employer	\$437.53	\$313.63	\$0.00	\$391.90	\$279.00	\$163.00	\$88.83	\$483.35	\$421.89	\$0.00	\$95,549,186,000
Average portion of premium paid by employee	\$83.30	\$169.52	\$546.88	\$97.98	\$0.00	\$0.00	\$8.79	\$135.14	\$190.22	\$305.75	\$34,912,666,000
<b>Total premium</b>	\$520.83	\$483.15	\$546.88	\$489.88	\$279.00	\$163.00	\$97.62	\$618.49	\$612.11	\$305.75	\$130,461,851,000
Enrollee expenses for covered benefits (deductibles, copays, etc.)	\$28.54	\$46.99	\$109.38	\$25.99	\$0.00	\$0.00	\$4.51	\$87.22	\$209.80	\$163.07	\$14,462,198,000
Enrollee expenses for benefits not covered (f)	\$—	\$—	\$—	\$—	\$—	\$—	\$—	\$—	\$—	\$—	\$—
<b>Total expenditures</b>	\$549.37	\$530.15	\$656.26	\$515.87	\$279.00	\$163.00	\$102.13	\$705.72	\$821.91	\$468.82	\$144,924,050,000

Source: California Health Benefits Review Program, 2013.

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

(b) As of September 30, 2012, 57.5%, or 469,000, CalPERS members were state retirees, state employees, or their dependents. CHBRP assumes the same ratio for 2014.

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

(d) Children in Healthy Families, California's Children's Health Insurance Program, will be moved into Medi-Cal Managed Care by January 1, 2014, as part of the 2012–2013 budget.

(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) “—” denotes that CHBRP was unable to estimate the value. Includes only those expenses that are paid directly by enrollees or other sources to providers for treatments related to the mandated benefit that are not currently covered by insurance. CHBRP cannot estimate these costs due to lack of data or research literature on treatments provided that are not currently covered by insurance. Other components of expenditures in this table include all health care treatments 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.

## PUBLIC HEALTH IMPACTS

SB 320 would prohibit DMHC-regulated plans and CDI-regulated policies from denying coverage for medically necessary medical and rehabilitative treatment at specified facilities for ABI. The bill language emphasizes facilities, rather than specific treatments, which presents analytical challenges for CHBRP because coverage of facilities does not necessarily equate to coverage for the variety of treatments and services that might be available at any of the specified facilities, or what an enrollee with ABI may require.

### Estimated Public Health Outcomes

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. In the case of SB 320, the preponderance of evidence shows that persons with moderate to severe ABI have better outcomes from multidisciplinary postacute rehabilitation treatment than those who use little or no intervention (see *Medical Effectiveness*). However, the *Benefit Coverage, Utilization, and Cost Impacts* section concludes that the impact of the bill on coverage and utilization is unknown due to broad bill language concerning treatments and services that could be covered and whether health plans and health insurance policies are permitted to or prohibited from limiting utilization of those treatments and services. Additionally, CHBRP was unable to identify datasets or literature estimating unmet demand for ABI-related rehabilitation treatment or services. Therefore, CHBRP concludes that the overall public health impact of SB 320 is unknown. Even if CHBRP estimated a known non-zero impact, CHBRP would be unable to estimate a quantitative public health impact because there are not sufficient data to determine what percentage of persons with ABI need multidisciplinary rehabilitation treatment (see *Background* section).

The preponderance of evidence shows that persons with moderate to severe ABI benefit from multidisciplinary, postacute rehabilitation treatment as compared to those who receive little or no intervention (see *Medical Effectiveness*). However, CHBRP is unable to estimate a change in coverage or utilization of these rehabilitation treatments at the specified facilities for two reasons: (1) the bill's focus on facilities precludes capturing premandate coverage or utilization of treatments; and (2) CHBRP is unable to estimate the unmet demand for these treatments. **Therefore, CHBRP concludes that the overall public health impact of SB 320 is unknown.**

### Estimated Impact on Financial Burden

An enrollee's out-of-pocket<sup>54</sup> costs for covered treatments/services and expenses for uncovered treatments/services comprise CHBRP's definition of financial burden. The *Benefit Coverage, Utilization, and Cost Impacts* section estimates the average ABI-related, inpatient hospital stay

<sup>54</sup> 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.

costs about \$159,000, comprehensive inpatient rehabilitation facilities cost about \$78,000, skilled nursing facilities cost approximately \$14,000, and outpatient treatments/services cost about \$1,100 (Table 3). Patients with ABI may use a variety of treatments in one, some, or all of these facilities during their continuum of care.

CHBRP estimates that 4,500 Californians with insurance subject to SB 320 were hospitalized for ABI and would use at least some treatments/services at some facility. Furthermore, CHBRP assumes there is an unknown portion of insured California patients with ABI who pay for postacute rehabilitation treatments not covered by insurance or who rely on publicly funded or charitable organizations to provide or pay for these rehabilitation treatments. However, CHBRP found no data that estimated the unmet demand for these ABI treatments and services, therefore the impact of SB 320 on the financial burden of patients with ABI is unknown.

Without literature or data to guide CHBRP estimates of unmet demand as well as an absence of regulator interpretation of SB 320's scope of coverage, CHBRP cannot estimate the possible reduction in financial burden from uncovered expenses that SB 320 might produce for insured Californians who, premandate, pay out-of-pocket for covered treatments or who pay for uncovered expenses related to rehabilitation treatments.

## **Impact on Gender and Racial Disparities**

Several competing definitions of “health disparities” exist. CHBRP relies on the following definition:

A health disparity/inequality is a particular type of difference in health or in the most important influences of health that could potentially be shaped by policies; it is a difference in which disadvantaged social groups (such as the poor, racial/ethnic minorities, women or other groups that have persistently experienced social disadvantage or discrimination) systematically experience worse health or great health risks than more advantaged groups (Braveman, 2006).

CHBRP investigated the effect that SB 320 would have on health disparities by gender, race, and ethnicity. Evaluating the impact on racial and ethnic disparities is particularly important because racial and ethnic minorities report having poorer health status and worse health indicators (KFF, 2007). One important contributor to racial and ethnic health disparities is differential rates of insurance, where minorities are more likely than whites to be uninsured; however, disparities still exist within the insured population (Kirby et al., 2006; Lillie-Blanton and Hoffman, 2005). Since SB 320 would only affect the insured population, a literature review was conducted to determine whether there are gender, racial, or ethnic disparities associated with the prevalence and treatment of ABI outside of disparities attributable to differences between insured and uninsured populations.

### **Impact on Gender Disparities**

Some studies suggest that women show more improvement in cognitive skills and executive function as a result of rehabilitation treatments compared to men. For instance, two studies used



data from the national Traumatic Brain Injury Model Systems of Care project<sup>55</sup>, and considered multiple predictors of recovery, such as cause of injury, length of coma, educational level, race/ethnicity, gender, and history of illicit drug use. Ratcliff et al. (2007) found that after controlling for multiple factors, women performed significantly better than men on tests of attention and language one year following brain injury. Niemeier's study (2007) of executive function in 1,331 patients found that men were 1.55 times more likely to score in the impaired range in tests of executive function compared to women. CHBRP assumes that patients in the Traumatic Brain Injury Model Systems hospitals received similar rehabilitation treatments, and so it is unclear the extent to which SB 320 would reduce gender disparities in recovery of cognitive or executive function after a TBI.

CHBRP was unable to locate studies on gender differences in utilization of rehabilitation treatments for TBI.

