

**CENTER FOR HEALTH
INFORMATION AND ANALYSIS**

**MANDATED BENEFIT REVIEW OF H.B. 843
SUBMITTED TO THE 189TH GENERAL COURT:
AN ACT RELATIVE TO COGNITIVE
REHABILITATION**

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TABLE OF CONTENTS

Benefit Mandate Overview:.....	1
History of the bill.....	1
What does the bill propose?.....	1
Medical efficacy of H.B. 843.....	1
Current coverage.....	2
Cost of implementing the bill.....	2
Plans affected by the proposed benefit mandate.....	2
Plans not affected by the proposed benefit mandate.....	2
Medical Efficacy Assessment.....	3
Acquired and traumatic brain injuries.....	3
Cognitive rehabilitation therapy.....	6
Medical efficacy of cognitive rehabilitation therapy.....	6
Conclusion.....	8
Appendix A: Glossary of services.....	9
Appendix B: Brain Injury Continuum of Care.....	13
Appendix C: Model of Cognitive Rehabilitation Therapy.....	17
Endnotes.....	18
Actuarial Assessment	

BENEFIT MANDATE OVERVIEW:

H.B. 843: AN ACT RELATIVE TO COGNITIVE REHABILITATION

HISTORY OF THE BILL

The Committee on Financial Services referred House Bill (H.B.) 843, “An Act relative to cognitive rehabilitation,” sponsored by Rep. Ferguson of Holden in the 189th General Court, to the Center for Health Information and Analysis (CHIA) for review.¹ The bill is substantively equivalent to Senate Bill 485 sponsored by Sen. Chandler of Worcester. Massachusetts General Laws, chapter 3, §38C requires CHIA to review and evaluate the potential fiscal impact of each mandated benefit bill referred to the agency by a legislative committee.

WHAT DOES THE BILL PROPOSE?

H.B. 843 requires carriers to cover treatment of an acquired or traumatic brain injury, to include: cognitive rehabilitation therapy and a full range of related therapies; neurofeedback therapy; functional rehabilitation therapy and remediation; and acute and post-acute transition services, community reintegration services, residential services, inpatient services, outpatient day treatment services, and other necessary post-acute care treatment services. Plans may not include any lifetime limitations, or any unreasonable annual limitations, on the number of days or sessions for acute or post-acute treatment, and must cover reasonable expenses related to periodic care re-evaluation. Cost sharing for these services must be similar to that for other services covered under the plan.

MEDICAL EFFICACY OF H.B. 843

Cognitive rehabilitation therapy (CRT) is treatment provided to a patient following brain injury that focuses on increasing the patient’s capacity to process and interpret information to improve her/his ability to function independently. Individually tailored in setting, scope, duration, and sequence, CRT focuses on restoring function or compensating for impairments in the cognitive domains, including memory, attention, executive function, and language or social communication. While the individual nature of brain injury prevents development of a single cognitive rehabilitative track, researchers have concluded that CRT in general is effective when managed by specialized and experienced multi-disciplinary teams, and evidence-based guidelines and recommendations exist regarding its provision.

The proposed mandate requires insurance carriers to cover a range of CRT services anywhere in the spectrum of settings in which they may be provided. To the extent this requirement improves access to evidenced-based services provided in settings suited to treating an individual patient’s needs in the acute and post-acute phases of recovery that adapt over time and to varying circumstances, the legislation will contribute to the improved health and recovery of those with acquired brain injuries. If in addition, some services are provided that are not coordinated and planned by the appropriate multi-disciplinary teams, some of these services may not be efficacious or as efficacious.

CURRENT COVERAGE

All fully-insured commercial health plans cover acute care for acquired brain injury (ABI), as well as continued rehabilitation in sub-acute settings, when medically necessary. Continued ongoing rehabilitation services provided by occupational therapists, physical therapists, speech/language pathologists, neuropsychologists, and physicians are generally covered when deemed medically necessary. Certain acquired brain injury treatments, such as neurofeedback, are considered investigational and may not be covered.

Providers and advocates assert that while cognitive deficits are a valid diagnosis for outpatient services, claims for cognitive rehabilitation services are seldom reimbursed, and that providers typically must bill the services under occupational, physical, or speech therapy procedure codes to be reimbursed. However, most carriers surveyed for this analysis reported that cognitive rehabilitation following an acquired brain injury is a covered service, and small amounts of paid claims for the service were found in 2014 Massachusetts medical claims for several insurance carriers. Reconciling these perspectives, it seems likely only certain services are covered by carrier benefit packages (many carriers exclude coverage for custodial and non-medical community-based services) and other services covered by carrier benefit packages may be denied because carriers determine in specific cases the patients do not meet their medical necessity criteria for those services.

COST OF IMPLEMENTING THE BILL

Requiring coverage for this benefit by fully-insured health plans would result in an average annual increase, over five years, to the typical member's monthly health insurance premiums of between \$0.01 (0.003%) and \$0.19 (0.040%). While the bill requires carriers to cover some services they may not have covered previously, this analysis interprets H.B. 843 as making no changes to carriers' ability to set and evaluate medical necessity criteria for cognitive rehabilitation services; to the extent that application of these criteria limit reimbursement for cognitive rehabilitation services, the potential impact of the bill on premiums is in turn limited.

The Massachusetts Division of Insurance and the Commonwealth Health Insurance Connector Authority are responsible for determining any potential state liability associated with the proposed mandate under Section 1311 of the Affordable Care Act (ACA).

PLANS AFFECTED BY THE PROPOSED BENEFIT MANDATE

Individual and group accident and sickness insurance policies, corporate group insurance policies, and HMO coverage issued pursuant to Massachusetts General Laws would be subject to this proposed mandate. Based on input from bill sponsors, this review assumes the proposed mandate would apply to self-insured and fully-insured plans operated by the Group Insurance Commission (GIC) for the benefit of public employees and their dependents. The proposed mandate would apply to members, regardless of state of residence, covered under the relevant plans when issued in the Commonwealth.

PLANS NOT AFFECTED BY THE PROPOSED BENEFIT MANDATE

Self-insured plans (i.e., where the employer or policyholder retains the risk for medical expenses and uses a third-party administrator or insurer only to provide administrative functions), except for those provided by the GIC, are not subject to state-level health insurance mandates. State mandates do not apply to Medicare and Medicare Advantage plans, the benefits of which are qualified by Medicare, nor to federally-funded plans including TRICARE (covering military personnel and dependents), the Veterans Administration, and the Federal Employee's Health Benefit Plan. The bill does not apply to Medicaid/MassHealth.

MEDICAL EFFICACY ASSESSMENT

Massachusetts House Bill (H.B.) 843, as submitted in the 189th General Court, would require fully-insured plans to cover a variety of services related to the treatment of acquired brain injuries, including traumatic brain injuries.² Benefits include the following services. (Appendix A contains more detailed descriptions.)

- Cognitive rehabilitation therapy
- Cognitive communication therapy
- Neurocognitive therapy and rehabilitation
- Neurofeedback therapy
- Functional rehabilitation therapy and remediation
- Neurobehavioral, neuropsychological, and psychophysiological testing and treatment
- Acute and post-acute services, including:
 - Transition
 - Community reintegration
 - Residential
 - Inpatient
 - Outpatient day treatment
- Other necessary post-acute care treatment

Plans may not include any lifetime limitations, or any unreasonable annual limitations, on the number of days or sessions for acute or post-acute treatment, and must cover reasonable expenses related to periodic care re-evaluation. Cost sharing for these services must be similar to that for other services covered under the plan.

M.G.L. Chapter 3 §38C charges the Massachusetts Center for Health Information and Analysis (CHIA) with reviewing the medical efficacy of proposed mandated health insurance benefits. Medical efficacy reviews summarize current literature on the effectiveness and use of the mandated treatment or service, and describe the potential impact of a mandated benefit on the quality of patient care and the health status of the population.

ACQUIRED AND TRAUMATIC BRAIN INJURIES

According to the Brain Injury Association of America (BIAA), an acquired brain injury (ABI) is one that occurred after birth, and is not hereditary, congenital, degenerative (such as those caused by Alzheimer’s or Parkinson’s disease), or the result of birth trauma.³ Major categories of ABIs include:⁴

- Neoplastic: Including primary and secondary cancerous tumors. Patient outcomes are associated with the specific tumor type, and the availability and efficacy of treatments including chemotherapy, radiotherapy, and neurosurgical interventions.
- Neurotoxic: Related to poisons, alcohol, illicit drugs, and other toxins. Short- and long-term outcomes are associated with the specific toxic substance, the duration and magnitude of exposure, patient age, accurate diagnosis, identification and removal of toxin, prevention of re-exposure, and the availability and efficacy of treatment. Many neurotoxic exposures result in permanent impairments.
- Infectious: Caused by bacterial, viral, fungal, parasitic, and other agents, resulting in meningitis, encephalitis, meningoencephalitis, and encephalomyelitis. Long-term outcomes depend on the specific disease, infection severity, diagnostic timeliness, availability and efficacy of treatment, and patient’s age, general health, and overall immunity. While outcomes vary by disease, for some categories most will not “experience significant residual disabilities”, though some cases, especially in those with compromised immune systems, may result in post-infectious cognitive disorders that “diminish functional capacity”.

- **Metabolic:** Caused by systemic diseases, nutritional deficiencies, and endocrine disorders. Mortality and outcomes depend on the specific disease and its underlying cause, patient overall health, and timely diagnosis and treatment. Some individuals may experience progressive neurological deficits that emerge after a period of apparent recovery.
- **Neurovascular:** Including stroke and other diseases and conditions affecting the brain's blood supply. Outcomes and mortality depend on the type and site of the brain injury, any underlying brain disease or other medical conditions, patient age, gender, general health, genetic risk factors, and timeliness of treatment interventions.
- **Traumatic (TBI):** Caused by external force(s). The most common cause of TBI is falls; others include motor vehicle accidents, firearms or explosives, and blows from objects or persons. Mortality and outcomes resulting from TBI are related to environmental, personal, and medical factors, including the type, location, and severity of initial injuries and secondary complications (e.g., cardiac and/or respiratory arrest, hemorrhages or hematomas, brain swelling, and increased intracranial pressure); patient age, gender, genetics, cognitive reserve (i.e., IQ and education), and health, including other neurodevelopmental or behavioral health disorders; and the availability and efficacy of medical care during the acute and recovery phases.⁵ While some acute impairments may abate without treatment, others may not appear immediately after the injury.⁶

TBIs are the primary cause of ABI in Massachusetts. TBIs are measured on a scale of severity, from mild to severe; the severity of the acute injury is related to the predicted short- and long-term cognitive impairment and recovery.⁷ Mild TBI is also referred to as concussion; while individuals may suffer short- and long-term effects, most patients will recover completely.⁸ Moderate and severe TBIs, often grouped together and difficult to distinguish, are most often caused by more severe acute injuries and result in more severe residual cognitive deficits involving more cognitive domains for longer periods.^{9,10}

While TBIs, including concussions, are more common than other types of ABIs, most patients with TBIs do not require inpatient stays but are instead treated in an emergency room and discharged. Stroke (neurovascular) is the second most common cause of ABI, and results in more hospital stays annually, as shown in the following table.

Inpatient Hospitalizations, Observation Stays and Emergency Department Discharges Associated with a Discharge Diagnosis of Acquired Brain Injury, MA Residents, 2008-2010¹¹

Type of Acquired Brain Injury	Average Annual Events			Per 100,000 MA residents		
	IP and OBS ^a	ER ^b	Total Hospital	IP and OBS ^a	ER ^b	Total Hospital
Infectious	2,296	737	3,033	35.2	11.3	46.5
Metabolic	9,609	4,780	14,389	147.5	73.3	220.8
Neurovascular	20,173	2,630	22,804	309.6	40.4	349.9
Traumatic	7,721	59,326	67,048	118.5	910.4	1,028.9

^a Inpatient and Observation Stays

^b Emergency Room Visits

Similar epidemiological data is not available for neoplastic or neurotoxic ABIs.

ABIs may have short- and long-term effects, resulting in acute and chronic symptoms, treatment, support, and recovery needs. Depending on the specific injury and individual, ABIs can impact a patient's cognitive, physical, and behavioral abilities.¹² Symptoms and disorders of ABIs can include:^{13,14}

Cognitive

- Attention/arousal
- Executive functioning
- Constructional skill
- Mathematical skill
- Language, cognitive linguistics and social communication
- Reading skill (dyslexia)
- Learning, memory and recognition
- Orientation
- Perception
- Motivation
- Praxis (ability to correctly execute motor commands and purposeful actions)
- Progressive dementia
- Developmental disorders
- Intellectual and adaptive disorders in conceptual, social or practical functioning

Physical

- Motor impairments
- Voluntary movement
- Paralysis
- Involuntary movement
- Motor control
- Tremor
- Abnormal muscle tone
- Coordination
- Gait disorder
- Slowness
- Decreased movement
- Balance
- Fatigue
- Pain and headaches
- Seizure disorder
- Sleep disturbances
- Vision
- Dizziness
- Light/noise sensitivity
- Nausea and vomiting
- Loss of sensation

Behavioral

- Anger and irritability
- Stress
- Anxiety
- Depression
- Post-traumatic stress disorder

Cognitive impacts of ABIs may decrease quality of life and limit activities of daily and independent living, participation in community, and vocational (employment and educational), recreational, and social relationships.^{15,16}

COGNITIVE REHABILITATION THERAPY

Treatment following a brain injury follows a continuum of care, the specific elements of which are determined by the individual, the specific injury and its severity, and the availability of certain types of care and support. An example of such a continuum can be found in Appendix B.

