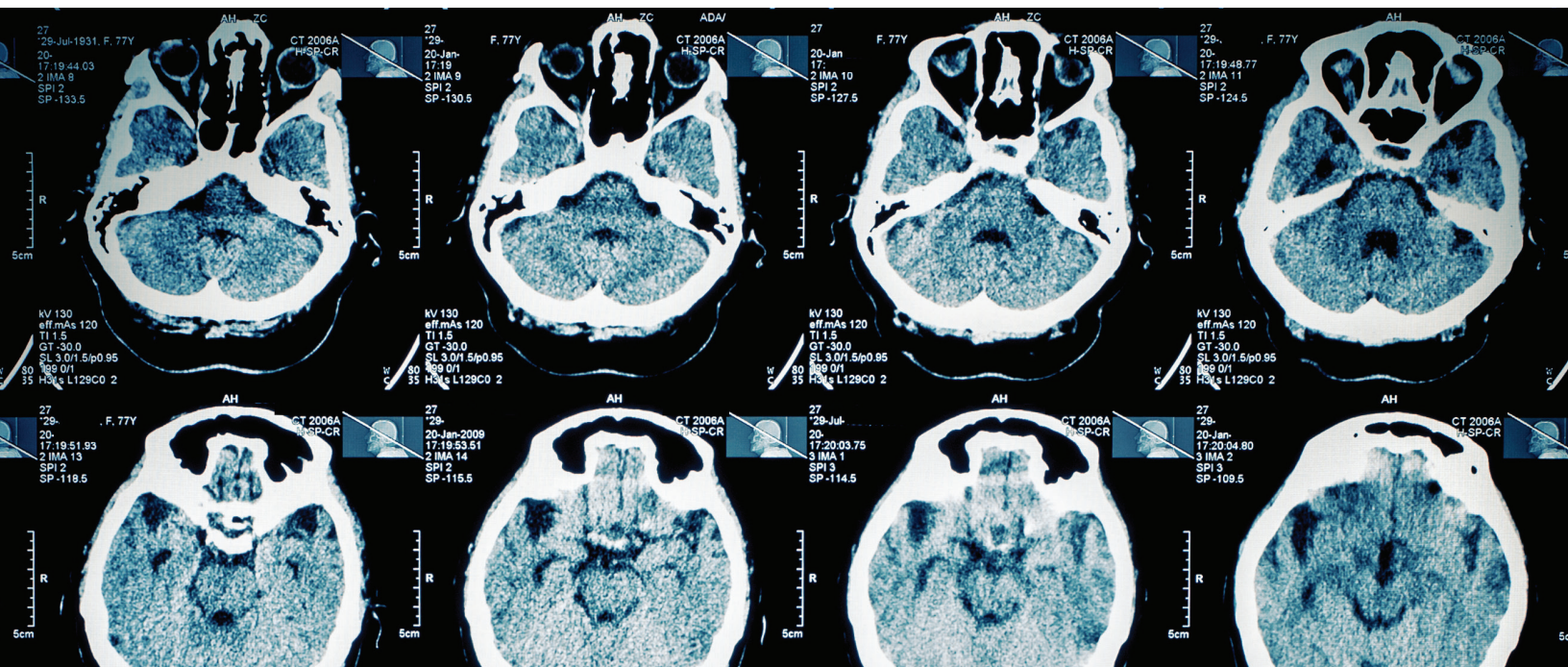


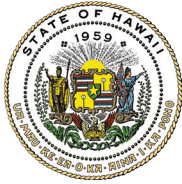
# Study of Proposed Mandatory Health Insurance for Cognitive Rehabilitation Therapy

A Report to the Governor  
and the Legislature of  
the State of Hawai'i

Report No. 17-13  
December 2017



**OFFICE OF THE AUDITOR**  
STATE OF HAWAII



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## Foreword

We assessed the social and financial impacts of mandating insurance coverage for medically necessary cognitive rehabilitation therapy for patients suffering from traumatic brain injury as proposed in Senate Bill No. 225, S.D. 1, pursuant to Sections 23-51 and 23-52, Hawai‘i Revised Statutes (HRS). Section 23-51, HRS, requires passage of a concurrent resolution requesting an impact assessment by the Auditor before any legislative measure mandating health insurance coverage for a specific health service, disease, or provider can be considered. The 2017 Legislature requested this assessment through Senate Concurrent Resolution No. 105, S.D. 1, H.D. 1.

We wish to express our appreciation for the cooperation and assistance extended to us by the Hawai‘i Medical Service Association, Kaiser Permanente, and the State’s other health plan providers, as well as other organizations and individuals we contacted during the course of our audit.