There are, however, studies on gender differences in the utilization of rehabilitation treatments for *stroke*. For instance, a national study that analyzed data from more than 187,000 stroke patients found small, but statistically significant differences between men and women's use of rehabilitation treatments after discharge from acute care when controlling for illness severity/comorbid conditions and hospital length of stay (Freburger et al., 2011). Women were about 13% more likely to be discharged home versus to an institution. For those discharged directly to home care, women were 33% less likely to receive home care. Among men and women discharged to an institution, women were 26% more likely than men to be referred to a skilled nursing facility compared to a rehabilitation center. Gender disparities seem to persist in outpatient rehabilitation treatments according to an analysis of 11,000 stroke patients in the Kaiser system when controlling for hospital length of stay (proxy for severity of illness) (Chan, 2009). One year after discharge from the hospital, women had fewer outpatient rehabilitation appointments compared to men (an average of 5 visits for women vs. 6 for men), and used in-home health care more often.

There appear to be gender differences in certain aspects of recovery from ABI, but the impact of SB 320 on reducing gender disparities is unknown.

### **Impact on Racial/Ethnic Disparities**

Research on various measures of recovery from TBI, including executive function, residence, and employment status, suggests that African Americans may be at a disadvantage compared to whites. Because most of the patient study populations include only whites and African Americans, a limitation in this area of research is the lack of information on recovery among other racial/ethnic groups such as Hispanics, Asian Americans, and American Indians.

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<sup>55</sup> The Traumatic Brain Injury Model Systems National Database tracks the recovery and outcomes of acute brain injury care and postacute, in-hospital rehabilitation among 16 actively participating centers nationally. All centers provide a multidisciplinary system of rehabilitation care, including emergency medical, acute medical, and postacute services (TBINDSC, 2010).

Gary et al. (2009) conducted a literature review of post-TBI outcomes by race and ethnicity using 39 articles meeting review criteria. Outcomes measured varied. For instance, they found that African Americans and Hispanics were less likely to be discharged to rehabilitation centers for further treatment, receive additional/more intensive rehabilitative treatments and be discharged for further rehabilitation after inpatient treatment (7 of 9 studies). Seven of 8 articles studying functional outcomes found that minorities had worse outcomes 1 to 5 years after discharge from inpatient rehabilitation programs (Gary et al., 2009).

A study of more than 3,000 cases of TBI seen at a Level 1 trauma center found that patients who were minorities were significantly less likely to be placed in a rehabilitation center. Race was not associated with a higher mortality rate, but lack of private insurance was (Heffernan, 2011). In her study of recovery of executive function following rehabilitation for TBI, Niemeier (2007) found that African Americans were two times more likely to have scores indicating impairment compared to whites, after controlling for other factors including severity of injury. Measurements of executive function were conducted within 10 days of discharge from a Model Systems hospital.

In a study of persons with TBI who participated in the Traumatic Brain Injury Model System program, researchers found that African Americans had lower life satisfaction scores than whites and Asians one year after injury despite all receiving multidisciplinary rehabilitation treatments even when controlling for pre-injury marital and employment status, cause and severity of injury, and functional status (Arango-Lasprilla et al., 2009). Another study showed that one-year post-rehabilitation discharge, African Americans and Hispanics had statistically significant poorer outcomes than whites as measured by community integration, disability rating and functional independence (as adjusted for numerous confounders) (Arango-Lasprilla et al., 2007).

Racial/ethnic disparities have been found in residence and employment among studies using large patient databases from the national Traumatic Brain Injury Model Systems of Care project. For instance, one 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-Lasparilla, 2008). At one, two, and five years post-injury, whites were more likely to be living independently compared to African Americans (Penna, 2010). This finding controlled for the effects of place of residence pre-injury, as well as gender, age, severity of injury, and level of disability at discharge. A review by Gary et al., found ambiguous evidence of differences in quality of life between whites and minorities (Gary et al., 2009).

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 postacute 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 postacute care (Sandel et al., 2009).

Studies of potential racial and ethnic disparities vary considerably in their methodology, outcomes measured, and type of injury; however, the preponderance of evidence indicates disparities in some postacute ABI rehabilitation outcomes by race/ethnicity. Despite the

evidence, CHBRP concludes that SB 320 would have an unknown impact on coverage and utilization. Therefore the proposed mandate's impact on reducing racial/ethnic disparities is unknown.

## **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. One study using data from the California Department of Developmental Services reported that the rate of death among persons with TBI was 3 times greater than that of the general population. The most common causes of death included seizures, choking/suffocation, and kidney/urinary disease (Shavelle et al., 2001). Another study found that survivors of TBI who used comprehensive rehabilitation treatments were two times more likely to die prematurely than the general population. They also found an average life expectancy reduction of seven years (as compared with three to five years in other studies) (Harrison-Felix et al., 2004). A more recent study found that persons with TBI who used inpatient rehabilitation treatments were 1.5 times more likely to die than the general population. The primary causes of death were aspiration pneumonia, seizures, pneumonia, suicide, and digestive conditions (Harrison-Felix et al., 2009). 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 320 on premature death is unknown due lack of evidence regarding the effectiveness of multidisciplinary rehabilitation on mortality as well as an unknown impact on coverage and utilization.

## **Economic Loss**

Moderate to severe ABI frequently results in costly medical care (direct costs) and temporary or permanent job loss (indirect costs such as lost productivity [income] for persons with ABI and their caregivers).

The Traumatic Brain Injury Model Systems National Database examines the recovery and outcomes of acute brain injury care and postacute, in-hospital rehabilitation among 19 participating centers nationally (TBINDSC, 2010). They report that within their population, 62% are employed at injury and 14% 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, 2010). 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 impact of SB 320 on economic loss is unknown because evidence of the rehabilitation treatment(s) effectiveness on employment is ambiguous and because CHBRP is unable to estimate a change in coverage or utilization of multidisciplinary rehabilitation treatments.

## **Long-Term Public Health Impacts**

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. 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). In the case of SB 320, the change in utilization attributable to SB 320 is unknown; therefore the long-term public health impacts are unknown.

The long-term public health impact attributable to SB 320 is unknown because CHBRP is unable to estimate a change in the coverage or utilization of multidisciplinary rehabilitation treatments.

# APPENDICES

## Appendix A: Text of Bill Analyzed

On February 20, 2013, the Senate Committee on Health requested that CHBRP analyze SB 320.

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, 2014, shall not deny coverage for medically necessary medical or rehabilitation treatment for an acquired brain injury at a facility that is properly licensed and accredited at which appropriate services may be provided, including any of the following facilities:

(1) A hospital.

(2) An acute rehabilitation hospital.

(3) A long-term acute care hospital.

(4) An adult residential or postacute residential transitional rehabilitation facility accredited by the Commission on Accreditation of Rehabilitation Facilities as a specialty brain injury rehabilitation program, such as an interdisciplinary outpatient medical rehabilitation program, a brain injury program, or a residential rehabilitation program.

(5) A medical office.

(6) Another analogous facility at which appropriate services may be provided.

(b) A health care service plan shall not deny coverage pursuant to subdivision (a) because the treating facility is not near the enrollee's home.

(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.

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, 2014, shall not deny coverage for medically necessary medical or rehabilitation treatment for an acquired brain injury at a facility that is properly licensed and accredited at which appropriate services may be provided, including any of the following facilities:

(1) A hospital.

(2) An acute rehabilitation hospital.

(3) A long-term acute care hospital.

(4) An adult residential or postacute residential transitional rehabilitation facility accredited by the Commission on Accreditation of Rehabilitation Facilities as a specialty brain injury rehabilitation program, such as an interdisciplinary outpatient medical rehabilitation program, a brain injury program, or a residential rehabilitation program.

(5) A medical office.

(6) Another analogous facility at which appropriate services may be provided.

(b) A health insurance policy shall not deny coverage, pursuant to subdivision (a) because the treating facility is not near the insured's home.

(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 320, a bill that would prohibit all DMHC-regulated health plan contracts and all CDI regulated policies from denying coverage for medically necessary medical rehabilitation or treatment 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 2000 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, and EconLit. 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.