In general terms, for many conditions, rehabilitation focuses on the “complex correspondence between disease and the ability to function: a disease may be eradicated while disability remains; disability can be reduced in the face of permanent injury or chronic disease.”¹⁷ Cognitive rehabilitation therapy (CRT) specifically is a set of medical and therapeutic treatments for patients with brain damage or disease that focuses on increasing a patient’s capacity to process and interpret information to improve the ability to function independently; in other words, CRT rehabilitates thinking skills following brain injury.¹⁸

These treatments are tailored to each individual based on the specific injury, impairments, and limitations, other existing conditions, and the availability of a family or social support system. Most often CRT focuses on either restoring function or compensating for impairments in the cognitive domains, which include such areas as memory, attention, executive function, and language or social communication.

CRT is provided in a wide variety of inpatient and outpatient settings, and in a patient’s home, school, or workplace, by a diverse range of professionals in rehabilitation medicine, nursing, psychology and counseling, psychiatry, neuropharmacology, neuropsychology, vocational rehabilitation, speech-language pathology, and physical and occupational therapy.¹⁹ CRT programs are generally interdisciplinary interventions intended to improve or accommodate one or more cognitive functions, the contents of which vary by the needs of the patient.^{20,21,22,23} Interventions are intended to “restore or reorganize function, compensate for impaired function through new cognitive patterns or external devices, and enable patients to adapt to their new level of functioning...in various contexts.”²⁴ Appendix C describes a model of CRT.

MEDICAL EFFICACY OF COGNITIVE REHABILITATION THERAPY

While some elements of CRT have become standardized, the range of interventions, settings, and providers for these services creates a wide array of approaches to treating ABIs. Likewise, no single duration, sequencing, set of services, or setting can be defined, as the treatment must be tailored to the individual patient and his/her specific needs and situations, adapting to changes over time.²⁵

With such variability across individuals in the types of brain injury and paths to recovery, conducting controlled studies of specific courses of treatment, with sample sizes sufficient to be meaningful, poses a challenge. As stated in a publication by the National Institute of Medicine (IOM) focused on evaluating CRT, “[a]lthough individualization is clinically useful, it presents challenges to researchers who attempt to study standardized CRT practices and discover what is effective, what could be improved, and what could be harmful to patients.”²⁶ While systematic reviews of CRT have found evidence of benefit to patients and no evidence of harm or downside risks, the methodologies of specific studies have varied and yielded mixed results, prompting researchers to propose evaluation criteria for research quality, as well as study design and reporting improvements for future research into CRT.^{27,28} This conclusion is reflected in a consensus statement by the National Institute of Health published in 1998.²⁹ In general, though, researchers agree that “[t]here is now sufficient information to support evidence-based protocols and implement empirically-supported treatments for cognitive disability after TBI and stroke.”³⁰

To that end, the American Congress of Rehabilitation Medicine has published an evidence-based manual for treating ABIs through CRT,³¹ and an international group of researchers has published evidence-based clinical practice guidelines for cognitive rehabilitation post-traumatic brain injury.^{32,33,34,35,36,37} Moreover, the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) at the National Institutes of Health (NIH) is currently funding 16 TBI model systems nationally that provide comprehensive specialty services from the time of injury until a patient's "eventual re-entry into full community life," to evaluate the medical, rehabilitative, vocational, and other services provided to these patients, including comprehensive CRT.³⁸ One such system is located at the Spaulding-Harvard Traumatic Brain Injury Model System in Boston.³⁹

Both the comprehensive set of services known as CRT, and the individual components within its spectrum, have been evaluated for various specific circumstances and populations. Several large studies, used in part to develop evidence-based practices, found evidence of effectiveness for several forms of CRT for persons with stroke and TBI, specifically for cognitive-linguistic therapies (cognitive communication therapy) for patients with left hemisphere stroke who suffer language deficits; visuospatial rehabilitation for right hemisphere stroke patients with visual neglect deficits; and attention, memory, functional communication, and executive functioning remediation following TBI.^{40,41,42,43} Other studies found, for TBI patients previously unable to resume community functioning, that holistic, intensive programs of CRT or neuropsychological rehabilitation—that help patients to self-regulate cognitive and emotional processes and integrate treatment of cognitive, interpersonal, and functional skills—are effective at improving self-efficacy, functional outcomes, social participation, community functioning, subjective well-being, and quality of life.^{44,45} A few studies have found that specific forms of CRT can improve self-concept and interpersonal relationships while reducing memory failures and anxiety for patients with TBI,⁴⁶ while computerized CRT has been shown to improve cognitive function in patients with ABIs.⁴⁷ In addition, neurofeedback therapy "is a promising treatment," but there is currently "no standard methodology" or accepted evidence-based guidelines for its use, and therefore the treatment "remains experimental" and "warrants double-blind, placebo-controlled studies to determine its potential role in the treatment of...brain injury."⁴⁸

Overall, according to the Brain Injury Association of America,

There is no single pathway or course of recovery from TBI...A patient's length of stay at any level of the TBI continuum of care should be based on the nature of the neurological injuries and the degree to which additional, measurable functional improvement within specific time frames is anticipated. Such judgments, and the scope, intensity and duration of medical, rehabilitative and long-term treatment and service plans should be developed by a highly specialized and experienced interdisciplinary team in concert with the patient and family.⁴⁹

Cognitive rehabilitation therapy is a broad set of treatments and services available to individuals depending on their specific injury, personal and environmental factors, and recovery needs. As with any broad category of treatment, some of the specific services have been proven effective in specific circumstances, while none meet the needs of every patient. For some patients with a single or more predominant need, modular CRT, or treatments aimed at single impairments separately, may be effective.⁵⁰ For patients with multiple impairments, a comprehensive approach that mixes modular treatments, services to enhance self-awareness of the impact of the cognitive deficit(s), and therapies focused on developing coping mechanisms for residual deficits and their consequences, are more effective.⁵¹ Overall, though, evidence-based CRT services, delivered in a coordinated fashion and managed by experts who adapt specific treatment to an individual's needs, have been proven effective.

Effectiveness of CRT therefore requires both the availability of the service components and their management by a specialized and experienced team. H.B. 843 does not explicitly address whether or how services are planned and coordinated (except for requiring periodic reevaluation of patients unresponsive to treatment). By mandating only the service components, it allows the possibility that services will be delivered and paid for by carriers even if they are not provided as part of a managed continuum of care consistent with the evidence-basis for CRT as described above by the Brain Injury Association of America.

CONCLUSION

Cognitive rehabilitation therapy is treatment provided to patients following brain injury that focuses on increasing the capacity to process and interpret information to improve the ability for a patient to function independently. Individually tailored in setting, scope, duration, and sequence, CRT focuses on restoring function or compensating for impairments in the cognitive domains, including memory, attention, executive function, and language or social communication. While the individual nature of brain injury prevents the development of a single cognitive rehabilitative track, researchers have concluded that CRT in general is effective for ABI patients when managed by specialized and experienced multi-disciplinary teams, and evidence-based guidelines and recommendations exist regarding its provision.

The proposed mandate requires insurers to cover a range of CRT services anywhere in the spectrum of settings in which they may be provided. To the extent this requirement improves access to evidence-based services in settings best suited to treating an individual patient's needs in the acute and post-acute phases of recovery that adapt over time and in varying circumstances, the legislation will contribute to the improved health and recovery of those with acquired brain injuries. If, in addition, some services are provided that are not coordinated and planned by the appropriate multi-disciplinary teams, some of these services may not be efficacious or as efficacious.

APPENDIX A: GLOSSARY OF SERVICES

Cognitive rehabilitation therapy: A set of medical and therapeutic treatments for patients with brain damage or disease that focuses on increasing a patient's capacity to process and interpret information to improve the ability to function independently; in other words, CRT rehabilitates thinking skills following brain injury.⁵²

Cognitive communication therapy: Therapy focused on problems of communication caused by cognitive deficits, as opposed to a primary language or speech deficit.⁵³

Neurocognitive therapy and rehabilitation: Treatment of disorders in which the primary clinical deficit is in cognitive function which has not been present since birth or very early life, and thus represent a decline from a previously attained level of function, such as those caused by acquired brain injuries.⁵⁴ Also known as cognitive rehabilitation therapy.

Neurofeedback therapy: Direct training of brain function to enhance self-regulatory capacity, or an individual's ability to exert control over behavior, thoughts, and feelings.⁵⁵ Neurofeedback is a form of biofeedback whereby a patient can learn to control brain activity, such as that measured and recorded by an electroencephalogram.⁵⁶

Functional rehabilitation therapy and remediation: A structured approach to rehabilitation for brain disorders that emphasizes learning by doing, and focuses on learning or relearning a specific task in a prescribed format that can be accomplished by the patient in his given recovery state or setting, most often centered on activities of daily living.⁵⁷ Also known as bottom-up therapy, as opposed to cognitive rehabilitation, which is known as top-down therapy.⁵⁸

Neurobehavioral testing and treatment: A set of medical and therapeutic assessment and treatments focused on behavioral impairments associated with brain disease or injury.⁵⁹

Neuropsychological testing and treatment: A set of medical and therapeutic assessment and treatments focused on amelioration of cognitive, emotional, psychosocial, and behavioral deficits caused by brain injury.⁶⁰ Also known as holistic, multi-modal, or comprehensive cognitive rehabilitation therapy.⁶¹

Psycho physiological testing and treatment: A set of medical and therapeutic assessment and treatments focused on psycho physiological disorders, or physical disorders with psychological overlay.⁶² Disorders often consist of pain or other physical symptoms caused by psychological processes without any corresponding physical cause or pathological or structural abnormality.^{63,64}

Transition services: The definition of this group of services is not standard, as providers span several disciplines, including medical, vocational, educational, and social services. Therefore, this report presents the definitions outlined in the American Medical Association's Current Procedural Terminology⁶⁵ (CPT) guide, as well as that provided by the Brain Injury Association of Massachusetts (BIA-MA).⁶⁶ Please note that the CPT definition is focused on medical decision making for patients during transitions from inpatient to community settings, while the BIA-MA definition encompasses care and treatment for patients during any life transition.

American Medical Association Current Procedural Terminology, CPT Codes 99495, 99496:

Codes 99495 and 99496 are used to report transitional care management services (TCM). These services are for an established patient whose medical and/or psychosocial problems require moderate or high complexity medical decision making during transitions in care from an inpatient hospital setting (including acute hospital, rehabilitation hospital, long-term acute care hospital), partial hospital, observation status in a hospital, or skilled nursing facility/nursing facility, to the patient's community setting (home, domiciliary, rest home, or assisted living). TCM commences upon the date of discharge and continues for the next 29 days.

TCM is comprised of one face-to-face visit within the specified timeframes, in combination with non-face-to-face services that may be performed by the physician or other qualified health care professional and/or licensed clinical staff under his/her direction.

Non-face-to-face services provided by clinical staff, under the direction of the physician or other qualified health care professional, may include:

- communication (with patient, family members, guardian or caretaker, surrogate decision makers, and/or other professionals) regarding aspects of care;
- communication with home health agencies and other community services utilized by the patient;
- patient and/or family/caretaker education to support self-management, independent living, and activities of daily living;
- assessment and support for treatment regimen adherence and medication management;
- identification of available community and health resources;
- facilitating access to care and services needed by the patient and/or family.

Non-face-to-face services provided by the physician or other qualified health care provider may include:

- obtaining and reviewing the discharge information (e.g., discharge summary, as available, or continuity of care documents);
- reviewing need for or follow-up on pending diagnostic tests and treatments;
- interaction with other qualified health care professionals who will assume or reassume care of the patient's system-specific problems;
- education of patient, family, guardian, and/or caregiver;
- establishment or reestablishment of referrals and arranging for needed community resources;
- assistance in scheduling any required follow-up with community providers and services.

BIA-MA: As patients' conditions change (improve or decline) due to life transitions (e.g., new job, new home, new city), different cognitive rehabilitation treatments may be required. This type of transitional care is similar to the ongoing care provided to patients with other chronic conditions, such as paralysis.