Leslie H. Kondo  
State Auditor

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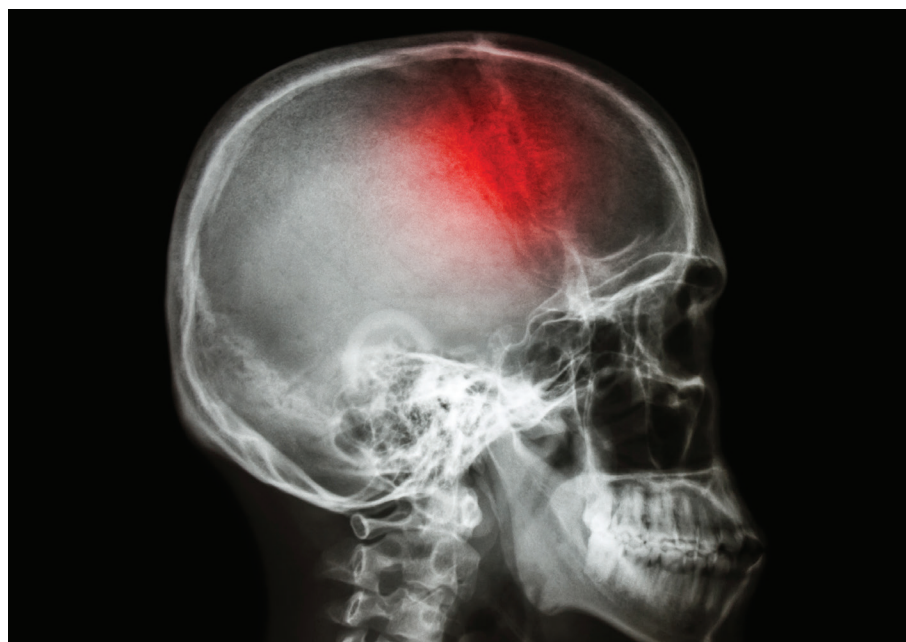
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# Auditor's Summary

## Study of Proposed Mandatory Health Insurance for Cognitive Rehabilitation Therapy

Report No. 17-13



Traumatic brain injury is defined as damage to the brain caused by an external force that may produce a diminished or altered state of consciousness and may result in an impairment of cognitive abilities or physical functioning.

It does not include damage to the brain by degenerative or congenital causes.

### It's Already Covered

**IN THE 2017 LEGISLATIVE SESSION**, the Hawai'i State Legislature contemplated mandating insurance coverage for cognitive rehabilitation therapy. In Report No. 17-13, *Study of Proposed Mandatory Health Insurance for Cognitive Rehabilitation Therapy*, we surveyed Hawai'i's health-plan providers and found that their plans currently provide coverage for medically necessary cognitive rehabilitation therapy for traumatic brain injury patients. In fact, current coverage exceeds the Legislature's requirements in Senate Bill No. 225, S.D. 1, which proposes a maximum benefit of \$300,000 per insured, unless the individual and group hospital or medical service plan contract states otherwise. Hawai'i health-plan providers do not currently have any lifetime or annual limits on cognitive rehabilitation therapy for traumatic brain injury in their plans.

### Social and Financial Impacts of Senate Bill No. 225, S.D. 1

State law requires an impact assessment by the Auditor before any legislative measure mandating health insurance coverage for a specific health service, disease, or provider can be considered. In our examination of the potential social and financial effects of mandating health insurance coverage for cognitive rehabilitation therapy for patients suffering from traumatic brain injury, we found that an average of almost 13,000 Hawai'i residents sustained traumatic brain injuries each year from 2011 through 2015. In addition, from June 2016 to May 2017, Queen's Medical Center

treated and discharged 863 trauma patients, of which 840 patients (or 97 percent) were expected to require cognitive rehabilitation treatment. Since health insurance coverage currently exists, we found the social and financial impacts to survivors of traumatic brain injury likely would not change if coverage was mandated.

### Recommendation

Because the coverage that Senate Bill No. 225, S.D. 1, seeks to mandate is currently provided — and even exceeded — by Hawai'i's health plan providers, we recommend that mandatory coverage insurance for medically necessary cognitive rehabilitation therapy for patients suffering from traumatic brain injury is not currently needed.