Because SB 320 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 320 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 659 abstracts found in the literature review, 83 were reviewed for potential inclusion in this report on SB 320. The medical effectiveness review relied heavily on two systematic reviews that assessed findings from 30 articles that presented findings from a total of 24 randomized controlled trials (RCTs) and quasi-experimental studies of multidisciplinary rehabilitation programs<sup>56</sup> (Brasure et al., 2012; Turner-Stokes et al., 2005). The systematic reviews were completed by the Cochrane Collaboration and the AHRQ Evidence-based Practice Centers, two organizations that have rigorous standards for conducting systematic reviews. Fifteen of the 30 articles included in the two systematic reviews were among the 83 articles for which abstracts were reviewed. Two individual articles that summarized findings from quasi-experimental studies that were not included in the two systematic reviews were also included (Ghaffar et al., 2006; Hopman et al., 2012). The other 64 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 medical effectiveness

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<sup>56</sup> Quasi-experimental studies are nonrandomized studies with comparison groups that are designed prospectively to maximize similarities between the intervention and comparison groups at baseline.

can be found in CHBRP's *Medical Effectiveness Analysis Research Approach*.<sup>57</sup> 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
- 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
- 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 320 Traumatic Brain Injury were as follows:

### *MeSH Terms Used to Search PubMed*

#### Activities of Daily Living

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<sup>57</sup> Available at: [www.chbrp.org/analysis\\_methodology/docs/medeffect\\_methods\\_detail.pdf](http://www.chbrp.org/analysis_methodology/docs/medeffect_methods_detail.pdf)



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 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  
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  
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  
Physical therapy  
Psychotherapy  
Quality of life  
Racial  
Self help  
Severe  
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
- Systematic Reviews

## Appendix C: Summary Findings on Medical Effectiveness

Appendix C describes the meta-analyses, systematic reviews, and individual studies on rehabilitation for acquired brain injury (ABI) that were included in the medical effectiveness review for SB 320. Table C-1 describes the type of research design, the populations studied, and the intervention and comparison groups. Table C-2 summarizes findings from the studies included in the medical effectiveness review. Table C-2 is divided into sub-sections based on the types of comparisons that have been made in the literature.

**Table C-1.** Characteristics of Studies That Examined the Effectiveness of Rehabilitation for ABI

Type of Intervention	Citation	Type of Trial <sup>58</sup>	Intervention versus Comparison Group	Population Studied	Location
Multidisciplinary rehabilitation	Turner-Stokes et al., 2005	Systematic review of Level II and Level III studies	<p>Milder traumatic brain injury: community based treatment vs. lesser intervention control group</p> <p>Milder traumatic brain injury: hospitalization vs. outpatient</p> <p>Intensive outpatient therapy vs. care as usual group</p> <p>Late intensive out-patient intervention vs. usual care</p> <p>Home-based treatment vs. standard outpatient treatment</p> <p>Early vs. late intervention vs. control groups</p> <p>Increased intensity of rehabilitation vs. care as usual</p>	<p>2233 patients (predominantly mean age 16-65yrs old) and 132 carers.</p> <p>Participants had acquired brain injury (ABI) from any cause including traumatic brain injury (TBI), diffuse brain injury, stroke, subarachnoid hemorrhage, intracranial hemorrhage, or mixed ABI populations</p> <p>Two studies (Wade et al., 1997; Wade et al., 1998) recruited people with brain injury of all severities, two (Elgmark et al., 2007; Paniak et al., 1998) recruited only mild TBI, the rest recruited patients with moderate to severe ABI.</p>	Not reported

<sup>58</sup> Level I = well-designed randomized controlled trials, Level II = randomized controlled trials with major weaknesses, Level III = nonrandomized studies with comparison groups, Level IV = case series, Level V = case studies.

**Table C-1.** Characteristics of Studies That Examined the Effectiveness of Rehabilitation for ABI (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention versus Comparison Group	Population Studied	Location
Multidisciplinary postacute rehabilitation	Brasure et al., 2012	Systematic review of Level II and Level III studies	<p>More intensive vs. less intensive program or standard care</p> <p>Two intensive inpatient rehabilitation approaches for veterans</p> <p>Intensive inpatient cognitive rehabilitation program vs. limited home-based rehabilitation program</p> <p>hospitals with complement existing rehabilitation services with case management vs. hospitals without</p> <p>community-based postacute rehabilitation program vs. center-based program</p> <p>Day treatment vs. no participation</p> <p>neuropsychological rehabilitation vs. nonparticipants</p> <p>three treatment mixes for comparative effectiveness</p> <p>Residential rehabilitation program vs. standard care</p>	<p>Sample sizes ranged from 36 to 366.</p> <p>Subjects were predominantly male (85 percent) and young (mean age of 31).</p> <p>Studies rarely reported other demographic statistics.</p> <p>Median time since injury varied widely among studies, from 1 to 45 months with a median of 19 months.</p>	Finland, United Kingdom, United States
Community-based postacute rehabilitation	Hopman et al., 2012	Level III study	Transitional living programs vs. home-based community rehabilitation programs	41 adults (between 18 and 65 years) with moderate to severe brain impairment	United Kingdom

**Table C-1.** Characteristics of Studies That Examined the Effectiveness of Rehabilitation for ABI (Cont'd)

Type of Intervention	Citation	Type of Trial	Intervention versus Comparison Group	Population Studied	Location
Outpatient rehabilitation	Ghaffar et al., 2006	Level II study	Multidisciplinary team intervention vs. no treatment	191 patients with mild traumatic brain injury between the ages of 16-60.	Canada

Sources: Brasure et al., 2012; Ghaffar et al., 2006; Hopman et al., 2012; Turner-Stokes et al., 2005

**Table C2-a.** Interventions for Persons with Mild ABI

Outcome	Citation (s)	Research Design <sup>59</sup>	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Cognitive function	Ghaffar et al., 2006	1 Level II study	Not statistically significant	No effect	No difference	Routine treatment of all patients with mild traumatic brain injury does not improve cognitive function.
Health status	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Paniak et al., 1998, 2000</b>	No statistically significant difference between groups	No effect	No difference	No difference in health status between persons who received a single session of advice and education and persons who received further treatment as needed.
Impairment	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Paniak et al., 1998, 2000</b>	Not statistically significant	No effect	No difference	No difference in impairment between persons who received a single session of advice and education and persons who received further treatment as needed.
Participation	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Paniak et al., 1998, 2000</b>	Not statistically significant	No effect	No difference	No difference in participation between persons who received a single session of advice and education and persons who received further treatment as needed.

<sup>59</sup> Level I = well-designed randomized controlled trials, Level II = randomized controlled trials with major weaknesses, Level III = nonrandomized studies with comparison groups, Level IV = case series, Level V = case studies.

**Table C2-a. Interventions for Persons with Mild ABI (Cont'd)**

Outcome	Citation (s)	Research Design <sup>60</sup>	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Social disability	Ghaffar et al., 2006	1 Level II study	Not statistically significant	No effect	No difference	Routine treatment of all patients with mild traumatic brain injury does not reduce psychological distress.
	Ghaffar et al., 2006; Turner-Stokes et al., 2005	Systematic review: 3 Level II studies <b>Elgmark et al., 2007; Wade et al., 1997, 1998</b>  1 Level II study <b>Ghaffar et al., 2006</b>	Statistically significant (for persons with > 1 hour posttraumatic amnesia): 2 of 4 studies ( <b>Wade et al., 1997, 1998</b> )  Not statistically significant: 2 of 4 studies ( <b>Elgmark et al., 2007; Ghaffar et al., 2006</b> )	Favors intervention for persons with > 1 hour posttraumatic amnesia: 2 of 4 studies ( <b>Wade et al., 1997, 1998</b> )  No effect: 2 of 4 studies ( <b>Elgmark et al., 2007; Ghaffar et al., 2006</b> )	<b>Wade et al., 1997, 1998:</b> (Rivermead head injury Follow-Up Questionnaire RFUQ) Intervention score 5.36 (SD 7.81) vs. Control score 8.23 (SD 8.75)	Findings from four RCTs suggest that among unselected persons with mild TBI, the impact of receiving multidisciplinary rehabilitation on social disability is ambiguous.