Community reintegration services: The definition of this group of services is not standard, as providers span several disciplines, including medical, vocational, educational, and social services. Therefore, this report presents the definitions outlined in the American Medical Association's Current Procedural Terminology⁶⁷ (CPT) guide, including additional codes that may be interpreted as community reintegration services as they relate to Activities of Daily Living (ADLs), as well as that provided by the Brain Injury Association of Massachusetts (BIA-MA).⁶⁸ Please note that the definition provided by the BIA-MA is more expansive than that defined in the CPT medical coding guide, as BIA-MA includes all occupational domains defined by the American Occupational Therapy Association (AOTA).

American Medical Association Current Procedural Terminology:

CPT Code 97537: Community/work reintegration training (e.g., shopping, transportation, money management, avocational activities and/or work environment/modification analysis, work task analysis, use of assistive technology device/adaptive equipment), direct one-on-one contact by provider, each 15 minutes.

CPT Code 97535: Self-care/home management training (e.g., activities of daily living (ADL) and compensatory training, meal preparation, safety procedures, and instructions in use of assistive technology devices/adaptive equipment), direct one-on-one contact, each 15 minutes.

CPT Code 98960: Education and training for patient self-management by a qualified, nonphysician health care professional using standardized curriculum, face-to-face with the patient (could include caregiver/family) each 30 minutes; individual patient.

98961: 2-4 patients

98962: 5-8 patients

CPT Code 99509: Home visit for assistance with activities of daily living and personal care.

BIA-MA: These services assist individual with reintegration back into the community, including activities of daily living (ADLs, e.g., self-care) and instrumental activities of daily living (IADLs, e.g., home management, rest and sleep habits, work demands, play, leisure, social participation). They help clients relearn how to do these activities through guided, graded instruction within the context of the client's community. Practitioners may work with individuals in real life settings such as the grocery store, bank, mall, bus/train, workplace, home, or any other environment in which they need to regain competence. These therapies are most closely associated to, and often interchangeable with "occupational" therapy.

The following definitions are taken from the American Occupational Therapy Association (AOTA) Classification Codes:⁶⁹

Activities of Daily Living (ADLs): Activities oriented toward taking care of one's own body. ADLs also are referred to as basic activities of daily living (BADLs) and personal activities of daily living (PADLs). These activities are fundamental to living in a social world; they enable basic survival and well-being. ADLs include: bathing and showering; toileting and toilet hygiene; dressing; swallowing and eating; feeding; functional mobility; personal device care; personal hygiene and grooming; and sexual activity.

Instrumental Activities of Daily Living (IADLs): Activities to support daily life within the home and community that often require more complex interactions than those used in ADLs. IADLs include: care of others, including selecting and supervising caregivers; care of pets; child rearing; communication management; driving and community mobility; financial management; health management and maintenance; home establishment and management; meal preparation and cleanup; religious and spiritual activities and expression; safety and emergency maintenance; shopping.

Rest and Sleep: Activities related to obtaining restorative rest and sleep to support healthy, active engagement in other occupations. Specific activities include: rest; sleep preparation; sleep participation.

Education: Activities needed for learning and participating in the educational environment. These include formal education preparation; information personal education needs or interests exploration; informal personal education participation.

Work: Labor or exertion; to make, construct, manufacture, form, fashion, or shape objects; to organize, plan, or evaluate services or processes of living or governing; committed occupations that are performed with or without financial reward. These include employment interests and pursuits; employment seeking and acquisition; job performance; retirement preparation and adjustment; volunteer exploration; volunteer participation.

Play: Any spontaneous or organized activity that provides enjoyment, amusement or diversion. These include play exploration; play participation.

Leisure: Nonobligatory activity that is intrinsically motivated and engaged in during discretionary time, that is, time not committed to obligatory occupations such as work, self-care, or sleep. These include leisure exploration; leisure participation.

Social participation: The interweaving of occupations to support desired engagement in community and family activities as well as those involving peers and friends. Involvement in a subset of activities that involve social situations with others and that support social interdependence. Social participation can occur in person or through remote technologies such as telephone calls, computer interaction, and video conferencing. These include activities in the community; with family, peers or friends.

In general, the proposed mandate is interpreted to require that the previously-defined services provided as treatment for acquired brain injury be covered regardless of setting, including inpatient and residential facilities, outpatient day treatment programs, and other home and community settings. For residential facilities, the services provided during the stays are to be covered under this mandate, though this analysis assumes that the room and board charges are not, as they are considered by carriers to be custodial in nature, are excluded under their medical necessity criteria, and are therefore most often not reimbursable.

Facility and program types, including inpatient, residential, and outpatient day treatment programs are described in more detail in Appendix B.

APPENDIX B: BRAIN INJURY CONTINUUM OF CARE

Treatment following a brain injury follows a continuum of care, the specific elements of which are determined by the individual, the specific injury and its severity, and the availability of certain types of care and supports. The following example continuum is taken from a publication of the Brain Injury Association of America.^{70,71,72}

There is no single pathway or course of recovery from TBI. Advances in emergency medicine and improvements in diagnostic procedures, monitoring devices and treatment methods have evolved into a complex continuum of TBI care that includes acute hospitalization, acute rehabilitation, post acute rehabilitation and community support services. In the private sector, the TBI continuum of care is comprised of specific facility and specialty programs.

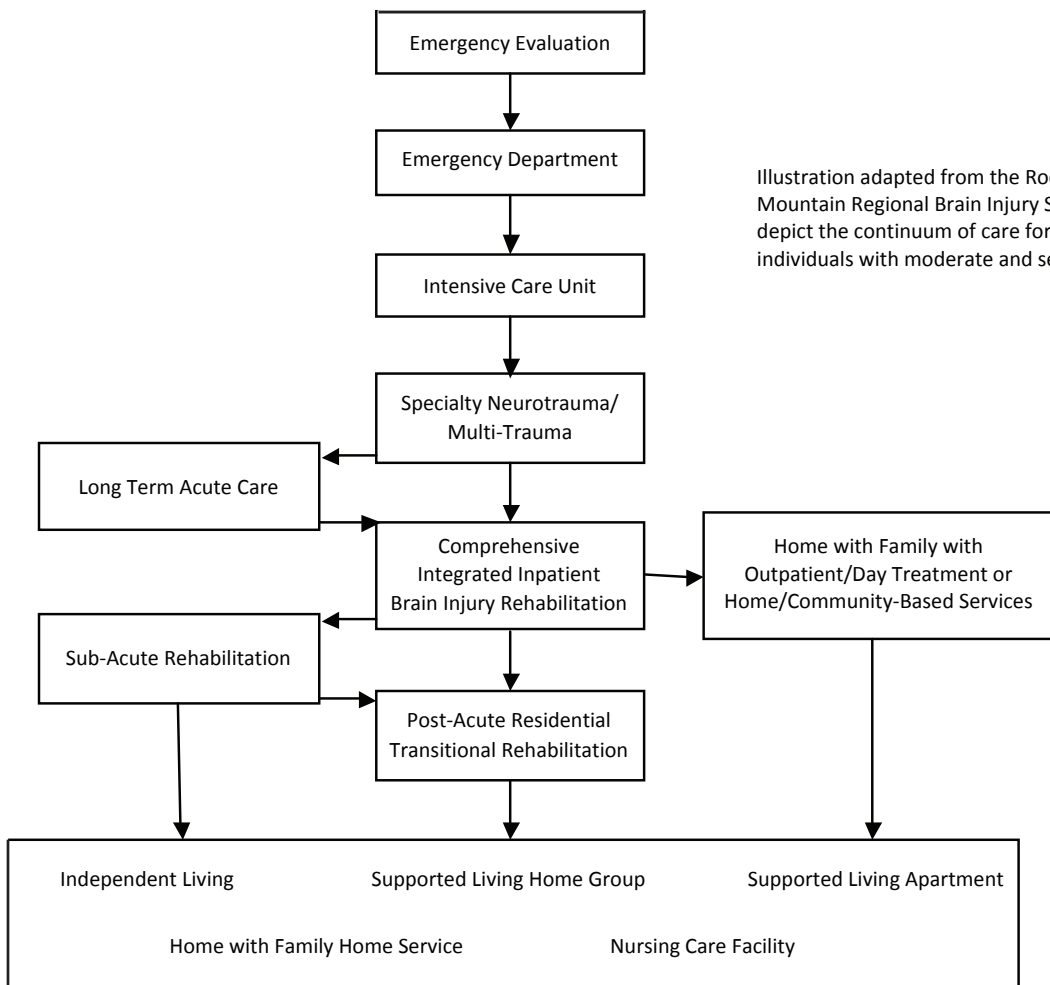


Illustration adapted from the Rocky Mountain Regional Brain Injury System to depict the continuum of care for individuals with moderate and severe TBI.

A patient's length of stay at any level of the TBI continuum of care should be based on the nature of the neurological injuries and the degree to which additional, measurable functional improvement within specific time frames is anticipated. Such judgments, and the scope, intensity and duration of medical, rehabilitative and long-term treatment and service plans should be developed by a highly specialized and experienced interdisciplinary team in concert with the patient and family.

FACILITY AND PROGRAM TYPES:

ACUTE CARE

Established Emergency Medical Services (EMS) triage guidelines and organized pre-hospital trauma systems improve the delivery of trauma care and should be used. Trauma systems with identified regionally-designated neuro-trauma centers (preferably Level I or Level II Trauma Centers) should be used for acute care of individuals with traumatic brain injury. Neurotrauma centers should have a multidisciplinary trauma team, an in-house trauma surgeon, promptly available neurosurgeon, a continuously staffed operating room, neuroscience nurses, neuro-intensive care unit, lab, and a CT immediately available at all times. Other team members should include orthopedists, radiologists and anesthesiologists. Rehabilitation therapies should be initiated in this phase of care as soon as the patient is stable.

INTENSIVE CARE UNIT (ICU)

After receiving emergency medical treatment, persons with a moderate to severe brain injury may be admitted to a hospital's Inpatient Intensive Care Unit. The goals in the ICU include achieving medical stability, medical management, and prevention of medical crisis. Some preventive rehabilitation may be initiated in the Intensive Care Unit such as body positioning, splinting, and range of motion (a therapist moves the person's limbs). Persons treated in the ICU may be unconscious, in a coma, and medically unstable. Many tubes, wires, and pieces of medical equipment may be attached to the patient to provide life sustaining medical care.

ACUTE REHABILITATION

Following medical stability, individuals with moderate/severe brain injury should be transferred from acute hospital care to a comprehensive integrated inpatient brain injury rehabilitation program. Acute brain injury rehabilitation hospitals should have a designated specialty program, with therapy programs, equipment, and a sufficient number of individuals with TBI to constitute a peer and family milieu. Acute rehabilitation hospitals should be accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and have components consistent with the Commission on Accreditation of Rehabilitation Facilities (CARF). CARF certification implies that programs meet specific care standards of design and efficacy.

As early as possible in the recovery process, individuals who sustain brain injuries will begin acute rehabilitation. The treatment is provided in a special unit of the trauma hospital, a rehabilitation hospital or another inpatient setting. During acute rehabilitation, a team of health professionals with experience and training in brain injury work with the patient to regain as many activities of daily living as possible. Activities of daily living include dressing, eating, toileting, walking, speaking and more.

LONG-TERM ACUTE CARE (LTAC)

Some individuals will be unable to participate in a full inpatient program immediately following acute care and may need long-term acute care for a period of time prior to entering a comprehensive program. LTAC is a recognized designation (by the Centers for Medicare and Medicaid Services) for acute care hospitals whose average length of stay is at least 25 days. LTAC hospitals provide specialized care services, including skilled nursing care to manage medical conditions so that individuals with catastrophic or acute illnesses/injuries may progress toward entry into comprehensive brain injury inpatient rehabilitation. LTAC programs should be accredited by the JCAHO. LTAC rehabilitation is generally accepted, but should not be used in lieu of categorical inpatient rehabilitation.

POST ACUTE REHABILITATION

Post acute rehabilitation describes programs following inpatient rehabilitation, including outpatient or day treatment rehabilitation, residential transitional rehabilitation, or home-based programs. The most appropriate post acute rehabilitation depends on the individual's needs following inpatient rehabilitation, as well as proximity and availability of services, family dynamics, and projected long-term outcomes. Individuals with significant deficits or who require behavioral treatment or supervision for safety may require brain injury residential transitional rehabilitation. Other individuals may be able to use a combination of home and community-based rehabilitation and outpatient or day treatment rehabilitation. Post acute rehabilitation programs should be accredited by CARF. CARF certification implies that programs meet specific care standards of design and efficacy.

When patients are well enough to participate in more intensive therapy, they may be transferred to a postacute rehabilitation setting, such as a residential rehabilitation facility. The goal of postacute rehabilitation is to help the patient regain the most independent level of functioning possible. Rehabilitation channels the body's natural healing abilities and the brain's relearning processes so an individual may recover as quickly and efficiently as possible. Rehabilitation also involves learning new ways to compensate for abilities that have permanently changed due to brain injury. Much is still unknown about the brain and about brain injury rehabilitation. Treatment methods and technologies are rapidly advancing as knowledge of the brain and its function increases.