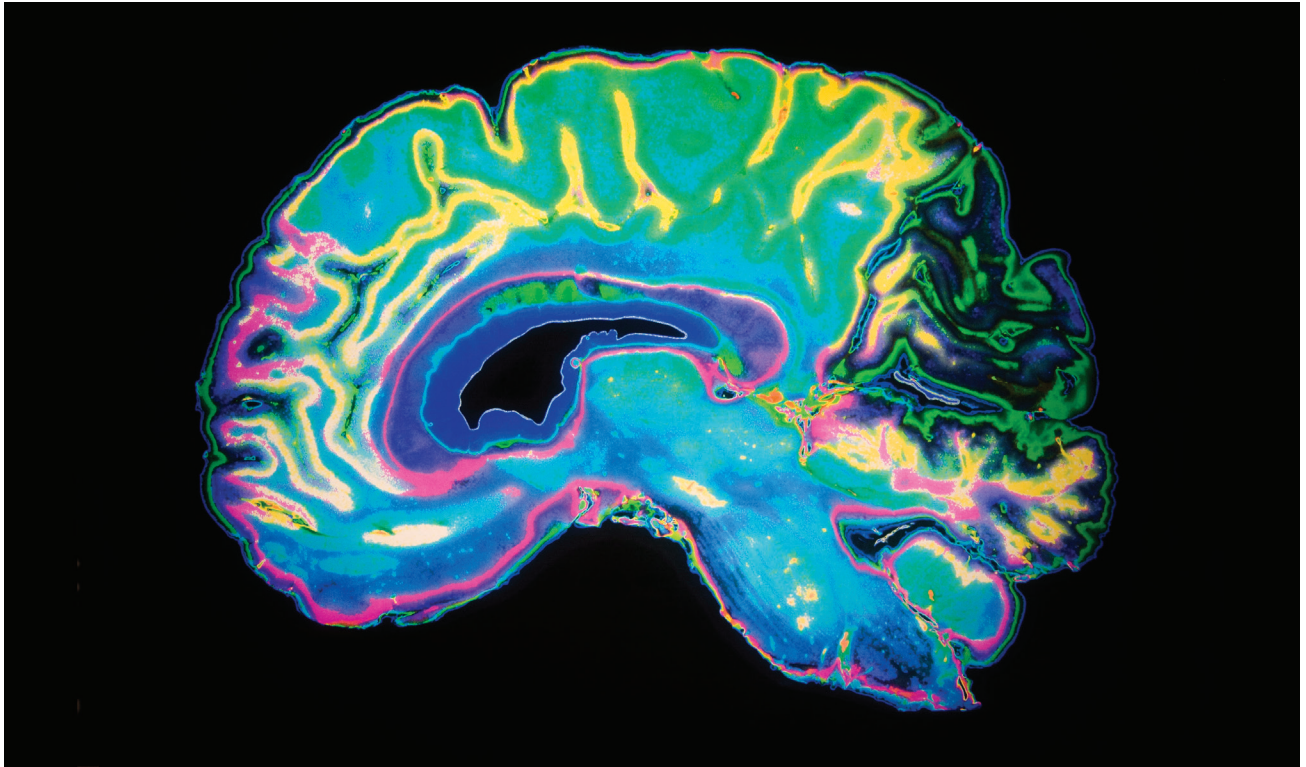


PHOTO: THINKSTOCK.COM

## Study of Proposed Mandatory Health Insurance for Cognitive Rehabilitation Therapy

**M**OST KINDS OF TRAUMATIC BODILY INJURIES are straightforward for medical doctors to treat — bone fractures, cuts, burns. When it comes to traumatic injury of the brain, however, successful diagnosis and treatment have long been much more challenging. Traumatic brain injury can cause impairment of cognitive abilities or physical functioning, often long-lasting and, in some cases, permanent. In fact, these cognitive and behavioral deficits, as opposed to motor impairments, account for a great share of long-term disability, financial dependence, and family distress for those with chronic injuries.

The primary treatment method for traumatic brain injury is cognitive rehabilitation therapy, which involves a broad range of intervention strategies or techniques that attempt to help patients reduce, manage, or cope with cognitive defects caused by brain injury. Cognitive rehabilitation strategies comprise tasks designed to retrain the individual or alleviate problems caused by deficits in attention, visual processing, problem solving, executive functions, memory, language, and reasoning skills.



**Cognitive rehabilitation strategies comprise tasks designed to retrain the individual or alleviate problems caused by deficits in attention, visual processing, problem solving, executive functions, memory, language, and reasoning skills.**



**Medicare defines “medically necessary” as: Health care services or supplies needed to diagnose or treat an illness, injury, condition, disease or its symptoms and that meet accepted standards of medicine.**

In 2004, the Legislature considered mandating health insurance coverage for this kind of therapy for survivors of traumatic brain injury. At the time, however, the field of cognitive rehabilitation therapy was still developing. In Report No. 04-11, *Assessment of Proposed Mandatory Health Insurance for Cognitive Rehabilitation*, we reviewed the then-current medical research literature and found that scientific studies were in their infancy. Our assessment concluded that the existing studies had not definitively determined the efficacy of cognitive rehabilitation for traumatic brain injuries. For that reason, we did not make any recommendation as to whether health insurance coverage for cognitive rehabilitation therapy for survivors of traumatic brain injury should be mandated.

Senate Bill No. 225, S.D. 1, introduced during the 2017 legislative session, would mandate health insurance providers to cover medically necessary cognitive rehabilitation therapy for patients suffering from traumatic brain injury. Through Senate Concurrent Resolution No. 105, S.D. 1, H.D. 1, the Legislature requested the Office of the Auditor evaluate the social and financial effects of mandating such health insurance coverage as well as the current medical research on the treatment of traumatic brain injuries.

We found that Hawai‘i’s health insurers currently provide coverage for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injuries that exceeds what would be mandated by the bill and that these insurers are very unlikely to eliminate or reduce this coverage. Our study of current coverages offered by Hawai‘i insurers shows that the coverage is based on the current state of medical research on cognitive rehabilitation therapy, which generally finds that therapy appears to be beneficial, i.e., medically necessary, for survivors of traumatic brain injury. We suggest that, currently, it is unnecessary for the Legislature to mandate insurance coverage for medically necessary cognitive rehabilitation therapy for traumatic brain injury survivors and further suggest that the Legislature defer its consideration of mandating such health insurance coverage until such time that health insurance providers doing business in Hawai‘i no longer provide the coverage.