<sup>60</sup> Level I = well-designed randomized controlled trials, Level II = randomized controlled trials with major weaknesses, Level III = nonrandomized studies with comparison groups, Level IV = case series, Level V = case studies.



**Table C2-a. Interventions for Persons with Mild ABI (Cont'd)**

Outcome	Citation (s)	Research Design <sup>61</sup>	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Symptoms	Ghaffar et al., 2006; Turner-Stokes et al., 2005	Systematic review: 3 Level II studies <b>Elgmark et al., 2007; Wade et al., 1997, 1998</b>  1 Level II study <b>Ghaffar et al., 2006</b>	Statistically significant for persons with > 1 hour posttraumatic amnesia: 1 of 4 studies ( <b>Wade et al., 1998</b> )  Not statistically significant: 3 of 4 studies ( <b>Elgmark et al., 2007; Ghaffar et al., 2006; Wade et al., 1997</b> )	Favors intervention for persons with > 1 hour posttraumatic amnesia: 1 of 4 studies ( <b>Wade et al., 1998</b> )  No effect: 3 of 4 studies ( <b>Elgmark et al., 2007; Ghaffar et al., 2006; Wade et al., 1997</b> )	<b>Wade et al., 1998:</b> (Rivermead Postconcussion Questionnaire -RPQ) Intervention score: 9.8 (11.7) vs. control score 13.9 (13.6)	The preponderance of evidence from three RCTs suggests that multidisciplinary rehabilitation does not reduce symptoms among unselected groups of persons with mild TBI.
Work status	Turner-Stokes et al., 2005	Systematic review: 2 Level II studies <b>Paniak et al., 1998, 2000; Salazar et al., 2000</b>	Not statistically significant	No effect	No difference	Findings from two RCTs suggest that among unselected persons with mild TBI receipt of multidisciplinary rehabilitation does not affect work status.

<sup>61</sup> Level I = well-designed randomized controlled trials, Level II = randomized controlled trials with major weaknesses, Level III = nonrandomized studies with comparison groups, Level IV = case series, Level V = case studies.

**Table C2-b. Outpatient Rehabilitation for Persons with Moderate to Severe ABI vs. No Intervention**

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Activity	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <sup>62</sup> <b>Werner and Kessler, 1996</b>	Statistically significant at 3 months (immediately after intervention) but not at 9 months (6 months post intervention)	Favors intervention - effect found immediately after intervention sustained at 6 months post intervention	Functional Independence Measure - Motor (FIM-MM) Mean Score at 0-3 months; difference in mean score 5.1 3-9 months= Difference in mean score: 1.7 (not statistically significant)	Outpatient rehabilitation associated with significant changes in activity that were sustained for 6 months after intervention relative to no specific intervention.
Dependency for ADLs <sup>63</sup>	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Smith et al., 1981</b>	Statistically significant	Favors intervention	ADL score mean change: 0-3 months: Intensive rehab 3.54 vs. Control 1.50  ADL score mean change: 0-12 months: Intensive rehab 3.50 vs. Control 0.60	Outpatient rehabilitation associated with significantly less dependence on others to perform ADLs relative to minimal intervention. The difference is sustained at 1-year follow-up with a greater number of patients deteriorating in the control group.
Depression	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Werner and Kessler, 1996</b>	Not statistically significant at 3 months (immediately after intervention) and 9 months (6 months post intervention)	No effect	No difference	Outpatient rehabilitation did not affect existence or severity of symptoms of depression relative to no specific intervention.

<sup>62</sup> Level I = well-designed randomized controlled trials, Level II = randomized controlled trials with major weaknesses, Level III = nonrandomized studies with comparison groups, Level IV = case series, Level V = case studies.

<sup>63</sup> ADLs = activities of daily living

**Table C2-b.** Outpatient Rehabilitation for Persons with Moderate to Severe ABI vs. No Intervention (Cont'd)

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Participation	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Werner and Kessler, 1996</b>	Statistically significant at 3 months (immediately after intervention) and sustained for 6 months post intervention	Favors intervention	Sickness Impact Profile (SIP) 0-3 months: Difference in mean score: 7.8	Significant changes in participation at 3 months maintained a 9 months relative to no specific intervention.

**Table C2-c.** Home and Community-based Multidisciplinary Rehabilitation for Persons with Moderate to Severe ABI vs. Minimal Intervention

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Activity	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Powell et al., 2002</b>	Statistically significant	Favors intervention	Barthes Index: Intervention: 35.4% improving, Median change: 0 (IQR <sup>64</sup> = -5, 5) vs. Control: 19.6% improving, Median change: 0 (IQR = -5, 4)	Persons who received community-based coordinated rehabilitation were more likely to experience gains in activity relative to receipt of written information only.
Participation	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Powell et al., 2002</b>	Statistically significant	Favors intervention	BICRO-39 <sup>65</sup> : Intervention: % with change in score: 80%; Median change: 2.5 (IQR = -1.7, 6.2)  Control: % with change in score: 70%; Median change: 0.9 (IQR = -4.1, 6.8)	Persons who received community-based coordinated rehabilitation were more likely to experience gains in participation relative to receipt of written information only.

<sup>64</sup> IQR = inter quartile range

<sup>65</sup> BICRO-39 = Brain Injury Community Rehabilitation Outcome scale

**Table C2-d. Increased Intensity of Rehabilitation for Moderate to Severe ABI**

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Activity	Turner-Stokes et al., 2005	Systematic review: 2 Level II studies <b>Shiel et al., 2001;</b> <b>Zhu et al., 2001</b>	Statistically significant: 1 of 2 studies (Shiel et al., 2001)  Not statistically significant: 1 of 2 studies (Zhu et al., 2001)	Favors enhanced intensity group: 1 of 2 studies (Shiel et al., 2001)  No effect 1 of 2 studies (Zhu et al., 2001)	Shiel et al., 2001: FIM+FAM Motor scores: Median (IQR): Enhanced intensity group: 74 (47-95) vs. Routine group: 21 (2-48)  Zhu et al., 2001: No difference	Two studies of the impact of more intensive vs. less intensive rehabilitation on activity reached opposite conclusions.
ADL activity	Turner-Stokes et al., 2005	Systematic review: 2 Level II studies <b>Kwakkel et al., 1999;</b> <b>Slade et al., 2002</b>	Statistically significant: 1 of 2 studies (Kwakkel et al., 1999)  Not statistically significant: 1 of 2 studies (Slade et al., 2002)	Favors intensive leg training: 1 of 2 studies (Kwakkel et al., 1999)  No effect: 1 of 2 studies (Slade et al., 2002)	Kwakkel :ADL ability: Barthel Index (BI) score at 20 weeks: Median (IQR): Leg training group:19 (16-20) vs. control group:16 (10-19)  Slade: no difference	Two studies of the impact of more intensive vs. less intensive rehabilitation on ability to perform ADLs reached opposite conclusions. One intervention focused more specifically on improving arm or leg function.
Dexterity	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Kwakkel et al., 1999</b>	Statistically significant	Favors intensive arm training	AR Arm test score at 20 weeks: Median (IQR): Arm training intervention: 9 (0-39) vs. control group: 0 (0-2)	Intensive arm training is associated with improvement in dexterity.