SUB-ACUTE REHABILITATION PROGRAMS

These programs are located on separate and specially licensed units of hospitals or nursing homes. Individuals who are appropriate for sub-acute care typically are medically stable, require skilled nursing care, and have either completed comprehensive inpatient rehabilitation or are judged to not be able to benefit from inpatient rehabilitation. Sub-acute rehabilitation is generally accepted, but should not be used in lieu of categorical inpatient rehabilitation for individuals who may benefit from a comprehensive inpatient rehabilitation program. Sub-acute rehabilitation programs should be accredited by the JCAHO.

Patients who cannot tolerate intensive therapy may be transferred to a subacute rehabilitation facility. Subacute rehabilitation programs are designed for persons with brain injury who need a less intensive level of rehabilitation services over a longer period of time. Subacute programs may also be designed for persons who have made progress in the acute rehabilitation setting and are still progressing but are not making rapid functional gains. Subacute rehabilitation may be provided in a variety of settings, often a skilled nursing facility or nursing home.

LONG-TERM CARE

The range of long-term outcomes following TBI is diverse, from virtually complete independence and function to severe and permanent disability. Therefore, the range of needed services is complex and individualized. Some individuals with moderate/severe brain injury will require significant care and supervision, either at home by family or attendant care, in a nursing care facility, or in a long-term assisted or supported living program. Individuals may benefit from periodic re-evaluations, based on condition and needs. Long-term care programs should be accredited by the JCAHO or CARF. CARF eligibility or certification implies that programs meet specific care standards of design and efficacy.

DAY TREATMENT (DAY REHAB OR DAY HOSPITAL)

Day treatment provides rehabilitation in a structured group setting during the day and allows the person with a brain injury to return home at night.

OUTPATIENT THERAPY

Following acute, postacute or subacute rehabilitation, a person with a brain injury may continue to receive outpatient therapies to maintain and/or enhance their recovery. Individuals whose injuries were not severe enough to require hospitalization or who were not diagnosed as having a brain injury when the incident occurred may attend outpatient therapies to address functional impairments.

HOME HEALTH SERVICES

Some hospitals and rehabilitation companies provide rehabilitation therapies within the home for persons with brain injury.

COMMUNITY RE-ENTRY/COMMUNITY REINTEGRATION

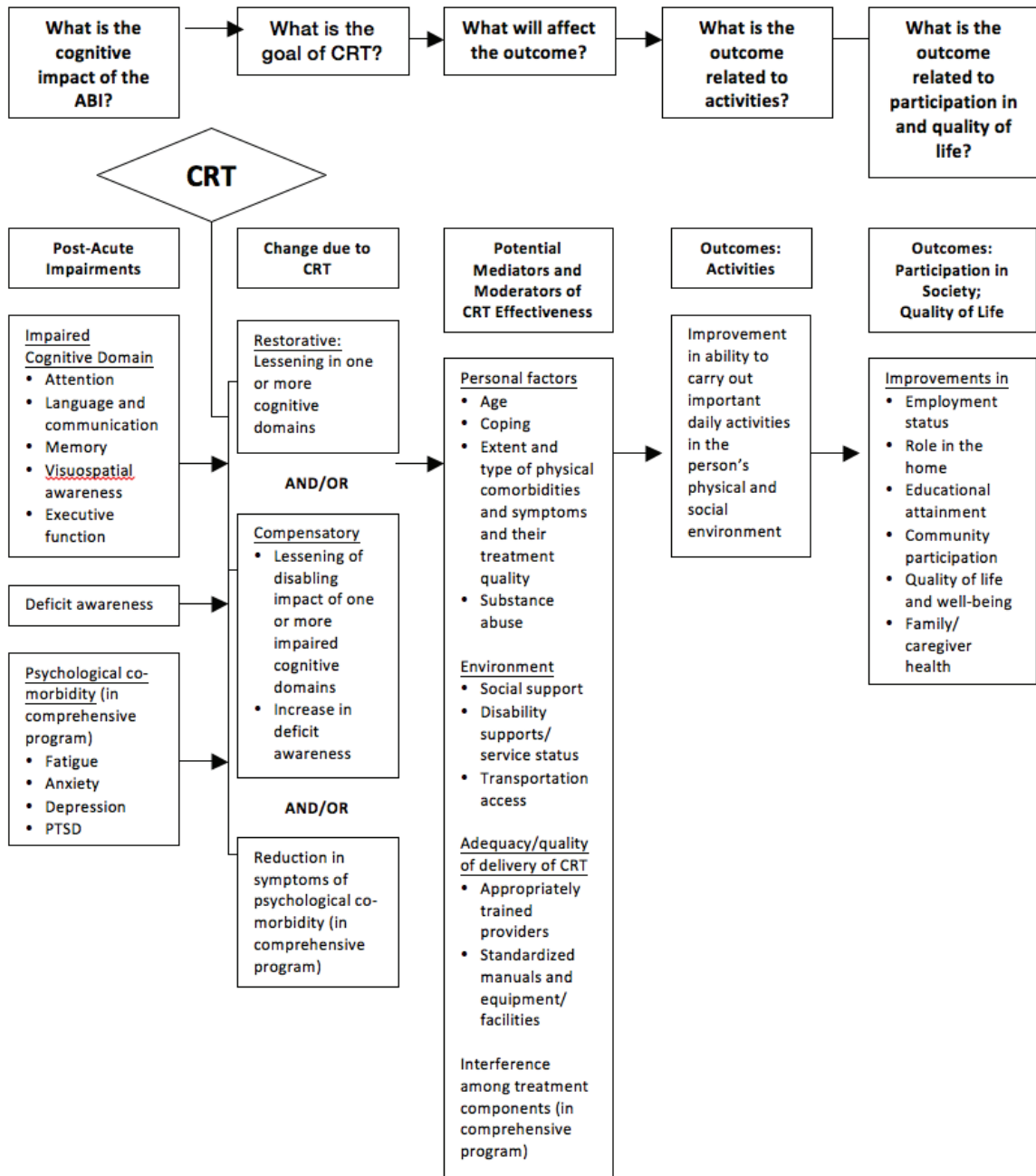
Community re-entry programs generally focus on developing higher level motor, social, and cognitive skills in order to prepare the person with a brain injury to return to independent living and potentially to work. Treatment may focus on safety in the community, interacting with others, initiation and goal setting and money management skills. Vocational evaluation and training may also be a component of this type of program. Persons who participate in the program typically live at home.

INDEPENDENT LIVING PROGRAMS

Independent living programs provide housing for persons with brain injury with the goal of regaining the ability to live as independently as possible. Usually, independent living programs will have several different levels to meet the needs of people requiring more assistance and therapies as well as those who are living independently and being monitored.

APPENDIX C: MODEL OF COGNITIVE REHABILITATION THERAPY

This chart depicts the possible cognitive impacts on patients with ABI, the goals of providing cognitive rehabilitation therapy for these patients, what variables can impact CRT's effectiveness for any one patient, and what outcomes—as measured by daily activities, participation in society, and quality of life—are sought for the patient when providing CRT.



ENDNOTES

- ¹ The 189th General Court of the Commonwealth of Massachusetts, House Bill 843, “An Act relative to cognitive rehabilitation.” Accessed 31 March 2016: <https://malegislature.gov/Bills/189/House/H843>.
- ² The 189th General Court of the Commonwealth of Massachusetts, House Bill 843, “An Act relative to cognitive rehabilitation.” Accessed 31 March 2016: <https://malegislature.gov/Bills/189/House/H843>. Also Senate Bill 485: <https://malegislature.gov/Bills/189/Senate/S485>.
- ³ Brain Injury Association of America (BIAA). What is the difference between an acquired brain injury and a traumatic brain injury? Accessed 15 April 2016: <http://www.biausa.org/FAQRetrieve.aspx?ID=43913>.
- ⁴ Hackman H, LaVecchia F, Kamen D, et al. Acquired Brain Injury in Massachusetts. Massachusetts Department of Public Health and Massachusetts Rehabilitation Commission; October, 2014. Accessed 15 April 2016: <http://www.mass.gov/eohhs/docs/mrc/acquired-brain-injury-ma.pdf>.
- ⁵ Institute of Medicine (IOM), Committee on Cognitive Rehabilitation Therapy for Traumatic Brain Injury. Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence. Washington, DC: The National Academies Press, 2011. Accessed 22 February 2016: http://www.nap.edu/download.php?record_id=13220.

	Initial response	Recovery
Environmental factors	<ul style="list-style-type: none"> ■ Mechanism of injury ■ Multiple TBIs ■ Polytrauma ■ Severity of injury 	<ul style="list-style-type: none"> ■ Disability supports/service status ■ Family functioning ■ Social support ■ Transportation access ■ Deployment and postdeployment stressors (for military)
Personal factors	<ul style="list-style-type: none"> ■ Age ■ Gender ■ Genetics ■ Premorbid neurodevelopmental or mental health disorders ■ Cognitive reserve (i.e. IQ, education) 	<ul style="list-style-type: none"> ■ Behavioral problems ■ Lack of awareness deficits ■ Neurodevelopmental disorders ■ Comorbid conditions concurrent with TBI (e.g. visual impairment) ■ Comorbid conditions due to TBI (e.g. epilepsy) ■ Psychological comorbid conditions (e.g. anxiety, depression, PTSD) ■ Pain ■ Sleep disturbances
Medical care factors	<ul style="list-style-type: none"> ■ Access to acute care ■ Quality of care 	<ul style="list-style-type: none"> ■ Access to general medical, mental or behavioral, and rehabilitation care ■ Quality of care

- ⁶ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ⁷ Dikmen SS, Ross BL, Machamer JE, et. al. One year psychosocial outcome in head injury. *J Int Neuropsychol Soc.* 1995 Jan;1(1):67-77. Accessed 20 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/9375211>.
- ⁸ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ⁹ Novack TA, Alderson AL, Bush BA, et. al. Cognitive and functional recovery at 6 and 12 months post-TBI. *Brain Inj.* 2000 Nov;14(11):987-96. Accessed 20 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/11104138>.
- ¹⁰ Schretlen DJ, Shapiro AM. A quantitative review of the effects of traumatic brain injury on cognitive functioning. *Int Rev Psychiatry.* 2003 Nov;15(4):341-9. Accessed 20 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/15276955>.
- ¹¹ *Op. cit.* Hackman H, LaVecchia F, Kamen D, et al., Acquired Brain Injury in Massachusetts.
- ¹² Cernak I, Noble-Haesslein LJ. Traumatic brain injury: an overview of pathobiology with emphasis on military populations. *J Cereb Blood Flow Metab.* 2010 Feb;30(2):255-66. Accessed 15 April 2016: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2855235/>.
- ¹³ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ¹⁴ *Op. cit.* Hackman H, LaVecchia F, Kamen D, et al., Acquired Brain Injury in Massachusetts.
- ¹⁵ Temkin NR, Corrigan JD, Dikmen SS, et. al. Social functioning after traumatic brain injury. *J Head Trauma Rehabil.* 2009 Nov-Dec;24(6):460-7. Accessed 15 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/19940679>.
- ¹⁶ Wise EK, Mathews-Dalton C, Dikmen S, et. al. Impact of traumatic brain injury on participation in leisure activities. *Arch Phys Med Rehabil.* 2010 Sep;91(9):1357-62. Accessed 15 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/20801252>.
- ¹⁷ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ¹⁸ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.