## Objectives of the Study

1. Assess and update the findings in Report No. 04-11, *Assessment of Proposed Mandatory Health Insurance for Cognitive Rehabilitation*.
2. Assess the social and financial effects of requiring health insurers, mutual benefit societies, and health maintenance organizations to provide coverage for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury.
3. Determine whether medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury is a “rehabilitative and habilitative service” for which coverage is required as an essential health benefit pursuant to the federal Patient Protection and Affordable Care Act.
4. Make recommendations as deemed appropriate.

## Scope and Methodology

We reviewed the current scientific and medical literature regarding the efficacy of cognitive rehabilitation therapy for survivors of traumatic brain injuries. We conducted an impact assessment, examining the potential social and financial effects of mandating health insurance coverage of cognitive rehabilitation therapy for survivors of traumatic brain injury through surveys and interviews of patient advocate groups, clinicians, medical organizations, labor unions, and health insurance providers operating in the State.

We conducted this study from May 2017 through August 2017 in accordance with Sections 23-51 and 23-52, Hawai‘i Revised Statutes (HRS).

### Top Three Causes of Traumatic Brain Injury

**No.1**



Falls account for 47 percent of all traumatic brain injury-related emergency department visits, hospitalizations, and deaths in the United States.

**No.2**



Being struck by or against an object account for about 15 percent.

**No.3**



Motor vehicle crashes account for 14 percent.

Source: Centers for Disease Control and Prevention



**Traumatic brain injury is defined as damage to the brain caused by an external force that may produce a diminished or altered state of consciousness and may result in an impairment of cognitive abilities or physical functioning.**

**It does not include damage to the brain by degenerative or congenital causes.**

## Overview of Traumatic Brain Injury

Traumatic brain injury is defined as damage to the brain caused by an external force that may produce a diminished or altered state of consciousness and may result in an impairment of cognitive abilities or physical functioning. It does not include damage to the brain by degenerative or congenital causes. Cognitive impairments may include: impaired memory or retrieval of information; impaired comprehension; slow thought processing; reduced attention span; difficulty understanding cause and effect; inability to prioritize thoughts or determine the main idea; difficulty following a schedule; and misunderstanding or misperceptions of abstract, conceptual, or complex information.

For people with brain injuries, these cognitive problems may present the greatest barrier to returning to normal life. Patients can face difficulties with memory, attention, social behavior, safety judgment, and planning and carrying out future actions, all of which affect a person's ability to care for himself, keep appointments, complete tasks, or interact with people appropriately. At stake is the patient's ability to succeed at work, school, and home.

## Overview of Cognitive Rehabilitation Therapy

Cognitive rehabilitation therapy is designed to help patients who have suffered traumatic brain injury restore normal function or compensate for cognitive deficits caused by the brain injury. There exist several slightly different definitions of what exactly cognitive rehabilitation therapy entails; Senate Concurrent Resolution No. 105, S.D. 1, H.D. 1, defines it as "a systematically applied set of medical and therapeutic services designed to improve cognitive functioning and participation in activities that may be affected by difficulties in one or more cognitive domains."<sup>1</sup> The specific treatment strategy is based on an assessment and understanding of the ways in which a person's normal brain function has been negatively affected.

<sup>1</sup> Senate Bill No. 225, S.D. 1, defines cognitive rehabilitation therapy slightly differently: "a systematic, functionally-oriented service of therapeutic cognitive activities, based on an assessment and understanding of a person's brain-behavior deficits."

Cognitive rehabilitation therapy services aim to achieve functional changes in a patient's abilities by:

1. Reinforcing, strengthening, or reestablishing previously learned patterns of behavior; or
2. Establishing new patterns of cognitive activity or compensatory mechanisms for impaired neurological systems.

The definition of cognitive rehabilitation therapy is intentionally broad, given the wide range of symptoms and severity of cognitive problems in individuals with brain injury. It is important to note that the term “cognitive rehabilitation therapy” does not refer to one specific approach to treatment. The therapy can involve many variables, including a range of providers, settings, focuses, and treatment formats. Anything from motor-skills practice to teaching the use of memory notebooks or self-cuing strategies can be considered cognitive rehabilitation therapy. The defining, unifying characteristic is not the contents or active ingredients of treatment, but rather the intention to improve or accommodate one or more impaired cognitive functions.

## The Current State of Medical Research on Cognitive Rehabilitation Therapy

When we examined this issue in 2004, we found the state of the research on cognitive rehabilitation therapy to be inconclusive, with studies at the time lacking any strong confirmation of the treatment's efficacy.<sup>2</sup> We recommended that the issue of mandatory health insurance for cognitive rehabilitation therapy should be revisited when more conclusive studies became available.