**Table C2-d. Increased Intensity of Rehabilitation for Moderate to Severe ABI (Cont'd)**

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Global outcome	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Zhu et al., 2001</b>	A significantly greater number of patients achieved maximal GOS <sup>66</sup> scores within 3 months but no difference at later time points	Favors intensive intervention at 3 months	% good GOS at 3 months: Intensive: 38% vs. conventional 14%  No difference at later time period	Intensive rehabilitation speeded up recovery but did not change final outcome relative to less intensive rehabilitation.
Impairment	Brasure et al., 2012;	Systematic review: 1 Level II study <b>Greenwood et al., 1994</b>	Not statistically significant	No effect	GOS-E <sup>67</sup> : No difference  DRS <sup>68</sup> : No difference	Adding case management to home-based intervention did not reduce level of impairment.
Length of stay	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Slade et al., 2002</b>	Statistically significant	Favors intervention	14 day difference in length of stay	Receipt of more intensive rehabilitation associated with shorter length of stay.
Walking ability	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Kwakkel et al., 1999</b>	Statistically significant	Favors intensive leg training	Walking ability: Functional ambulation categories (FAC) score at 20 weeks (median (IQR)): Arm training intervention and leg training intervention groups: 4 (3-5) vs. control group 3 (1-4).	Intensive leg training is associated with improvement in walking ability.
Work status	Brasure et al., 2012	Systematic review: 1 Level II study <b>Greenwood et al., 1994</b>	Not statistically significant	No effect	No difference	Adding case management to a home-based intervention did not increase the percentage of patients working at 6, 12, and 24 months after injury.

<sup>66</sup> GOS = Glasgow Outcome Scale

<sup>67</sup> Extended Glasgow Outcome Scale

<sup>68</sup> DRS = Disability Rating Scale

**Table C2-e.** Specialized Inpatient Rehabilitation vs. Non-specialized Inpatient Rehabilitation for Moderate to Severe ABI

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Activity	Turner-Stokes et al., 2005	Systematic review: 1 Level III studies <b>Semlyen et al., 1998</b>	Statistically significant	Favors intervention	NIAF <sup>69</sup> : At 12-24 months: intervention group = 2.66, control group = 0.13	Specialized inpatient rehabilitation is associated with improvement in activity relative to non-specialized inpatient rehabilitation.
Work status (Working, studying, and/or participating in volunteer activities)	Brasure et al., 2012	Systematic review: 1 Level II study <b>Sarajuuri et al., 2005</b>	Statistically significant	Favors intervention	% Working after treatment: Control group: 55% (11/20) vs. Intervention group: 89% (17/19)	Comprehensive neuropsychologically oriented rehabilitation programs can improve productivity.

<sup>69</sup> NIAF = Newcastle Independence Assessment Form

**Table C2-f.** Cognitive Didactic Inpatient Rehabilitation vs. Functional Experiential Inpatient Rehabilitation for Moderate to Severe ABI

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Disability rating scale	Brasure et al., 2012	Systematic review: 1 Level II study <b>Vanderploeg et al., 2008</b>	Not statistically significant	No effect	No difference	No difference in disability at 1 year posttreatment.
Quality of life	Brasure et al., 2012	Systematic review: 1 Level II study <b>Vanderploeg et al., 2008</b>	Not statistically significant	No effect	No difference	No difference on a measure of life satisfaction at 1 year posttreatment.
Work status (Working, studying, and/or participating in volunteer activities)	Brasure et al., 2012	Systematic review: 1 Level II study <b>Vanderploeg et al., 2008</b>	Not statistically significant	No effect	No difference	No difference between groups when patients of all ages compared; younger patients who received cognitive didactic rehabilitation were more likely to be employed.



**Table C2-g. Intensive Outpatient Cognitive Rehabilitation vs. Standard Outpatient Rehabilitation for Moderate to Severe ABI**

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Neuropsychological functioning	Brasure et al., 2012	Systematic review: 1 Level II study <b>Cicerone et al., 2008</b> 1 Level III study <b>Prigatano et al., 1984</b>	Statistically significant: 1 of 2 studies ( <b>Prigatano et al., 1984</b> )  Not statistically significant: 1 of 2 studies ( <b>Cicerone et al., 2008</b> )	Favors cognitive rehabilitation: 1 of 2 studies ( <b>Prigatano et al., 1984</b> )  No effect: 1 of 2 studies ( <b>Cicerone et al., 2008</b> )	Not reported: <b>Prigatano et al., 1984</b>  No difference: <b>Cicerone et al., 2008</b>	Findings from two studies of the impact of intensive outpatient cognitive rehabilitation on neuropsychological functioning are ambiguous.
Participation	Brasure et al., 2012	Systematic review: 1 Level II study <b>Cicerone et al., 2008</b> 1 Level III study <b>Cicerone, 2004</b>	Statistically significant: 1 of 2 studies <b>Cicerone, 2004</b>  Not statistically significant: 1 of 2 studies <b>Cicerone et al., 2008</b>	Favors intensive cognitive rehabilitation: 1 of 2 studies <b>Cicerone, 2004</b>  No effect: <b>Cicerone et al., 2008</b>	<b>Cicerone, 2004:</b> CIQ <sup>70</sup> score after treatment: Intervention: 16.8 (±4.2) vs. standard treatment 16.1 (±5.4)	Findings from two studies of the impact of intensive outpatient cognitive rehabilitation on participation are ambiguous.
Quality of community integration	Brasure et al., 2012	Systematic review: 1 Level III study <b>Cicerone, 2004</b>	Statistically significant	Favors standard care	QCI score: Intervention: 27.1 (4.6) vs. Control: 29.7 (4.4)	Small but statistically significant difference in quality of community integration favoring standard outpatient rehabilitation.

<sup>70</sup> CIQ = Community Integration Questionnaire

**Table C2-g.** Intensive Outpatient Cognitive Rehabilitation vs. Standard Outpatient Rehabilitation for Moderate to Severe ABI

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Quality of life	Brasure et al., 2012	Systematic review: 1 Level II study <b>Cicerone et al., 2008</b>	Statistically significant	Favors intensive cognitive rehabilitation	PQOL <sup>71</sup> score after treatment: Intervention: 66.1 (±20.8) vs. standard treatment 59.6 (±17.2)	Intensive outpatient cognitive rehabilitation associated with better quality of life.
Work status (working or studying)	Brasure et al., 2012	Systematic review: 1 Level II study <b>Cicerone et al., 2008</b> 1 Level III studies <b>Prigatano et al., 1984</b>	Statistically significant: 1 of 2 studies ( <b>Cicerone et al., 2008</b> )  Not statistically significant: 1 of 3 studies ( <b>Prigatano et al., 1984</b> )	Favors intervention: 1 of 2 studies No effect: 1 of 2 studies	<b>Cicerone et al., 2008:</b> % working after treatment: Intervention: 47% vs. Control 21%  <b>Prigatano et al., 1984:</b> no difference	Findings from two studies were inconsistent.

**Table C2-h.** Outpatient Rehabilitation Emphasizing Cognitive Remediation vs. Outpatient Rehabilitation Emphasizing Small Group Interpersonal Exercises for Moderate to Severe ABI

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Work status (working or studying)	Brasure et al., 2012	Systematic review: 1 Level III study <b>Rattok et al., 1992</b>	Not statistically significant	No effect	No difference	Treatment mix was unrelated to the percentage of patients attaining employment.

<sup>71</sup> PQOL = Perceived Quality of Life

**Table C2-i.** Home- and Community-based Multidisciplinary Rehabilitation vs. Clinic-based Rehabilitation for Moderate to Severe ABI

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Functional assessment	Turner-Stokes et al., 2005	Systematic review: 1 Level II study <b>Björkdahl et al., 2006</b>	Not statistically significant	No effect	No difference	Receiving home-based or clinic-based rehabilitation was associated with similar improvement in functional status.
Impairment	Turner-Stokes et al., 2005	Systematic review: Level II study <b>Björkdahl et al., 2006</b>	Not statistically significant	No effect	No difference	Receiving home-based or clinic-based rehabilitation was associated with similar reductions in impairment.