- ¹⁹ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ²⁰ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ²¹ Katz DI; Ashley MJ, O'Shanick GJ, et. al. Cognitive rehabilitation: the evidence, funding and case for advocacy in brain injury. McLean, VA: Brain Injury Association of America, 2006. Accessed 22 April 2016: http://www.biausa.org/literature_49035/cognitive_rehabilitation_position_paper.
- ²² Harley JPC, Allen TL, Braciszewski, et. al. Guidelines for cognitive rehabilitation. *NeuroRehabilitation* 2(3):62-67. Published 1992. As quoted in *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ²³ Benedict SM, Belanger HG, Ceperich SD, et. al. Veterans Health Initiative on Traumatic Brain Injury. U.S. Department of Veterans Affairs. Published 2010; accessed 22 April 2016: <http://www.publichealth.va.gov/docs/vhi/traumatic-brain-injury-vhi.pdf>.
- ²⁴ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ²⁵ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ²⁶ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ²⁷ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ²⁸ Cicerone KD, Azulay J, Trott C. Methodological quality of research on cognitive rehabilitation after traumatic brain injury. *Arch Phys Med Rehabil.* 2009 Nov;90(11 Suppl):S52-9. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/19892075>.
- ²⁹ Rehabilitation of Persons With Traumatic Brain Injury. NIH Consensus Statement Online 1998 Oct 26-28; 16(1): 1-41. Accessed 25 April 2016: <https://consensus.nih.gov/1998/1998traumaticbraininjury109html.htm>.
- ³⁰ Cicerone KD, Langenbahn DM, Braden C, et. al. Evidence-based cognitive rehabilitation: updated review of the literature from 2003 through 2008. *Arch Phys Med Rehabil.* 2011 Apr;92(4):519-30. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/21440699>.
- ³¹ Haskins EC, Cicerone KD, Dams-O'Connor K, et. al. Cognitive Rehabilitation Manual: Translating Evidence-Based Recommendations into Practice. American Congress of Rehabilitation Medicine, Brain Injury Interdisciplinary Special Interest Group. Published 2014; accessed 22 April 2016: http://www.acrm.org/wp-content/uploads/pdf/COG_Manual_020413_frontSection.pdf.
- ³² Bayley MT, Tate R, Douglas JM, et. al.; INCOG Expert Panel. INCOG guidelines for cognitive rehabilitation following traumatic brain injury: methods and overview. *J Head Trauma Rehabil.* 2014 Jul-Aug;29(4):290-306. Accessed 25 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24984093>.
- ³³ Ponsford J, Janzen S, McIntyre A, et. al.; INCOG Expert Panel. INCOG recommendations for management of cognition following traumatic brain injury, part I: posttraumatic amnesia/delirium. *J Head Trauma Rehabil.* 2014 Jul-Aug;29(4):307-20. Accessed 25 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24984094>.
- ³⁴ Ponsford J, Bayley M, Wiseman-Hakes C, et. al.; INCOG Expert Panel. INCOG recommendations for management of cognition following traumatic brain injury, part II: attention and information processing speed. *J Head Trauma Rehabil.* 2014 Jul-Aug;29(4):321-37. Accessed 25 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24984095>.
- ³⁵ Tate R, Kennedy M, Ponsford J, et. al.; INCOG Expert Panel. INCOG recommendations for management of cognition following traumatic brain injury, part III: executive function and self-awareness. *J Head Trauma Rehabil.* 2014 Jul-Aug;29(4):338-52. Accessed 25 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24984096>.
- ³⁶ Togher L, Wiseman-Hakes C, Douglas J, et. al.; INCOG Expert Panel. INCOG recommendations for management of cognition following traumatic brain injury, part IV: cognitive communication. *J Head Trauma Rehabil.* 2014 Jul-Aug;29(4):353-68. Accessed 25 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24984097>.
- ³⁷ Velikonja D, Tate R, Ponsford J, et. al.; INCOG Expert Panel. INCOG recommendations for management of cognition following traumatic brain injury, part V: memory. *J Head Trauma Rehabil.* 2014 Jul-Aug;29(4):369-86. Accessed 25 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24984098>.
- ³⁸ National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), Model Systems Knowledge Translation Center. Traumatic Brain Injury Model Systems. Accessed 25 April 2016: <http://www.msctc.org/tbi/model-system-centers>.
- ³⁹ Spaulding-Harvard Traumatic Brain Injury Model System. Accessed 25 April 2016: <http://www.sh-tbi.org/>.
- ⁴⁰ Cicerone KD, Dahlberg C, Kalmar K, et. al. Evidence-based cognitive rehabilitation: recommendations for clinical practice. *Arch Phys Med Rehabil.* 2000 Dec;81(12):1596-615. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/11128897>.
- ⁴¹ *Op. cit.* Cicerone KD, Langenbahn DM, Braden C, et. al., Evidence-based cognitive rehabilitation: updated review of the literature from 2003 through 2008.
- ⁴² Cicerone KD, Dahlberg C, Malec JF, et. al. Evidence-based cognitive rehabilitation: updated review of the literature from 1998 through 2002. *Arch Phys Med Rehabil.* 2005 Aug;86(8):1681-92. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/16084827>.
- ⁴³ Rohling ML, Faust ME, Beverly B, et. al. Effectiveness of cognitive rehabilitation following acquired brain injury: a meta-analytic re-examination of Cicerone et al.'s (2000, 2005) systematic reviews. *Neuropsychology.* 2009 Jan;23(1):20-39. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/19210030>.
- ⁴⁴ Cicerone KD, Mott T, Azulay J, et. al. Community integration and satisfaction with functioning after intensive cognitive rehabilitation for traumatic brain injury. *Arch Phys Med Rehabil.* 2004 Jun;85(6):943-50. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/15179648>.

- ⁴⁵ Cicerone KD, Mott T, Azulay J, et. al. A randomized controlled trial of holistic neuropsychologic rehabilitation after traumatic brain injury. *Arch Phys Med Rehabil.* 2008 Dec;89(12):2239-49. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/19061735>.
- ⁴⁶ Carney N, Chesnut RM, Maynard H, et. al. Effect of cognitive rehabilitation on outcomes for persons with traumatic brain injury: A systematic review. *J Head Trauma Rehabil.* 1999 Jun;14(3):277-307. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/10381980>.
- ⁴⁷ Bogdanova Y, Yee MK, Ho VT, et. al. Computerized Cognitive Rehabilitation of Attention and Executive Function in Acquired Brain Injury: A Systematic Review. *J Head Trauma Rehabil.* 2015 Dec 24. Accessed 22 April 2016: <http://www.ncbi.nlm.nih.gov/pubmed/26709580>.
- ⁴⁸ May G, Benson R, Balon R, et. al. Neurofeedback and traumatic brain injury: a literature review. *Ann Clin Psychiatry.* 2013 Nov;25(4):289-96. Accessed 11 May 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24199220>.
- ⁴⁹ Brain Injury Association of America (BIAA): Traumatic Brain Injury in the United States: A Call for Public/Private Cooperation. Published 2007; accessed 9 May 2016: <http://www.neuroskills.com/files/publicprivate.pdf>.
- ⁵⁰ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ⁵¹ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ⁵² *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ⁵³ American Speech-Language-Hearing Association. Rehabilitation of Children and Adults With Cognitive-Communication Disorders After Brain Injury, Technical Report. Published 2003; accessed 11 May 2016: https://www.researchgate.net/profile/Doug-Johnson-Greene/publication/255641493_Rehabilitation_of_Children_and_Adults_With_Cognitive-Communication_Disorders_After_Brain_Injury/links/53e8c5820cf21cc29fde9835.pdf.
- ⁵⁴ American Psychiatric Association. Neurocognitive Disorders. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Accessed 11 May 2016: <http://dsm.psychiatryonline.org/doi/abs/10.1176/appi.books.9780890425596.dsm17>.
- ⁵⁵ Moriyama TS, Polanczyk G, Caye A, et. al. Evidence-based information on the clinical use of neurofeedback for ADHD. *Neurotherapeutics.* 2012 Jul;9(3):588-98. Accessed 11 May 2016: <http://www.ncbi.nlm.nih.gov/pubmed/22930416>.
- ⁵⁶ May G, Benson R, Balon R, et. al. Neurofeedback and traumatic brain injury: a literature review. *Ann Clin Psychiatry.* 2013 Nov;25(4):289-96. Accessed 11 May 2016: <http://www.ncbi.nlm.nih.gov/pubmed/24199220>.
- ⁵⁷ Giles GM. Cognitive versus functional approaches to rehabilitation after traumatic brain injury: commentary on a randomized controlled trial. *Am J Occup Ther.* 2010 Jan-Feb;64(1):182-5. Accessed 11 May 2016: <http://ajot.aota.org/article.aspx?articleid=1862650>.
- ⁵⁸ *Op. cit.* Giles GM, Cognitive versus functional approaches to rehabilitation after traumatic brain injury: commentary on a randomized controlled trial.
- ⁵⁹ Zasler ND, Martelli MF, Jacobs HE. Neurobehavioral disorders. *Handb Clin Neurol.* 2013;110:377-88. Accessed 11 May 2016: <http://www.ncbi.nlm.nih.gov/pubmed/23312657>.
- ⁶⁰ Wilson BA. Neuropsychological rehabilitation. *Annu Rev Clin Psychol.* 2008;4:141-62. Accessed 11 May 2016: <http://www.ncbi.nlm.nih.gov/pubmed/17716045>.
- ⁶¹ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence.
- ⁶² Sansone RA. Psychophysiological disorders and pain medication prescription among internal medicine outpatients. *Psychiatry (Edgmont).* 2010 Feb;7(2):13-4. Accessed 11 May 2016: <http://www.ncbi.nlm.nih.gov/pubmed/20376268>.
- ⁶³ Psychophysiological Disorders Association (PPDA). Psychophysiological Disorders. Accessed 11 May 2016: <http://www.ppdassociation.org/>.
- ⁶⁴ Psychophysiological Disorders Association (PPDA): Learn. Accessed 11 May 2016: <http://www.ppdassociation.org/learn>.
- ⁶⁵ Abraham M, Ahlmann JT, Boudreau AJ, et. al. Current procedural terminology: CPT 2015 Professional Edition. Chicago: American Medical Association, 2014.
- ⁶⁶ Brain Injury Association of Massachusetts (BIA-MA). Definitions of acute, sub-acute, and chronic phases of recovery post-TBI. Document provided to Compass Health Analytics, 13 April 2016.
- ⁶⁷ American Medical Association. CPT 2014 Standard Edition.
- ⁶⁸ Brain Injury Association of Massachusetts (BIA-MA). Definitions of acute, sub-acute, and chronic phases of recovery post-TBI. Document provided to Compass Health Analytics, 13 April 2016.
- ⁶⁹ American Occupational Therapy Association (AOTA) Approved Provider Program. AOTA Classification Codes for Continuing Education Activities. Published 2014; accessed 26 September 2016: <https://www.aota.org/~media/Corporate/Files/EducationCareers/APP/AOTAClassificationCodesforCE-Companion.pdf?la=en>.
- ⁷⁰ BIAA. Treatment. Accessed 22 April 2016: http://www.biausa.org/brain-injury-treatment.htm#treatment_continuum.
- ⁷¹ *Op. cit.* BIAA, Traumatic Brain Injury in the United States: A Call for Public/Private Cooperation.
- ⁷² Traumatic Brain Injury Medical Treatment Guidelines, Rule 17: Exhibit 10. Endorsed by BIAA; presented by State of Colorado, Department of Labor and Employment, Division of Workers' Compensation. Revised 26 November 2012; accessed 26 September 2016: <http://www.healthpsych.com/tools/tbi.pdf>.
- ⁷³ *Op. cit.* IOM, Cognitive Rehabilitation Therapy for Traumatic Brain Injury: Evaluating the Evidence



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**Actuarial Assessment of
House Bill 843
Submitted to the 189th General Court:
“An act relative to cognitive rehabilitation”**

Prepared for
Commonwealth of Massachusetts
Center for Health Information and Analysis

October 2016

Prepared by
Compass Health Analytics, Inc.



**Actuarial Assessment of House Bill 843
Submitted to the 189th General Court:
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Table of Contents

Executive Summary	i
1. Introduction.....	1
2. Interpretation of H.B. 843	2
2.1. Plans affected by the proposed mandate	2
2.2. Covered services.....	3
2.3. Current coverage	3
2.4. Expanded Coverage	4
3. Methodology.....	5
3.1. Overview.....	5
3.2. Data sources	5
3.3. Steps in the analysis	5
3.4. Limitations.....	6
4. Analysis.....	7
4.1. Increase in treatment for cognitive impairment	7
4.2. Annual cost per user of additional treatments for cognitive impairment.....	11
4.3. Annual incremental medical expense of additional treatments	14
4.4. Incremental PMPM medical expense.....	14
4.5. Projected fully-insured population in Massachusetts	14
4.6. Projection of total marginal medical expense.....	15
4.7. Carrier retention and increase in premium.....	15
5. Results	16
5.1. Five-year estimated impact	16
5.2. Impact on the GIC.....	17
Appendix A: Membership Affected by the Proposed Mandate	18
Endnotes	19

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Actuarial Assessment of House Bill 843
Submitted to the 189th General Court:
“An act relative to cognitive rehabilitation”

Executive Summary

Massachusetts House Bill (H.B.) 843, as submitted in the 189th General Court, requires:

(1) A health benefit plan must include, but is not limited to, coverage for rehabilitation therapy, cognitive communication therapy, neurocognitive therapy and rehabilitation, neurobehavioral, neurophysiological, neuropsychological, and psychophysiological testing and treatment, neurofeedback therapy, functional rehabilitation therapy and remediation required for and related to treatment of an acquired or traumatic brain injury.

(2) A health benefit plan shall include coverage for acute and post-acute:

- (i) transition services
- (ii) community reintegration services
- (iii) residential services
- (iv) inpatient services
- (v) outpatient day treatment services
- (vi) other post-acute care treatment services deemed necessary as a result of, or related to, an acquired or traumatic brain injury.¹

In addition, the proposed mandate prohibits any lifetime limitation or unreasonable annual limitation on the number of days or sessions of acute or post-acute care.

Massachusetts General Laws (M.G.L.) c.3 §38C charges the Massachusetts Center for Health Information and Analysis (CHIA) with reviewing the potential impact of proposed mandated health care insurance benefits on the premiums paid by businesses and consumers. CHIA has engaged Compass Health Analytics, Inc. (Compass) to provide an actuarial estimate of the effect enactment of the bill would have on the cost of health insurance in Massachusetts.