This time around, 13 years later, we examined four peer-reviewed studies on the efficacy of cognitive rehabilitation therapy for patients suffering from traumatic brain injury that the Legislature specifically identified:<sup>3</sup>

1. *Mindfulness-Based Cognitive Therapy Reduces Symptoms of Depression in People with a Traumatic Brain Injury: Results from a Randomized Controlled Trial.* (M. Bedard, 2013).

<sup>2</sup> Report No. 04-11, *Assessment of Proposed Mandatory Health Insurance for Cognitive Rehabilitation.*

<sup>3</sup> Senate Concurrent Resolution No. 105, S.D. 1, H.D. 1 (Regular Session 2017), at p. 4-5.



There are four core cognitive domains:

### **Recent memory**

The ability to learn and recall new information

### **Language**

Comprehension or expression

### **Visuospatial ability**

The comprehension and effective manipulation of nonverbal, graphic, or geographic information

### **Executive function**

The ability to plan, perform abstract reasoning, solve problems, focus despite distractions, and shift focus when appropriate

Source: Alzheimer's Association





**Hawai'i Medical Service Association's most current circular** regarding cognitive rehabilitation therapy, effective April 28, 2017, states that,

for individuals with cognitive deficits due to traumatic brain injury, the randomized controlled trials "have methodological limitations and report mixed results, indicating there is no uniform or consistent evidence base supporting the efficacy of this technique. Systematic reviews generally conclude that efficacy of cognitive rehabilitation therapy is uncertain. . . . Clinical input provided strongest support for use of cognitive rehabilitation as part of the treatment of those traumatic brain injury. Cognitive rehabilitation may be considered medically necessary for traumatic brain injury based on this additional information."

In a later part, the circular states "**Cognitive rehabilitation ... is covered when provided by a qualified licensed professional such as a physician, licensed psychologist, speech therapist or occupational therapist ... in the rehabilitation of patients with traumatic brain injury[.]**"

2. *Evidence-Based Cognitive Rehabilitation: Updated Review of the Literature From 2003 Through 2008* (K.D. Cicerone, 2011).
3. *Recommendation for Best Practice in Cognitive Rehabilitation Therapy: Acquired Brain Injury* (M. Law/The Society for Cognitive Rehabilitation, 2004).
4. *Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence* (Committee on Cognitive Rehabilitation Therapy for Traumatic Brain Injury/R. Koehler/ Institute of Medicine of the National Academies, 2011).

Additionally, we reviewed other studies published after our last report, many of which were referred to us by clinicians and insurance providers during our review. (See appendix for the full list of studies, with summarized objectives and findings.)

We found that the current and recent research, on the whole, recognizes cognitive rehabilitation therapy as helpful and beneficial for patients suffering from traumatic brain injury, although it is commonly noted that additional research is necessary to make a conclusive determination of cognitive rehabilitation therapy's long-term efficacy for survivors of traumatic brain injuries. The studies describe positive or mixed short-term outcomes and recommend further work to replicate these positive findings and improve upon the efficacy and framework of the intervention.

## The Current State of Insurance Coverage of Cognitive Rehabilitation Therapy in Hawai'i

We found that health insurance plans offered in Hawai'i currently provide coverage for medically necessary cognitive rehabilitation therapy for traumatic brain injury patients. We surveyed the organizations providing health insurance that belong to the Hawai'i Association of Health Plans (HAHP), a statewide partnership that unifies Hawai'i's state-licensed health plans. The vast majority of Hawai'i residents receive their health coverage through a plan associated with one of these HAHP organizations.<sup>4</sup>

<sup>4</sup> We did not include in our survey Hawai'i Western Management Group and MDX Hawai'i, which are both members of HAHP, but are third-party administrators and do not offer their own medical plans. We also did not include Tricare, which provides health insurance to active duty and retired military and their families as well as to National Guard and Reserve members and their families.

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## Exhibit 1

In the following chart, we tracked whether or not the health plan provider provided coverage for medically necessary cognitive rehabilitation therapy for traumatic brain injury survivors. And if so, were there any limits on the number of treatments or any annual/lifetime dollar limits?

Hawai'i Health Plan Provider	Coverage?	Limits?
Hawai'i Medical Service Association (HMSA)	✓	X <sup>5</sup>
Kaiser Permanente (Kaiser)	✓	X
AlohaCare	✓	X
Hawai'i Medical Assurance Association (HMAA)	✓	X
'Ohana Health Plan (OHP)/Wellcare	✓	X
United Health Alliance (UHA)	✓	X
United Healthcare (UHC)	✓	X

## The Existing Coverage Matches or Exceeds the Coverage That Would Be Mandated by Senate Bill No. 225, S.D. 1

Senate Bill No. 225, S.D. 1, would mandate that health insurers provide coverage for cognitive rehabilitation therapy for survivors of traumatic brain injury for up to 20 years from the date on which the brain trauma occurred and up to “a maximum benefit of \$300,000 per insured, unless the individual and group hospital or medical service plan contract states otherwise.”