**Table C2-j.** Home- and Community-based Multidisciplinary Rehabilitation vs. Intensive Inpatient Rehabilitation for Moderate to Severe ABI

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Activity	Turner-Stokes et al., 2005	Systematic review: 1 Level III studies <b>Ozedemir et al., 2001</b>	Statistically significant	Favors intervention	FIM <sup>72</sup> : Inpatient 59.6 (SD <sup>73</sup> : 14.2) vs. home-based 12.3 (SD: 13.4) MMSE <sup>74</sup> : Inpatient 4.8 (SD: 5.0) vs. home-based 2.0 (SD: 2.1)	Specialist inpatient rehabilitation is associated with improvement in activity relative to home-based rehabilitation and non-specialized inpatient rehabilitation.
Impairment	Turner-Stokes et al., 2005	Systematic review: 1 Level III study <b>Ozedemir et al., 2001</b>	Statistically significant	Favors inpatient rehabilitation	Mean (SD) Brunnstrom score: (Upper Extremity) Inpatient 2.0 (SD: 1.2) vs. home-based 0.3 (SD: 0.6) Brunnstrom score: (Lower Extremity) Inpatient 2.4 (SD: 1.2) vs. home-based 0.8 (SD: 0.6)	Intensive inpatient rehabilitation provided significantly more improvement in upper extremity and lower extremity function than home based rehabilitation group.

<sup>72</sup> FIM = Functional Independence Measure

<sup>73</sup> SD = standard deviation

<sup>74</sup> MMSE = Mini-mental state Examination

**Table C2-k.** Home-based Multidisciplinary Rehabilitation vs. Multidisciplinary Rehabilitation in Transitional Living Setting for Moderate to Severe ABI

Outcome	Citation (s)	Research Design	Statistical Significance	Direction of Effect	Size of Effect	Conclusion
Disability	Hopman et al., 2012	Level III study	Not Statistically significant	No effect	CANS <sup>75</sup> : No difference	Reduction in needs for care and support needs similar for both groups.
Instrumental ADLs	Hopman et al., 2012	Level III study	Not Statistically significant	No effect	ALSAR <sup>76</sup> : No difference SMAF <sup>77</sup> : No difference	The groups made similar improvements.
Participation	Hopman et al., 2012	Level III study	Statistically significant: CIQ productivity, CIQ social integration  Not Statistically significant: CIM, MPAI-4, SPRS	CIQ productivity: CR group  CIQ social integration: TLU group  No effect: CIM, MPAI-4, SPRS	CIQ: productivity (F = 10.09); social integration (F = 8.43)  CIM <sup>78</sup> : No change MPAI-4 <sup>79</sup> : No difference SPRS <sup>80</sup> : No difference	The community rehabilitation (CR) group had greater improvement in productivity scale scores from Time 2 to Time 3 than the transitional living unit (TLU) group, but TLU group statistically greater social integration scores.
Work status	Hopman et al., 2012	Level III study	Not Statistically significant	No effect	No difference	No difference between groups in X.

Sources: Björkdahl et al., 2006; Brasure et al., 2012; Cicerone, 2004; Cicerone et al., 2008; Elgmark et al., 2007; Ghaffar et al., 2006; Greenwood et al., 1994; Hopman et al., 2012; Kwakkel et al., 1999; Ozdemir et al., 2001; Paniak et al., 1998, 2000; Powell et al., 2002; Prigatano et al., 1984; Rattok et al., 1992; Salazar et al., 2000; Sarajuuri et al., 2005; Semlyen et al., 1998; Shiel et al., 2001; Slade et al., 2002; Smith et al., 1981; Turner-Stokes et al., 2005; Vanderploeg et al., 2008; Wade et al., 1997, 1998; Werner and Kessler, 1996; Zhu et al., 2001.

<sup>75</sup> CANS = Care and Needs Scale

<sup>76</sup> ALSAR = Assessment of Living Skills and Resources

<sup>77</sup> SMAF = Functional Autonomy Measurement Scale

<sup>78</sup> CIM = Community Integration Measure

<sup>79</sup> Mayo-Portland Adaptability Inventory

<sup>80</sup> Sydney Psychosocial Reintegration Scale

## Appendix D: 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](http://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, San Diego, the University of California, Los Angeles, the University of California, Davis, and University of California, Berkeley, as well as the contracted actuarial firm, Milliman, Inc. (Milliman).<sup>81</sup>

### **Data Sources**

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

#### *Baseline model*

1. The California Simulation of Insurance Markets (CalSIM) is used to project health insurance status of Californians aged 64 and under in 2014. CalSIM is a microsimulation model that projects the effects of the Affordable Care Act on firms and individuals.<sup>82</sup> CalSIM relies on national Medical Expenditure Panel Survey (MEPS) Household Component and Person Round Plan, California Health Interview Survey (CHIS) 2009, and California Employer Health Benefits Survey data.
2. California Health Interview Survey (2011) data is used to estimate the number of Californians aged 65 and older, and the number of Californians dually eligible for both Medi-Cal and Medicare coverage. CHIS 2011 is also used to determine the number of Californians with incomes below 400% of the federal poverty level. CHIS is a continuous survey that provides detailed information on demographics, health insurance coverage, health status, and access to care. CHIS 2011 surveyed approximately 23,000 households and is conducted in multiple languages by the UCLA Center for Health Policy Research. More information on CHIS is available at [www.chis.ucla.edu](http://www.chis.ucla.edu).
3. The latest (2012) California Employer Health Benefits Survey is used to estimate:
  - a. Size of firm
  - b. Percentage of firms that are purchased/underwritten (versus self-insured)
  - c. Premiums for health care service plans regulated by the Department of Managed Health Care (DMHC) (primarily health maintenance organizations [HMOs] and point of service [POS] plans)

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<sup>81</sup> 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](http://www.chbrp.org/docs/authorizing_statute.pdf)).

<sup>82</sup> UC Berkeley Center for Labor Research and Education and UC Los Angeles Center for Health Policy Research. *Methodology & Assumptions, California Simulation of Insurance Markets (CalSIM) Version 1.7*, June 2012. Available at: [www.healthpolicy.ucla.edu/pubs/files/calsim\\_methods.pdf](http://www.healthpolicy.ucla.edu/pubs/files/calsim_methods.pdf). Accessed October 19, 2012.

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

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

4. Milliman data sources are relied on to estimate the premium impact of mandates. Milliman's projections derive from the Milliman Health Cost Guidelines (HCGs). The HCGs are a health care pricing tool used by many of the major health plans in the United States. See [www.milliman.com/expertise/healthcare/products-tools/milliman-care-guidelines/index.php](http://www.milliman.com/expertise/healthcare/products-tools/milliman-care-guidelines/index.php). Most of the data sources underlying the HCGs are claims databases from commercial health insurance plans. The data are supplied by health insurance companies, HMOs, self-funded employers, and private data vendors. The data are mostly from loosely managed health care plans, generally those characterized as preferred provider organization (PPO) plans. The HCGs currently include claims drawn from plans covering 37 million members. In addition to the Milliman HCGs, CHBRP's utilization and cost estimates draw on other data, including the following:
  - a. The MarketScan databases, which reflects the healthcare claims experience of employees and dependents covered by the health benefit programs of large employers. These claims data are collected from approximately 100 different insurance companies, Blue Cross Blue Shield plans, and third-party administrators. These data represent the medical experience of insured employees and their dependents for active employees, early retirees, individuals with COBRA continuation coverage, and Medicare-eligible retirees with employer-provided Medicare Supplemental plans. No Medicaid or Workers Compensation data are included.
  - b. An annual survey of HMO and PPO pricing and claim experience. The most recent survey (2010 Group Health Insurance Survey) contains data from seven major California health plans regarding their 2010 experience.
  - c. Ingenix MDR Charge Payment System, which includes information about professional fees paid for healthcare services, based upon approximately 800 million claims from commercial insurance companies, HMOs, and self-insured health plans.
  - d. These data are reviewed for applicability by an extended group of experts within Milliman but are not audited internally.
5. Premiums and enrollment in DMHC-regulated health plans and CDI-regulated policies by self-insured status and firm size are obtained annually from CalPERS for active state and local government public employees and their dependents who receive their benefits through CalPERS. Enrollment information is provided for DMHC-regulated health care service plans covering non-Medicare beneficiaries—about 74% of CalPERS total enrollment. CalPERS self-funded plans—approximately 26% of enrollment—are not