Background

Cognitive rehabilitation therapy is treatment following brain injury that focuses on increasing the capacity to process and interpret information to improve the ability for a patient to function independently. Individually tailored in setting, scope, duration, and sequence, cognitive rehabilitation therapy focuses on restoring function or compensating for impairments in the cognitive domains, including memory, attention, executive function, and language or social communication. While the individual nature of brain injury prevents the development of a single cognitive rehabilitative method, researchers have concluded that cognitive rehabilitation in general is effective for brain injury patients, and evidence-based guidelines and recommendations exist regarding its provision.

The proposed mandate requires insurance carriers to cover a range of cognitive rehabilitation-related services anywhere in the spectrum of settings in which they may be provided, and requires that any limits on reimbursement for these services be reasonable.

Required benefits include the following services:

Per Diem Services (including room and board)

- Acute inpatient
- Acute rehab
- Sub-acute rehab

Per Treatment Services

- Cognitive rehabilitation therapy
- Cognitive communication therapy
- Neurocognitive therapy and rehabilitation
- Neurofeedback therapy
- Functional rehabilitation therapy and remediation
- Neurobehavioral, neuropsychological, and psychophysiological testing and treatment
- Transition services
- Community reintegration services

- Sites of service include:
 - Outpatient
 - Day Treatment
 - Home
 - Community-based
 - Residential program facilities

For analytical purposes, this report splits the services listed above into two primary groups: (a) acute inpatient and rehabilitation hospital stays for cognitive rehabilitation; and (b) all other services described in the bill regardless of where these services are provided. The first category includes acute and rehabilitation hospital stays. The second category, referred to collectively as Cognitive Rehabilitation Related Services (CRRS), includes a suite of cognitive rehabilitation services, as opposed to stays, many of which are similar to one another, or even overlapping, and share similar cost profiles. These services are covered under this mandate regardless of the site of provision, including home, community, outpatient, and residential facility settings. For residential facilities, this mandate requires coverage for services provided during patient stays, though this analysis assumes the room and board charges are not covered, as they are considered by carriers to be custodial in nature, are excluded under their medical necessity criteria, and are therefore most often not reimbursable. This analysis estimates the potential incremental cost of H.B. 843 as the sum of the costs of increased utilization of CRRS and increased utilization of acute inpatient and rehabilitation hospital stays for cognitive rehabilitation resulting from the mandate.

Current Coverage

Most acquired brain injuries (ABIs) are treated in emergency departments or inpatient settings. If necessary, residential treatment will transition to various rehabilitation centers, skilled nursing facilities, and other facilities for continued care. All fully-insured commercial health plans cover these services when medically necessary. Continued ongoing rehabilitation services are also provided by occupational therapists, physical therapists, speech/language pathologists, neuropsychologists, and physicians and are generally covered when deemed medically necessary. Certain ABI treatments, such as neurofeedback, are considered investigational and are not covered.

Providers and advocates assert that while cognitive deficits are a valid diagnosis for outpatient services, claims for cognitive rehabilitation services are seldom reimbursed; providers typically

must bill the services under occupational, physical, or speech therapy procedure codes to be reimbursed. However, most carriers (covering the majority of membership for Massachusetts fully-insured commercial plans) reported in response to a survey conducted for this analysis that cognitive rehabilitation after an ABI is a covered service, and small amounts of paid claims for the service were found in the 2014 Massachusetts All Payer Claim Database (MA-APCD) medical claims for several carriers. Reconciling these perspectives, it seems likely only certain services are covered by carrier benefit packages (many carriers exclude coverage for custodial and non-medical community-based services) and other services covered by carrier benefit packages may be denied because carriers determine in specific cases the patients do not meet their medical necessity criteria for use of those services.

This analysis interprets H.B. 843 as making no changes to carriers' ability to set medical necessity criteria for cognitive rehabilitation services and evaluate claims against them; to the extent that application of these criteria is the limiting factor in reimbursement for cognitive rehabilitation services, the bill is less likely to increase the degree to which providers are reimbursed for them.

Expanded Coverage

While commercial carriers currently cover many of benefits under the proposed mandate, H.B. 843 expands coverage to neurofeedback and community reintegration services; neurofeedback is considered investigational and not covered by most insurance carriers. Even though some carriers reported coverage for community reintegration services, and others provided ambiguous information or did not respond to the question about coverage, fewer than \$5,000 of claims for this service were present in a review of the MA-APCD.ⁱ The proposed mandate also has the potential to increase utilization of CRRS and both acute and rehabilitation hospital stays by increasing awareness levels on the part of providers and patients, and by producing more successful appeals for service reimbursement.

Analysis

Compass estimates the cost of H.B. 843 as the sum of the costs of increased utilization of CRRS resulting from the expansion of covered services and increased utilization of currently-covered services, and increased utilization of residential stays for cognitive rehabilitation.

Compass estimated these costs by in turn estimating:

- The number of fully-insured individuals meeting the criteria for the additional services under the proposed mandate
- The range of increased utilization for new services and existing services as a result of the mandate
- The cost per treatment of these services

ⁱ See CHIA's companion CRT services efficacy report for a definition of community reintegration services.

Compass then multiplied these components and projected them forward over the next five years (2017 to 2021) for individuals under age 65 with Massachusetts-regulated, fully-insured commercial coverage, forecasting medical inflation and adding insurer retention (administrative cost and profit) to arrive at an estimate of the bill's effect on premiums.

This analysis relies on estimates of the prevalence of ABI, the number of these patients for whom additional treatments for cognitive impairment are medically necessary, and estimates of unit costs for these additional treatments. These uncertainties are addressed by modeling a range of assumptions within reasonable judgment-based limits, and producing a range of incremental impact estimates based on varying these parameters.

Summary results

Table ES-1 summarizes the estimated effect of H.B. 843 on premiums for fully-insured plans over five years. This analysis estimates that the proposed mandate, if enacted, would increase fully-insured premiums by as much as 0.04 percent on average over the next five years; a more likely increase is in the range of 0.008 percent, equivalent to an average annual expenditure of just under \$1 million over the period 2017 to 2021.

The impact on premiums is driven by the cost and utilization of new mandated benefits, trend projections, and cost sharing projections.

The impact of the bill on any one individual, employer-group, or carrier may vary from the overall results depending on the current level of benefits each receives or provides and on how those benefits would change under the proposed mandate.

**Table ES1:
Summary Results**

	2017	2018	2019	2020	2021	Weighted Average	5 Yr Total
Members (000s)	2,159	2,156	2,154	2,150	2,146		
Medical Expense Low (\$000s)	\$180	\$264	\$277	\$290	\$303	\$279	\$1,313
Medical Expense Mid (\$000s)	\$544	\$799	\$837	\$876	\$918	\$843	\$3,973
Medical Expense High (\$000s)	\$2,847	\$4,183	\$4,383	\$4,589	\$4,805	\$4,415	\$20,806
Premium Low (\$000s)	\$202	\$297	\$311	\$325	\$341	\$313	\$1,475
Premium Mid (\$000s)	\$611	\$897	\$940	\$984	\$1,031	\$947	\$4,463
Premium High (\$000s)	\$3,198	\$4,700	\$4,923	\$5,155	\$5,398	\$4,960	\$23,373
PMPM Low	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
PMPM Mid	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04
PMPM High	\$0.17	\$0.18	\$0.19	\$0.20	\$0.21	\$0.19	\$0.19
Estimated Monthly Premium	\$463	\$473	\$483	\$493	\$503	\$483	\$483
Premium percent Rise Low	0.002%	0.002%	0.002%	0.003%	0.003%	0.003%	0.003%
Premium percent Rise Mid	0.007%	0.007%	0.008%	0.008%	0.008%	0.008%	0.008%
Premium percent Rise High	0.037%	0.038%	0.039%	0.041%	0.042%	0.040%	0.040%

Executive Summary Endnotes

¹ The 189th General Court of the Commonwealth of Massachusetts, House Bill 843, “An act relative to cognitive rehabilitation.” Accessed 26 April 2016: <https://malegislature.gov/Bills/189/House/H843>.

Actuarial Assessment of House Bill 843 Submitted to the 189th General Court: “An act relative to cognitive rehabilitation”

1. Introduction

Massachusetts House Bill (H.B.) 843, as submitted in the 189th General Court, requires:

- (1) A health benefit plan must include, but is not limited to, coverage for rehabilitation therapy, cognitive communication therapy, neurocognitive therapy and rehabilitation, neurobehavioral, neurophysiological, neuropsychological, and psychophysiological testing and treatment, neurofeedback therapy, functional rehabilitation therapy and remediation required for and related to treatment of an acquired or traumatic brain injury.
- (2) A health benefit plan shall include coverage for acute and post-acute:
 - (i) transition services
 - (ii) community reintegration services (iii) residential services
 - (iv) inpatient services
 - (v) outpatient day treatment services
 - (vi) other post-acute care treatment services deemed necessary as a result of, or related to an acquired or traumatic brain injury.¹

For analytical purposes, this report splits the services listed above into two primary groups: (a) acute inpatient and rehabilitation hospital stays for cognitive rehabilitation; and (b) all other services described in the bill regardless of where these services are provided. The first category includes acute and rehabilitation hospital stays. The second category, referred to collectively as Cognitive Rehabilitation Related Services (CRRS), includes a suite of cognitive rehabilitation services, as opposed to stays, many of which are similar to one another, or even overlapping, and share similar cost profiles. These services are covered under this mandate regardless of the site of provision, including home, community, outpatient, and residential facility settings. For residential facilities, this mandate requires coverage for services provided during patient stays, though this analysis assumes the room and board charges are not covered, as they are considered by carriers to be custodial in nature, are excluded under their medical necessity criteria, and are therefore most often not reimbursable. This analysis estimates the potential incremental cost of H.B. 843 as the sum of the costs of increased utilization of CRRS and increased utilization of acute inpatient and rehabilitation hospital stays for cognitive rehabilitation resulting from the mandate.

Massachusetts General Laws (M.G.L.) c.3 §38C charges the Massachusetts Center for Health Information and Analysis (CHIA) with reviewing the potential impact of proposed mandated health care insurance benefits on the premiums paid by businesses and consumers. CHIA has engaged Compass Health Analytics, Inc. (Compass) to provide an actuarial estimate of the effect enactment of the bill would have on the cost of insured health plans in Massachusetts.

Assessing the impact of the proposed mandate on premiums entails analyzing its incremental effect on spending by insured health plans. This in turn requires comparing spending under the provisions of the bill to spending under current statutes and current benefit plans for the relevant services.

Section 2 of this report outlines the provisions of the bill. Section 3 summarizes the methodology used for the estimate. Section 4 discusses important considerations in translating the bill's language into estimates of its incremental impact on health care costs and steps through the calculations. Section 5 summarizes the results.

2. Interpretation of H.B. 843

H.B. 843 requires coverage of treatment for acquired brain injuries (ABIs), expanding benefits for selected treatments currently not covered.

2.1. Plans affected by the proposed mandate

The bill amends statutes that regulate health care insurance carriers in Massachusetts. It does so by proposing a statutory structure different from that employed by most health benefit mandate legislation; however it reaches the various types of insurance licenses regulated by the state:

- Accident and sickness insurance policies (under M.G.L. c. 175)
- Non-profit hospital service corporations (under M.G.L. c. 176A)
- Medical service agreements (under M.G.L. c. 176B)
- Health maintenance organizations (under M.G.L. 176G)

Although the bill as drafted does not explicitly reach the self-insured plans sponsored by the Group Insurance Commission (GIC) for the benefit of state and local employees and their dependents, the bill's sponsors, in response to questions about their intent, indicated that it should also apply to all plans (self- and fully-insured) sponsored by the GIC. The bill requires coverage for members under the relevant Massachusetts-insured health plans issued by Massachusetts-licensed carriers, regardless of whether the members reside within the Commonwealth or merely have their principal place of employment in the Commonwealth. Note that Massachusetts health benefit plan mandates do not apply to plans that cover Massachusetts residents but are issued in other states.

Self-insured plans, except for those managed by the GIC, are not subject to state-level health insurance benefit mandates. State mandates do not apply to Medicare or Medicare Advantage plans, the benefits of which are qualified by Medicare; this analysis excludes members of fully-insured commercial plans over 64 years of age and does not address any potential effect on Medicare supplement plans even to the extent they are regulated by state law. This analysis does not apply to Medicaid/MassHealth.

2.2. Covered services

The proposed mandate requires coverage of treatment for ABIs, including the following services:

Per Diem Services (including room and board)

- Acute inpatient
- Acute rehab
- Sub-acute rehab

Per Treatment Services

- Cognitive rehabilitation therapy
- Cognitive communication therapy
- Neurocognitive therapy and rehabilitation
- Neurofeedback therapy
- Functional rehabilitation therapy and remediation
- Neurobehavioral, neuropsychological, and psychophysiological testing and treatment
- Transition services
- Community reintegration services

- Sites of service include:
 - Outpatient
 - Day Treatment
 - Home
 - Community-based
 - Residential program facilities

These services focus on increasing the capacity to process and interpret information to improve a patient's ability to function independently. Individually-tailored in setting, scope, duration, and sequence, these services focus on restoring function or compensating for impairments in cognitive domains including memory, attention, executive function, and language or social communication. The proposed mandate requires insurers to cover a range of these services anywhere in the spectrum of settings in which they may be provided.