As noted in Exhibit 1, the coverage currently being offered by Hawai'i health-plan providers does not include any lifetime or annual limit, which exceeds the coverage proposed by Senate Bill No. 225, S.D. 1.

## Social and Financial Impact of Senate Bill No. 225, S.D. 1

Section 23-51, HRS, requires an impact assessment by the Auditor before any legislative measure mandating health insurance coverage for a specific health service, disease, or provider can be considered.

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<sup>5</sup> There are a few exceptions for grandfathered Employee Union Trust Fund (EUTF) retiree plans and Medicare. For example, the Hawai'i State Teachers' Association-retiree plan has a \$2 million lifetime maximum and Medicare has an annual limit on specific therapies. However, the other EUTF plans do not have lifetime or annual limits.





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We examined the potential social and financial effects of mandating health insurance coverage for cognitive rehabilitation therapy for patients suffering from traumatic brain injury in Senate Bill No. 225, S.D. 1, by applying the criteria in Section 23-52, HRS, as applicable.

## Social and Financial Impact

### 1) Social Impact

**A. The extent to which the treatment or service is generally utilized by a significant portion of the population:**

Because health insurance coverage currently exists for cognitive rehabilitation therapy for Hawai'i's approximately 95 percent-plus insured population, we assume that survivors of traumatic brain injury generally receive medically necessary cognitive rehabilitation therapy.

**B. The extent to which such insurance coverage is already generally available:**

Hawai'i's health insurers currently provide coverage for medically necessary cognitive rehabilitation therapy for patients with traumatic brain injuries, with no lifetime or annual limit.

**C. If coverage is not generally available, the extent to which the lack of coverage results in persons being unable to obtain necessary health care treatment:**

Health insurance coverage is currently available for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury.

**D. If the coverage is not generally available, the extent to which the lack of coverage results in unreasonable financial hardship on those persons needing treatment:**

Health insurance coverage is currently available for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury.

**E. The level of public demand for the treatment or service:**

According to the Department of Health's *Special Emphasis Report: Traumatic Brain Injury 2011-2015*, an average of 12,635 Hawai'i residents sustained a traumatic brain injury each year from 2011 through 2015.

In 2016, HMSA had 3,714 members who received either cognitive rehabilitation treatment and/or had traumatic brain injury claims. From June 2016 to May 2017, Queen's Medical Center treated and discharged 863 trauma patients, of which 840 trauma patients (or 97 percent) were expected to require cognitive rehabilitation treatment. The Hawai'i Neurological Society estimated, over the past 10 years, there are at least 5,000 traumatic brain injury patients in Hawai'i annually who require cognitive rehabilitation treatment.

**F. The level of public demand for individual or group insurance coverage of the treatment or service:**

The public demand for coverage for cognitive rehabilitation therapy for survivors of traumatic brain injuries is unclear; however, health insurance plans currently include coverage for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injuries.

**G. The level of interest of collective bargaining organizations in negotiating privately for inclusion of this coverage in group contracts:**

The labor unions that responded to our survey and were knowledgeable about their membership's health insurance coverages reported that medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injuries is already in their health plans.

**H. The impact of providing coverage for the treatment or service (such as morbidity, mortality, quality of care, change in practice patterns, provider competition, or related items):**

For people with brain injury and their families, cognitive problems may be the greatest barrier to returning to "normal" life. Patients face difficulties in memory, attention, social behavior, safety judgment, and planning and carrying out future actions. Brain injury affects a person's ability to care for himself, keep appointments, complete tasks, or interact with people appropriately. At stake is the patient's ability to succeed at work, school, or home. Cognitive rehabilitation therapy attempts to enhance functioning, independence, and quality of life in patients. Cognitive rehabilitation therapy for traumatic brain injury patients has shown to improve attention, memory, social communication skills, and executive functions (mental tasks to get things done).

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**I. The impact of any other indirect costs upon the costs and benefits of coverage as may be directed by the Legislature or deemed necessary by the Auditor in order to carry out the intent of this section:**

Because health insurance coverage of medically necessary cognitive rehabilitation therapy for traumatic brain injury patients is currently available, there likely are little or no indirect costs to implement the insurance mandate.

**Summary:** Since health insurance coverage of medically necessary cognitive rehabilitation therapy for traumatic brain injury patients currently exists, the social impact to survivors of traumatic brain injury likely would not change if coverage was mandated.

**2) Financial impact**

**A. The extent to which insurance coverage of the kind proposed would increase or decrease the cost of the treatment or service:**

The cost of treatment or service is expected not to change with mandated coverage since health insurers currently provide coverage for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injuries.

**B. The extent to which the proposed coverage might increase the use of the treatment or service:**

Health insurance coverage currently is available for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury. For that reason, mandating coverage likely will not increase the use of the treatment or service.

**C. The extent to which the mandated treatment or service might serve as an alternative for more expensive treatment or service:**

Health insurance coverage currently is available for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury. For that reason, mandating coverage likely will not serve as an alternative for more expensive treatment or service.