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

6. Enrollment in Medi-Cal Managed Care (beneficiaries enrolled in Two-Plan Model, Geographic Managed Care, and County Operated Health System plans) is estimated based on data maintained by the Department of Health Care Services (DHCS). CHBRP assesses enrollment information online at:

[www.dhcs.ca.gov/dataandstats/statistics/Pages/RASB\\_Medi-Cal\\_Enrollment\\_Trends.aspx](http://www.dhcs.ca.gov/dataandstats/statistics/Pages/RASB_Medi-Cal_Enrollment_Trends.aspx)

Starting with the 2013 model, the most recent Medi-Cal enrollment data from DHCS is projected to 2014 based on CalSIM's estimate of the impact of the Medi-Cal expansion in 2014.

#### *Estimate of premium impact of mandates*

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

For CHBRP reports analyzing specific benefit mandates, CHBRP surveys the seven major carriers on current coverage relevant to the benefit mandate. CHBRP reports the share of enrollees—statewide and by market segment—reflected in CHBRP's bill-specific coverage survey responses. The proportions are derived from data provided by CDI and DMHC. CDI provides data by market segment (large, small, and individual) based on "CDI Licenses With HMSR Covered Lives Greater Than 100,000" as part of the Accident and Health Covered Lives Data Call September 30, 2011, by the California Department of Insurance, Statistical Analysis Division. The Department of Managed Health Care's interactive website "Health Plan Financial Summary Report," July–September 2012, provides data on DMHC-regulated plans by segment.<sup>83</sup>

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

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<sup>83</sup> CHBRP assumes DMHC-regulated PPO group enrollees and POS enrollees are in the large-group segment. <http://wps0.dmhc.ca.gov/flash/>.



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

<b>Data Source</b>	<b>Items</b>
California Simulation of Insurance Markets (CalSIM)	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
California Health Interview Survey, 2011 (CHIS 2011)	Uninsured, age: 65+ Medi-Cal (non-Medicare), age: 65+ Other public, age: 65+ Employer-sponsored insurance, age: 65+
CalPERS data, annually, enrollment as of September 30	CalPERS HMO and PPO enrollment <ul style="list-style-type: none"> <li>• Age: 0–17; 18–64; 65+</li> </ul> HMO premiums
California Employer Survey, conducted annually by NORC and funded by CHCF	Enrollment by HMO/POS, PPO/indemnity self-insured, fully insured Premiums (not self-insured) by: <ul style="list-style-type: none"> <li>• Size of firm (3–25 as small group and 25+ as large group)</li> <li>• Family vs. single</li> <li>• HMO/POS vs. PPO/indemnity vs. HDHP employer vs. employer premium share</li> </ul>
DHCS administrative data for the Medi-Cal program, annually, 11-month lag from the end of November	Distribution of enrollees by managed care or FFS distribution by age: 0–17; 18–64; 65+ Medi-Cal Managed Care premiums
CMS administrative data for the Medicare program, annually (if available) as of end of September	HMO vs. FFS distribution for those 65+ (noninstitutionalized)
CHBRP enrollment survey of the seven largest health plans in California, annually as of end of September	Enrollment by: <ul style="list-style-type: none"> <li>• Size of firm (2–50 as small group and 51+ as large group),</li> <li>• DHMC vs. CDI regulated</li> <li>• Grandfathered vs. nongrandfathered</li> </ul> Premiums for individual policies by: <ul style="list-style-type: none"> <li>• DMHC vs. CDI regulated</li> <li>• Grandfathered vs. nongrandfathered</li> </ul>
Department of Finance population projections, for intermediate CHIS years	Projected civilian, noninstitutionalized CA population by age: 0–17; 18–64; 65+
Medical trend influencing annual premium increases	Milliman estimate

*Notes:* (a) Includes children previously enrolled in Healthy Families, California’s CHIP. By January 1, 2014, children enrolled in Healthy Families will be transitioned into Medi-Cal as required in the 2012–2013 state budget agreement.

(b) Includes individuals dually eligible for Medi-Cal and Medicare.

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

## **Projecting the Effects of the Affordable Care Act in 2014**

This subsection discusses adjustments made to CHBRP's Cost and Coverage Model to account for the potential impacts of the ACA effective January 2014. It is important to emphasize that CHBRP's analysis of specific mandate bills typically addresses the marginal effects of the mandate bill—specifically, how the proposed mandate would impact benefit coverage, utilization, costs, and public health, *holding all other factors constant*. CHBRP's estimates of these marginal effects are presented in the *Benefit Coverage, Utilization, and Cost Impacts* section of this report.

### *Baseline premium rate development methodology—2014 post-ACA*

Mandate bills introduced during 2013 would, if passed, become effective in 2014. Many significant provisions of the Affordable Care Act also become effective in 2014. In many cases, provisions required in the ACA would become effective on the same date as a mandate proposed to California law.

CHBRP's analyses of mandates effective in 2014 assume that carriers implement the new ACA provisions first. The baseline premiums reflect the estimated 2014 premium levels costs *after* carriers have implemented the 2014 ACA provisions. The estimated cost impact of a proposed mandate is then calculated relative to this post-ACA baseline.

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

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

For each plan type, CHBRP first obtained an estimate of the insurance premium PMPM by taking the 2012 reported premium from the above-mentioned data sources and trending that value to 2014. CHBRP uses trend rates published in the Milliman Health Cost Guidelines to estimate the health care costs for each plan segment in 2014.

In 2014, four plan segments in the previous CHBRP model<sup>84</sup> were split into 12 segments. Each of the two small-group segments (CDI-regulated and DMHC-regulated), and individual segments (CDI-regulated and DMHC-regulated) were split into: grandfathered non-exchange, nongrandfathered non-exchange, and exchange groups in order to separately calculate the impact of ACA and specific mandates that may apply differently to these three subgroups. The premium rate information received from NORC did not split the premiums based on grandfathered or exchange status. The 2012 CHBRP Annual Enrollment and Premium Survey asked the seven largest insurance carriers in California to provide their average premium rates separately for

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<sup>84</sup> In the past, CHBRP's model has reflected large-group, small-group, and individual market segments. These market segments were further subdivided by regulator: DMHC-regulated and CDI-regulated. The four plan segments refer to the small and individual market subdivisions by regulator.

grandfathered and nongrandfathered plans. The ratios from the carrier survey data are then applied to the NORC aggregate premium rates, to estimate premium rates for grandfathered and nongrandfathered plans that were consistent with the NORC results.

The marginal impact of ACA on 2014 premiums was established as follows:

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

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

- Health care costs paid by the health plan = insurance premiums PMPM  $\times$  (1 – profit/administration load).
- Gross claims costs PMPM = health care costs paid by the health plan  $\div$  percentage paid by health plan
- Member cost sharing PMPM = gross claims costs  $\times$  (1 – percentage paid by health plan)

In the above formulas, the quantity “profit/administration load” is the assumed percentage of a typical premium that is allocated to the health plan’s administration and profit. These values vary by insurance category, and under the ACA, are limited by the minimum medical loss ratio requirement. CHBRP estimated these values based on Milliman’s knowledge of the health care market.