As noted, for analytical purposes, this report splits the services listed above into two primary groups: (a) acute inpatient and rehabilitation hospital stays for cognitive rehabilitation; and (b) all other services described in the bill regardless of where these services are provided.

2.3. Current coverage

Most ABIs are treated initially in emergency departments or inpatient settings. If necessary, residential treatment will transition to various rehabilitation centers, skilled nursing facilities, and other facilities for continued care. All fully-insured commercial health plans cover these services when medically necessary. Continued ongoing rehabilitation services are also provided by occupational therapists, physical therapists, speech/language pathologists, neuropsychologists, and physicians and are generally covered when deemed medically necessary.

According to a leading Massachusetts neurologist specializing in the treatment of brain injury, cognitive recovery from a moderate to severe brain injury requires more time than does physical recovery, and the average length of stay in an inpatient unit (acute or rehabilitation hospital) should be about three weeks, depending on the injury.² However, carrier medical necessity criteria focus on physical recovery, and patients are typically discharged when they are physically healthy enough, regardless of cognitive deficit, resulting in a much shorter average length of inpatient stay

for ABI patients – about five days measured in the 2014 Massachusetts All Payer Claim Database (MA-APCD) – under current coverage. Continued ongoing CRRS are also provided by occupational therapists, physical therapists, speech/language pathologists, neuropsychologists, and physicians, and are generally covered when deemed medically necessary. Certain ABI treatments, such as neurofeedback, are considered investigational and are not covered.

Providers and advocates asserted that while cognitive deficits are a valid diagnosis for outpatient services, claims for cognitive rehabilitation services are seldom reimbursed; providers typically must bill the services under occupational, physical, or speech therapy procedure codes to be reimbursed. However, most carriers (covering the majority of membership for Massachusetts fully-insured commercial plans) reported in response to a survey conducted for this analysis that cognitive rehabilitation after an ABI is covered, and small amounts of paid claims for the service were found in the 2014 MA-APCD medical claims for several carriers. Reconciling these perspectives, it seems likely only certain services are covered by carrier benefit packages (many carriers exclude coverage for custodial and non-medical community-based services) and other services covered by carrier benefit packages may be denied because carriers determine in specific cases the patients do not meet their medical necessity criteria for use of those services

This analysis interprets H.B. 843 as making no changes to carriers' ability to set such medical necessity criteria for cognitive rehabilitation services and evaluate claims against them (though it does specify procedural standards for review of medical necessity determinations).

2.4. Expanded Coverage

While commercial carriers currently cover the majority of benefits in the bill, H.B. 843 expands coverage to neurofeedback and community reintegration services; the former is generally not covered and has coverage that is definitive for some carriers and more ambiguous for others. In any case, these services are rarely paid under the HCPCS/CPT codes associated with them. The proposed mandate also has the potential to increase utilization of CRRS and sub-acute residential stays.

The proposed mandate prohibits any lifetime limitation or unreasonable annual limitation on the number of days or sessions of acute or post-acute care. Under the Affordable Care Act (ACA), non-grandfathered health plans in the individual and small group markets must cover “rehabilitative and habilitative services and devices” as an essential health benefit.³ The specific scope of coverage for essential health benefits is defined by each state’s benchmark plan.⁴ The benchmark plan for Massachusetts provides for a 60-visit benefit limit per member per calendar year for short-term rehabilitation, including physical and occupational therapy.⁵ The 60-visit limit does not apply to treatment of speech, hearing, and language disorders, for which Massachusetts has a benefit mandate.⁶ Review of the MA-APCD found that few members with an ABI reach the 60-visit limit for physical and occupation therapy. This analysis did not attempt to constrain the increased utilization for CRRS for those members near or at the current 60-visit limit for short-term rehabilitative services, as the differences were immaterial.

3. Methodology

3.1. Overview

Estimating H.B. 843's impact on premiums requires assessing the cost and utilization of newly-mandated services relative to their coverage levels today. Combining these components, and accounting for carrier retention, results in a baseline estimate of the proposed mandate's incremental effect on premiums, which is then projected over the five years following the assumed January 1, 2017 implementation date of the law.

3.2. Data sources

The primary data sources used in the analysis were:

- Information, including descriptions of current coverage, from responses to a survey of commercial health insurance carriers in Massachusetts
- Academic literature, published reports, and population data, cited as appropriate
- An interview with a leading Massachusetts neurologist specializing in the treatment of brain injury⁷
- Massachusetts insurance carrier claim data from CHIA's Massachusetts All Payer Claim Database (MA-APCD) for calendar year 2014, for plans covering the majority of the under-65 fully-insured population subject to the mandate

3.3. Steps in the analysis

The analysis was executed in the following steps.

Analyze cost of cognitive rehabilitation services not currently covered

- Obtain Massachusetts incidence rates for ABI.
- Estimate the number of Massachusetts ABI patients with fully-insured commercial coverage (and the number of non-resident ABI patients with Massachusetts-regulated fully-insured commercial coverage).
- Estimate a range of rates of increase in utilization of mandated services. Develop low, medium, and high scenario estimates based on the range.
- Calculate the range of new fully-insured commercial service users by multiplying the estimated number of commercial fully-insured Massachusetts ABI patients by the estimated rates of utilization increase.
- Using claim data from the MA-APCD and input from a clinical expert, develop an estimated range of annual units per user for each service utilization of which is projected to increase. Develop low, medium, and high scenario estimates.

- Estimate the range of the unit cost of each mandated service using claim data from the MA-APCD. Develop low, medium, and high scenario estimates.
- Calculate annual incremental cost per user per year estimates by multiplying annual units per user by unit cost in each scenario.
- Calculate the annual incremental medical expense of the mandate by multiplying the estimated users per year by the average annual cost per user for each service in each scenario. Sum the results across services.

Calculate insurance premium impact of projected spending

- Divide the annual incremental cost by the corresponding membership to calculate baseline per-member per-month (PMPM) costs.
- Estimate the impact of insurer retention (administrative costs and profit) on premiums.
- Project the PMPM cost forward over the five-year analysis period using an estimated increase in medical costs.
- Estimate the Massachusetts fully-insured population under age 65, projected for the next five years (2017 to 2021).
- Multiply the PMPM costs by the corresponding membership to calculate annual incremental cost.

Section 4 describes these steps in more detail.

3.4. Limitations

Challenges and limitations in estimating the cost of the proposed mandate include:

- *Defining reasonable annual limits on services.* The proposed mandate requires annual limits on CRRS be reasonable but does not define “reasonable” further, leaving it subject to varying interpretations.
- *Provider coding practices.* According to one clinical expert, some providers bill cognitive rehabilitation therapy as other services (such as occupational therapy, physical therapy, and speech therapy). To the extent this is occurring, claim data, including that in the MA-APCD, will understate the utilization of outpatient CRRS.
- *Defining medical necessity.* This mandate includes treatments that insurance carriers currently consider “investigative” and thus don’t meet their medical necessity criteria. For example, neurofeedback is not usually covered. This study assumes determination of medical necessity continues to fall under the purview of the insurance carriers, and that carriers will make adjustments accordingly to comply with the proposed mandates.
- *Unavailable data.* Service costs must be estimated where no or only limited claim data are available in the MA-APCD, such as for neurofeedback. Similarly, estimating

treatment prevalence, duration, and cost with input from clinical experts and published studies, each with its own limitations, introduces uncertainty.

These uncertainties are addressed by modeling a range of assumptions within reasonable judgment-based limits, and producing a range of estimates of incremental cost by varying these parameters. The more detailed step-by-step description of the estimation process outlined in the next sections addresses these uncertainties further.

4. Analysis

This section describes the calculations outlined in the previous section in more detail. The analysis includes development of a best estimate “middle-cost” scenario, as well as a low-cost scenario using assumptions that produced a lower estimate, and a high-cost scenario using more conservative assumptions that produced a higher estimated impact.

Sections 4.1 and 4.2 below describe the steps used to calculate the increase in cognitive impairment treatment and associated cost per user. Sections 4.3 to 4.7 discuss the incremental cost calculation and the projection over the 2017 to 2021 reporting period.

4.1. Increase in treatment for cognitive impairment

Estimating the cost of the mandate requires projecting the costs for previously uncovered CRRS, increases in utilization for those CRRS already covered, and increased utilization as a result of the mandate of post-acute facility stays by members with an ABI. Insurance carrier survey responses and MA-APCD data indicate that insurance carriers cover emergency room and hospital treatment as well as ongoing physical therapy, speech therapy, occupational therapy, and several other rehabilitation therapies for individuals with an ABI.

The present analysis estimates the incremental cost of H.B. 843 in two parts: (i) additional CRRS and (ii) increased utilization of post-acute facility (e.g., rehabilitation hospital) stays for cognitive rehabilitation by ABI patients.

To provide some information on the historical spending for these services, Table 1 shows the range of 2014 fully-insured commercial APCD claim expenses for outpatient CRRS and acute and post-acute facility stays for all members who had at least one paid claim with an ABI diagnosis listed in the Massachusetts Department of Public Health’s (DPH) Brain Injury Commission’s 2014 epidemiology report on ABI in Massachusetts.⁸ The “Minimum” column shows only expenses coded with an ABI diagnosis; this may underestimate the true cost. The “Maximum” column shows all dollars for the services incurred by members with an ABI diagnosis during the year, regardless of the diagnosis reported on the claim; this certainly over-estimates the cost of ABI-related services. While the present analysis does not support a retrospective point estimate of 2014 claim expenses for CRRS and use of acute and post-acute inpatient facility stays in the treatment of ABI, it is likely those expenses lie somewhere in this range, and, given that the minimum values for the various service types are non-zero, Table 1 provides empirical support for the carriers’ claim that most CRRS are already covered.

**Table 1:
Range of Claim Expense for ABI-Related Services Provided to Fully-Insured Members
with at Least One Paid ABI Claim During 2014**

<u>Service Type</u>	<u>Paid Claim Dollar Range</u>	
	<u>Minimum</u>	<u>Maximum</u>
IP Hospital (ex Rehab)	\$ 51,173,638	\$ 183,795,783
Facility Based PT / OT	\$ 1,869,811	\$ 9,678,477
Rehab Hospital	\$ 875,759	\$ 11,361,626
Facility ST	\$ 661,846	\$ 2,056,791
Neurobehavior/psychological testing	\$ 242,294	\$ 944,832
Non Facility PT / OT	\$ 118,137	\$ 2,966,453
Home Management Training	\$ 111,658	\$ 111,658
Development of Cognitive Skills	\$ 38,621	\$ 38,621
Non Facility ST	\$ 33,368	\$ 557,633
Community Reintegration	\$ 4,748	\$ 4,748

Estimate the number of individuals requiring cognitive rehabilitation

The effects of ABIs vary widely by individual, with acuities ranging from mild to severe. This analysis assumes additional outpatient CRRS or post-acute facility stays may be indicated for patients discharged from an inpatient hospital with an ABI diagnosis.

**Table 2:
Average Annual Hospital Discharges Associated with a Discharge Diagnosis of ABI,
for MA Residents, 2008-2010,
and 2014 Estimate of Fully-Insured Members Age 0-64 with an ABI Discharge**

<u>Type of ABI</u>	<u>Total All Ages</u>	<u>Commercially- Insured All Ages</u>	<u>Commercial Fully Insured, Age 0-64, 2014</u>
TBI	7,721	1,915	739
Stroke	20,173	3,793	1,463
Metabolic	9,609	1,893	730
Infectious	<u>2,296</u>	<u>1,162</u>	<u>448</u>
Total	39,799	8,762	3,379

Table 2 shows average annual hospital discharges associated with an ABI discharge diagnosis for Massachusetts residents during the years 2008 to 2010, for the most common causes of ABIⁱⁱ for

ⁱⁱ Similar data are not available for the other major causes of ABI, neurotoxicity and neoplasms. According to Hackman, *et. al.* in the Massachusetts Brain Injury Commission report, incidence of neurotoxicity in the U.S. and Massachusetts is not known, and consequently incidence of neurotoxicity-related ABI cannot be measured (p. 53). Additionally, although similar epidemiological data are not available for neoplastic ABI, it is clear that, given the low incidence of central nervous system neoplasms (an annual average of 1272 in Massachusetts from 2008 to 2010), not all of which require ABI treatment, neoplasms account for a small fraction of ABI emergency department visits, hospital stays, and CRRS treatment (Hackman, *et. al.*, p. 23).

patients of all ages, commercially-insured patients of all ages, and a 2014 estimate for those age 0 to 64.^{iii,9}

Assuming no increases in ABI incidence between 2008 to 2010 and 2014, the following adjustments were made to derive the commercial fully-insured ABI total discharge estimate of 3,379:

- Estimate and apply population growth between the period 2008 to 2010 and 2014.
- Multiply the 2014 estimated discharges by the percent of the 2014 Massachusetts population comprised of the commercially-insured population under age 65. (See Appendix A for discussion of the 2014 commercially-insured population estimates.)
- Multiply the commercially-insured population under age 65 by the 2014 fully-insured coverage rate. (See Appendix A for further discussion of the 2014 fully-insured population estimates.)
- Assuming the same ABI discharge rate for Massachusetts residents and non-residents with commercial coverage subject to Massachusetts law, apply the estimated fully-insured commercial under-65 ABI discharge rate to the 2014 non-resident Massachusetts fully-insured coverage population estimate. (Please see Appendix A for discussion of the 2014 estimate of the non-resident population covered by the mandate.) Add the estimated non-resident ABI discharges to the resident estimate.