**D. The extent to which insurance coverage of the health care service or provider can be reasonably expected to increase or decrease the insurance premium and administrative expenses of policyholders:**

Health insurance coverage currently is available for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury. For that reason, mandating coverage likely will not significantly increase policyholders' insurance premiums and administrative expenses, if at all.

**E. The impact of this coverage on the total cost of health care:**

The impact on the total cost of health care would be minimal on the insurers and patients, because benefits currently exist.

**Summary:** Since mandating insurance coverage for medically necessary cognitive rehabilitation therapy for survivors of traumatic brain injury does not expand coverage currently provided to insureds, there likely would be no significant additional financial impact on the total cost of health care.

**Finding: Senate Bill No. 225, S.D. 1, Is Not Necessary at This Time**

Because the coverage that Senate Bill No. 225, S.D. 1, seeks to mandate is currently provided — and even exceeded — by Hawai'i's health plan providers, it is our recommendation that mandatory health coverage insurance for medically necessary cognitive rehabilitation therapy for patients suffering from traumatic brain injury, currently, is not needed. We suggest that the Legislature defer its consideration of mandating health insurance coverage for cognitive rehabilitation therapy until such time that such coverage is no longer provided by health insurance providers doing business in Hawai'i.

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## Appendix

### Summary of Medical Research Studies Reviewed for this Study

*Mindfulness-Based Cognitive Therapy Reduces Symptoms of Depression in People with a Traumatic Brain Injury: Results from a Randomized Controlled Trial* (M. Bedard, 2013).

**Objective:** The randomized control trial sought to determine if mindfulness-based cognitive therapy could reduce symptoms of depression in individuals with traumatic brain injury.

**Findings:** The results of the study were consistent with those of other researchers who use mindfulness-based cognitive therapy to reduce symptoms of depression in traumatic brain injury survivors (at least for three months) and suggested that further work to replicate these findings and improve upon the efficacy of the intervention was warranted. The study did not find reduction of symptoms of depression and also stated that it is not possible to generalize its findings to the general population of people with traumatic brain injuries.

*Evidence-Based Cognitive Rehabilitation: Updated Review of the Literature From 2003 Through 2008* (K.D. Cicerone, 2011).

**Objective:** The researchers conducted a systematic review of literature from 2003 to 2008 of cognitive rehabilitation of people with traumatic brain injury and stroke and made clinical recommendations. One hundred twelve articles were reviewed and evaluated. (Previously, the author had reviewed research reports from 1971–2002; this was a second review based on research reports from 2003–2008.) Update to the prior cognitive rehabilitation therapy clinical recommendations in the initial research report based on the 1971–2002 initial review were also implemented.

**Findings:** The report concluded that there was substantial evidence to support interventions for attention, memory, social communication skills, executive function, and for comprehensive-holistic neuropsychologic rehabilitation after traumatic brain injury. And there was information to support evidence-based protocols and implement empirically-supported treatments for cognitive disability after traumatic brain injury and stroke. The report indicated that cognitive rehabilitation was the best available form of treatment for people who exhibit neurocognitive impairment and functional limitation after traumatic brain injury or stroke. However, additional research would need to explain exactly how cognitive rehabilitation works and to measure the comparative effectiveness of different interventions. The report further indicated there was evidence from numerous studies indicating that cognitive rehabilitation is effective during the post-acute period, even many years after the initial injury. However, the report

found that additional research was needed to investigate the patient characteristics that influence treatment effectiveness. In the treatment of cognitive communication disorder after traumatic brain injury, there was a need to investigate the aspects of intensive language treatment that contribute to therapy effectiveness.

*Recommendation for Best Practice in Cognitive Rehabilitation Therapy: Acquired Brain Injury* (M. Law/The Society for Cognitive Rehabilitation, 2004).

**Objective:** The research report presented the basis for cognitive rehabilitation based on 81 recommendations from experts.

**Findings:** The report concluded that cognitive rehabilitation therapy treatment can influence brain structures. However, efficacy was complex and needed to be reviewed further in multiple facets to determine when, and in what way, each of these facets work best.

*Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence* (Committee on Cognitive Rehabilitation Therapy for Traumatic Brain Injury/R. Koehler/Institute of Medicine of the National Academies, 2011).

**Objective:** The report evaluated the value of cognitive therapy as a therapeutic intervention for traumatic brain injury.

**Findings:** The report found, in most cases, modest support for the efficacy of cognitive rehabilitation therapy interventions. The evidence was limited and various methodologies yielded mixed results. Systematic reviews published in peer-reviewed journals have generally found evidence for the benefits of cognitive rehabilitation therapy. A systematic review commissioned by Department of Defense found evidence of benefit from specific aspects of cognitive rehabilitation therapy, but generally found a small evidence base for the therapy, leading to inconclusive results of cognitive rehabilitation therapy's efficacy. The report emphasized that the limitations of the evidence did not rule out the meaningful benefit of treatment. The report supported the ongoing clinical application of cognitive rehabilitation therapy interventions for individuals with cognitive and behavioral deficits due to traumatic brain injury. The report found the heterogeneous array of treatments available, as well as the lack of a unified theoretical framework for defining and quantifying them, made definitive evaluation of their effectiveness challenging.