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 healthcare costs that are paid by the carrier.

### *Medi-Cal Managed Care*

Given that:

- California has not yet decided on Medi-Cal’s EHBs for Californians newly eligible for Medi-Cal Managed Care; and,
- The ACA does not require coverage of EHBs for individuals currently eligible for Medicaid,

CHBRP has estimated that the PMPM cost for Medi-Cal’s newly eligible population—in the absence of further guidance on EHBs for the newly eligible population—will equal the projected cost of Medi-Cal’s currently eligible family population, excluding maternity costs.

### **General Caveats and Assumptions**

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

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

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

- Cost impacts are shown only for plans and policies subject to state benefit mandate laws.
- Cost impacts are only for the first year after enactment of the proposed mandate.
- Employers and employees will share proportionately (on a percentage basis) in premium rate increases resulting from the mandate. In other words, the distribution of the premium paid by the subscriber (or employee) and the employer will be unaffected by the mandate.
- For state-sponsored programs for the uninsured, the state share will continue to be equal to the absolute dollar amount of funds dedicated to the program.
- When cost savings are estimated, they reflect savings realized for 1 year. Potential long-term cost savings or impacts are estimated if existing data and literature sources are available and provide adequate detail for estimating long-term impacts. For more information on CHBRP’s criteria for estimating long-term impacts, please see: [http://chbrp.org/documents/longterm\\_impacts08.pdf](http://chbrp.org/documents/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: [http://chbrp.org/documents/uninsured\\_010109.pdf](http://chbrp.org/documents/uninsured_010109.pdf).

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

- Population shifts by type of health insurance: If a mandate increases health insurance costs, some employer groups and individuals may elect to drop their health insurance. Employers may also switch to self-funding to avoid having to comply with the mandate.
- Changes in benefit plans: To help offset the premium increase resulting from a mandate, subscribers/policyholders may elect to increase their overall plan deductibles or copayments. Such changes would have a direct impact on the distribution of costs between the health plan and policies and enrollees, and may also result in utilization reductions (i.e., high levels of patient cost sharing result in lower utilization of health care services). CHBRP did not include the effects of such potential benefit changes in its analysis.
- Adverse selection: Theoretically, individuals or employer groups who had previously foregone health insurance may now elect to enroll in a health plan or policy, postmandate, because they perceive that it is to their economic benefit to do so.
- Medical management: Health plans and insurers may react to the mandate by tightening medical management of the mandated benefit. This would tend to dampen the CHBRP cost estimates. The dampening would be more pronounced on the plan types that previously had the least effective medical management (i.e., PPO plans).
- Geographic and delivery systems variation: Variation in existing utilization and costs, and in the impact of the mandate, by geographic area and delivery system models: Even within the health insurance types CHBRP modeled (HMO—including HMO and POS plans—and non-HMO—including PPO and FFS policies), there are likely variations in utilization and costs by type. Utilization also differs within California due to differences in the health status of the local population, provider practice patterns, and the level of managed care available in each community. The average cost per service would also vary due to different underlying cost levels experienced by providers throughout California and the market dynamic in negotiations between providers and health plans or insurers. Both the baseline costs prior to the mandate and the estimated cost impact of the mandate could vary within the state due to geographic and delivery system differences. For purposes of this analysis, however, CHBRP has estimated the impact on a statewide level.
- Compliance with the mandate: For estimating the postmandate coverage levels, CHBRP typically assumes that plans and policies subject to the mandate will be in compliance with the coverage requirements of the bill. Therefore, the typical postmandate coverage rates for populations subject to the mandate are assumed to be 100%.

## **Bill Analysis—Specific Caveats and Assumptions**

### *Incidence of ABI*

CHBRP applied treated incidence rates estimated from 2012 MedStat data to each segment of DMHC-regulated plans and CDI-regulated policies to determine the number of enrollees that utilize treatments for ABI. The incidence rates are shown in Table D-2.

**Table D-2.** Probabilities of ABI, 2010

<b>Type of ABI</b>	<b>Incidence</b>
Traumatic Brain Injury (TBI)	0.0839%
Stroke	0.1416%
Anoxic Brain Injury	0.0013%
Encephalitis	0.1791%
Intracranial Hemorrhages	0.0202%
Cerebral Vasculitis	0.0708%
<b>Total</b>	<b>0.4968%</b>

*Source:* California Health Benefits Review Program, 2013, using MedStat data.

Data for the incidence rates was pulled from the MedStat database. Milliman’s MedStat database was produced using Thomson Reuters’ MarketScan databases. The MarketScan databases reflect the healthcare experience of employees and dependents covered by the health benefit programs of large employers. These claims data are collected from approximately 100 different insurance companies, Blue Cross Blue Shield plans, and third-party administrators. These data represent the medical experience of insured employees and their dependents for active employees, early retirees, COBRA continuees, and Medicare-eligible retirees with employer-provided Medicare Supplemental plans. No Medicaid or Workers Compensation data are included. The data used was from calendar year 2010.

### *Current rehabilitation costs for ABI*

CHBRP determined current average expenditures for rehabilitation at facilities listed in SB 320 by identifying facilities at which rehabilitation for ABI occurred using Medicare Place of Service codes. These facilities were then matched to the facilities list in SB 320.

**Table D-3. CHBRP Match of SB 320 Categories to Medicare Place of Service Codes**

<b>SB 320 Facility Categories</b>	<b>Medicare Place of Service Code Names for Facilities</b>
Hospital	<ul style="list-style-type: none"> <li>• Inpatient hospital</li> <li>• Emergency room- hospital</li> </ul>
Acute Rehabilitation hospital	<ul style="list-style-type: none"> <li>• Comprehensive inpatient rehabilitation facility</li> </ul>
Long-term acute care hospital	<ul style="list-style-type: none"> <li>• Long-term acute care hospital</li> </ul>
Adult residential/post acute residential CARF	<ul style="list-style-type: none"> <li>• Assisted living facility</li> <li>• Adult living care facilities</li> <li>• Group Home</li> </ul>
Medical office	<ul style="list-style-type: none"> <li>• Office</li> <li>• Comprehensive outpatient rehabilitation facility</li> <li>• Outpatient hospital</li> <li>• Walk-in Retail health clinic</li> <li>• Urgent care facility</li> <li>• Independent clinic</li> <li>• State or local public health clinic</li> <li>• Rural health clinic</li> <li>• FQHC</li> </ul>
Analogous facility	<ul style="list-style-type: none"> <li>• Home</li> <li>• Mobile Unit</li> <li>• Other enlisted facility</li> <li>• Military treatment facility</li> <li>• Skilled Nursing Facility</li> <li>• Nursing facility</li> <li>• Custodial care facility</li> </ul>

## **Appendix E: Information Submitted by Outside Parties**

In accordance with CHBRP policy to analyze information submitted by outside parties during the first two weeks of the CHBRP review, the following parties chose to submit information.

Brain Injury Association of America. “Maximizing Rehabilitation Outcomes and Cost Efficiency Following Acquired Brain Injury,” Brain Injury Source. Vol. 7, Issue 1. February 2010.

Brain Injury Association of California, “Response to Questions Raised by Chairman Hernandez and His Staff.” February 4, 2013.

For information on the processes for submitting information to CHBRP for review and consideration please visit: [www.chbrp.org/requests.html](http://www.chbrp.org/requests.html).



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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. The **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. The level of involvement of members of the CHBRP Faculty Task Force and staff varies on each report, with individual participants more closely involved in the preparation of some reports and less involved in others. 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. Milliman also helped with the initial development of CHBRP methods for assessing that impact.

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 and thoughtful critiques provided by the members of the National Advisory Council. However, the Council does not necessarily approve or disapprove of or endorse this report. CHBRP assumes full responsibility for the report and the accuracy of its contents.

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