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*Effectiveness of cognitive rehabilitation following acquired brain injury: a meta-analytic re-examination of Cicerone et al.'s (2000, 2005) systematic reviews* (M. L. Rohling, 2009).

**Objective:** The study provided a meta-analysis of cognitive rehabilitation literature that was originally reviewed by K. D. Cicerone et al. (2000, 2005) for providing evidence-based practice guidelines for persons with acquired brain injury.

**Findings:** The report stated that the treatment effect directly attributable to cognitive rehabilitation was small. A larger treatment effect was found for single-group pre-test to post-test outcomes; however, modest improvement was observed for non-treatment control groups as well. The report found gaps in the scientific evidence supporting cognitive rehabilitation, thereby indicating future research was required.

*Cochrane Review for Executive Dysfunction* (CSY Chung, 2013).

**Objective:** This report assessed cognitive rehabilitation for executive dysfunction (planning, initiation, organization, inhibition, problem solving, self-monitoring, error correction) in adults with non-progressive acquired brain damage (traumatic brain injury, stroke, and other brain injury).

**Findings:** The report found no statistically significant effects on measures of global executive function or individual component functions.

*Assessment on CRT in Traumatic Brain Injury Patients* (Blue Cross Blue Shield Association Technology Evaluation Center, 2008).

**Objective:** This randomized controlled trial tried to determine whether there was adequate evidence to demonstrate that cognitive rehabilitation therapy results in improved health outcomes.

**Findings:** The trial did not find strong evidence for cognitive rehabilitation therapy efficacy in the treatment of traumatic brain injury patients.

*Randomized controlled trial of holistic neuropsychologic rehabilitation after traumatic brain injury* (KD Cicerone, 2008).

**Objective:** This randomized controlled trial compared comprehensive neuropsychologic rehabilitation programs with standard rehabilitation programs.

**Findings:** The trial had mixed findings of efficacy of comprehensive neuropsychologic rehabilitation for traumatic brain injury.

*A Randomized Controlled Trial to Treat Learning Impairment in Traumatic Brain Injury: The TBI-MEM Trial* (N. Chiaravalloti, 2016).

**Objective:** This randomized controlled trial compared a treatment group utilizing Story Memory Technique to improve learning and memory in subjects with traumatic brain injury to a non-treatment group.

**Findings:** The outcomes were statistically significant in favor of the treatment group for several measures assessing memory at five weeks; however, results at six months were less definitive.

*Cognitive Rehabilitation Manual: Translating Evidence-Based Recommendations into Practice* (E. Haskins/American Congress of Rehabilitation Medicine, 2011).

**Objective:** This manual contains recommendations made by the Cognitive Rehabilitation Task Force of the Brain Injury Interdisciplinary Special Interest Group (BI-ISIG) of the American Congress of Rehabilitation Medicine. This manual was based on *Evidence-Based Cognitive Rehabilitation: Updated Review of the Literature From 2003 Through 2008* (K. Cicerone).

**Findings:** The manual listed evidences of efficacy in ameliorating cognitive impairments following brain injury. It cited K. Cicerone's *Archives of Physical Medicine and Rehabilitation* in 2000, 2005, and 2011, and concerns with those results.

*Cognitive Rehabilitation for Traumatic Brain Injury Update to Archived Medical Technology Directory* (Hayes Inc., 2016).

**Objective:** This research report reviewed the use of cognitive rehabilitation for traumatic brain injury. Hayes Inc. updated to an archived Medical Technology Directory report, *Cognitive Rehabilitation for Traumatic Brain Injury*, published on June 23, 2011.

**Findings:** The research report found some evidence of efficacy of cognitive rehabilitation for memory or social skills. There was some evidence that comprehensive-holistic cognitive rehabilitation improved

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community integration compared with standard neurorehabilitation therapy. However, due to the variation among studies in the targeted domains and rehabilitation protocols, and the variation in type and severity of injury and impairment in traumatic brain injury, no strong conclusions could be drawn regarding the efficacy of cognitive rehabilitation. Therefore, the research report concluded that the use of cognitive rehabilitation in adults with traumatic brain injury has a potential but unproven benefit. And, there was no proven benefit on the use of cognitive rehabilitation in children and adolescents with traumatic brain injury.

*Cognitive Rehabilitation: The Evidence, Funding and Case for Advocacy in Brain Injury* (Brain Injury Association of America, 2006).

**Objective:** The report provided definitions and principles for application of cognitive rehabilitation, discussed research evidence for the efficacy of treatment, and highlighted the burden on individuals and their caregivers.

**Findings:** The research report found evidence to support the effectiveness of cognitive rehabilitation for persons with brain injury. The report concluded that, whether research reports on the effectiveness of cognitive rehabilitation therapy for traumatic brain injury survivors were positive or negative, they all emphasized that more research was needed to strengthen the evidence and better answer specific questions about what methods of rehabilitation are effective, for whom, and at what time post-injury.