This inpatient user count comprises the baseline population for whom additional (i) CRRS, or (ii) sub-acute residential treatment may be indicated. For both of these incremental expense components, calculations for which are detailed below, this analysis constructed a range of estimated additional users to account for uncertainty.

Estimate users of additional CRRS

MA-APCD data indicate low utilization of CRRS; to the extent available capacity exists for individuals seeking services, the low number of claims is likely due to the application of medical necessity criteria by the carriers as well as providers billing CRRS under physical therapy, occupational therapy, or speech therapy codes. Given that the majority of treatments falling under CRRS are currently covered by carriers and that H.B. 843 is interpreted as making no changes to carriers' ability to set medical necessity criteria for cognitive rehabilitation services, the impact on utilization of services is expected to be low. However, for the high case scenario, the analysis allows for the possibility that passage of the bill will bring added attention to CRRS resulting in more frequent approval of services, and so begins with the epidemiological rate of incidence of ABIs.

Epidemiological studies indicate long-term problems with cognitive functioning may persist in up to 65 percent of patients with a traumatic brain injury (TBI)¹⁰ and in 15 to 25 percent of stroke patients.¹¹ These percentages provide natural ceilings on the number of inpatient discharges derived above that will require cognitive rehabilitation.

ⁱⁱⁱ Hackman, *et. al.* provide discharge data by 10-year age band for these four ABI types. To derive the age 0 to 64 discharge estimates from these data, Compass added half of the discharges reported for the 60 to 69 age band to the sum of all discharges for ages 0 to 59.

In practice, even in the presence of complete coverage and medical necessity criteria less stringent than those currently applied, utilization rates will not reach these natural ceilings based on epidemiological rates of incidence/prevalence, for reasons including provider capacity constraints and lack of interest or compliance on the part of some potential patients. Therefore, in the high-cost scenario this analysis assumed 40 percent of patients with a discharge diagnosis of TBI and 15 percent of patients with a discharge diagnosis of any other ABI would use additional outpatient CRRS under H.B. 843. Table 3 shows the development of the high scenario user count relative to the estimate of total fully-insured ABI discharges.

**Table 3:
Estimated Number of Users of Incremental CRRS in High Scenario**

	Inpatient Discharges	Percentage Receiving Additional CRRS	Number of CRRS Users
TBI	739	40.0%	295
Other ABI	<u>2,641</u>	<u>15.0%</u>	<u>396</u>
Total	3,379	20.5%	692

The low- and mid-level scenarios rely more on data available in the MA-APCD, and assume the proportion of users of additional CRRS will be equal to the proportion of claims for speech and occupational therapy evaluations, respectively, to inpatient stays in the MA-APCD, for claims with an ABI diagnosis. This is based on the assumption that, as reported by some providers, these services are sometimes billed in place of CRRS in order to receive payment. Specifically, because the ratio of 2014 speech therapy evaluation claims with an ABI diagnosis to the number of 2014 inpatient stays with an ABI diagnosis is 3.8 percent in the 2014 MA-APCD data, this analysis assumes in the low-cost scenario that 3.8 percent of fully-insured commercial members with an inpatient stay for an ABI will receive additional CRRS. Similarly, because the ratio of 2014 occupational therapy evaluation claims with an ABI diagnosis to the number of 2014 inpatient stays with an ABI diagnosis is 7.1 percent in the 2014 MA-APCD data, this analysis assumes in the middle-cost scenario that 7.1 percent of fully-insured commercial members with an inpatient stay for an ABI will receive additional CRRS. Applying these percentages to the 3,379 ABI discharges derived above yields the expected low and middle scenario users of additional CRRS shown in Table 4.

**Table 4:
Estimated Users of Additional CRRS**

	Percentage Requiring CRRS	Additional Users of CRRS
Low Scenario	3.8%	130
Mid Scenario	7.1%	240
High Scenario	20.5%	692

As discussed above, this analysis interprets H.B. 843 as making no changes to carriers' ability to set medical necessity criteria for cognitive rehabilitation services and evaluate claims against them. Currently, services considered custodial in nature and not restorative, such as day-treatment programs, are generally not considered medically necessary and therefore are not covered. Many

plans have specific exclusions for custodial programs. Therefore, to the extent coverage is extended to these treatment settings, it would be for specific services provided in these settings and not for the custodial care aspect of the setting. (This is distinguished from some residential setting costs necessary for treatment.) It follows that the incremental cost of the mandate for users of these services will be captured in the costs calculated for the above estimated additional users of outpatient CRRS.

Estimate users of additional sub-acute facility stays

Although H.B. 843 does not address medical necessity, utilization of sub-acute facility stays for cognitive rehabilitation will likely increase at least somewhat in the presence of the mandate. A survey of Massachusetts commercial health insurance carriers conducted for this analysis indicated low levels of requests, such as grievances and appeals, related to the services in the proposed mandate. For example, one of the largest carriers reported only about 25 such requests over the two-year period 2014 to 2015. Given this evidence of low demand for additional service, the low-cost scenario assumes 25 additional users of sub-acute facility stays, representing a 3 percent growth rate over 2014 utilization of such stays indicating an ABI diagnosis in the MA-APCD. The middle- and high-cost scenarios assume growth rates of 5 percent and 10 percent, respectively. Table 5 shows the estimated growth rates and resulting additional users of sub-acute facility stays for cognitive rehabilitation.

**Table 5:
Estimated Number of Users of Additional Sub-acute Facility Stays**

	Percentage Increase in Users	Additional Users of Sub- acute Stays
Low Scenario	3%	25
Mid Scenario	5%	36
High Scenario	10%	73

4.2. Annual cost per user of additional treatments for cognitive impairment

Having estimated the counts of users of additional treatments in the two categories, the next step in developing the expected cost of the proposed mandate is to estimate a range of annual cost per user for each of the additional treatments.

Estimated units of additional CRRS per user

A clinical expert interviewed for this analysis stated that while cognitive impairments may continue for years or be permanent, the typical course of CRRS may last a few months, then require an “update” when circumstances or conditions warrant. Based on these comments, this analysis assumed a mid-level scenario of eight annual treatments per new user, or one treatment per week for about two months. This treatment schedule of eight treatments per year was also found to be consistent with average utilization per-user per-year for other services, such as physical therapy and occupational therapy, for fully-insured individuals with ABI identified in the MA-APCD. To

account for uncertainty around changes in provider behavior in the presence of the mandate, a range of five to fifteen additional treatments per year was modeled. Five treatments would be expected if the patient is already receiving outpatient CRRS for which the provider is successfully seeking reimbursement by billing the services as occupational, physical, or speech therapy. The fifteen treatments estimate reflects that the mandate does require some services, such as neurofeedback, not currently covered.

**Table 6:
Estimated Annual Additional CRRS per User**

	Additional CRRS per User
Low Scenario	5
Mid Scenario	8
High Scenario	15

Data from the MA-APCD for 2014 showed that 95 percent of users with acquired brain injuries and physical or occupational therapy visits had 23 or fewer such visits. Similarly, MA-APCD 2014 data showed that 95 percent of users with acquired brain injuries and speech therapy visits had 26 or fewer such visits. Patients seldom reach the maximum visits allowable in the benchmark plan for these services, even with the possibility of providers billing CRRS as physical, occupational, or speech therapy to improve the odds of reimbursement. Although adding CRRS will make it more likely a patient will reach a 60-day limit on rehabilitative services, this analysis did not constrain the additional CRRS visits per user, thus slightly overstating the impact if the rehabilitative visit limits are not increased by carriers in the presence of the mandate.

Estimate number of additional days per sub-acute facility stay user

As reflected above in the estimated range of additional users of sub-acute facility stays for cognitive rehabilitation, demand for such services may increase in the presence of the mandate due to increased awareness of the mandated services among patients and providers. In such an environment of increased awareness, carriers may broaden medical necessity criteria or grant more appeals for such care.

However, the new users of sub-acute facility stays, who would have returned home after their acute-care hospital inpatient stay in the absence of the mandate, may be likely to have less cognitive impairment and therefore relatively short residential stays. To account for this possibility, this analysis modeled a low-end assumption of seven additional sub-acute bed-days per user, which represents the average length of stay in the bottom half of the length of stay distribution for 2014 rehabilitation stays for patients with an ABI diagnosis in the MA-APCD (i.e., the mean length of stay among only the shorter half of stays). The middle scenario assumes the average length of stay, ten days, for the bottom 75 percent of the distribution (i.e., the mean length of stay among only the shortest 75 percent of stays). The 2014 MA-APCD data showed an average length of stay for *all* ABI patients with rehabilitation stays of approximately 18 days; this result informed the choice of additional days of treatment in the high scenario.

Table 7 displays the low, mid and high scenarios for additional sub-acute bed-days per user.

**Table 7:
Estimated Annual Additional Sub-Acute Bed-Days per User**

	<u>Additional Sub-Acute Bed-Days per User</u>
Low Scenario	7
Mid Scenario	10
High Scenario	18

Estimate unit costs and cost per user per year

This analysis developed a unit cost range for CRRS using MA-APCD 2014 paid claim data for members with an ABI diagnosis. The lower bound unit cost of \$125 is the average paid cost in the MA-APCD ABI patient data for speech and occupational therapy services. The high-end estimate of \$160 reflects the average paid cost for cognitive rehabilitation services.^{iv} This assumption will to some extent offset the inability to predict how many services will simply shift from being billed as physical, speech, or occupational therapy to being billed as cognitive rehabilitation.

For additional sub-acute bed-days, the high-cost scenario unit cost estimate of \$1,300 is based on the average paid amount per day for rehabilitation facility claims for fully-insured individuals with an ABI diagnosis in the 2014 MA-APCD. The Massachusetts 2014 Brain Injury Commission report shows that patients discharged to facility care are most commonly sent to rehabilitation hospitals or skilled nursing facilities, with a variety of other facility types (e.g., rest home, psychiatric hospital, short stay hospital) comprising the remainder.¹² To model a range of potential facility options and a complexity of treatment options for the new users, the middle scenario assumes costs of \$1,000 per day, and the low scenario assumes costs of \$750 per day. Table 8 displays the cost per unit ranges for both components of H.B. 843’s potential incremental cost.

**Table 8:
Estimated Carrier Paid Amount per Visit and per Day of Care**

	<u>CRRS Cost per Treatment</u>	<u>Sub-Acute Bed-Day Per Diem</u>
Low Scenario	\$125	\$750
Mid Scenario	\$145	\$1,000
High Scenario	\$160	\$1,300

Table 9 displays the estimated cost per user per year of each component of the incremental mandate cost (the number of treatments from Tables 6 and 7 multiplied by the costs per treatment from Table 8).

^{iv} CPT code 97532.

**Table 9:
Estimated Annual Cost per User**

	Additional CRRS	Additional Sub-Acute Bed-Days
Low Scenario	\$625	\$5,250
Mid Scenario	\$1,160	\$10,000
High Scenario	\$2,400	\$23,400

4.3. Annual incremental medical expense of additional treatments

The costs per user per year are multiplied by the estimated annual users of additional CRRS and additional sub-acute facility stays to obtain the total incremental cost for each component. These results are then summed to calculate the total estimated 2014 incremental cost of the proposed mandate. Table 10 displays these results.

**Table 10:
Estimated 2014 Annual Marginal Cost of Additional Treatments for Cognitive Impairment**

	Additional CRRS	Additional Sub-Acute Facility Stays	Total Incremental Cost
Low Scenario	\$81,250	\$131,250	\$212,500
Mid Scenario	\$278,400	\$364,500	\$642,900
High Scenario	\$1,660,800	\$1,705,860	\$3,366,660

4.4. Incremental PMPM medical expense

The annual cost is then divided by 2014 fully-insured member months calculated from the MA-APCD to derive the estimated baseline per-member per-month (PMPM) incremental medical expense attributable to the proposed mandate. Table 11 shows these results.

**Table 11:
Estimate of Increase in Carrier 2014 Claim Cost**

	Additional CRRS	Additional Sub-Acute Facility Stays	Total Incremental Cost
Low Scenario	\$0.00	\$0.01	\$0.01
Mid Scenario	\$0.01	\$0.01	\$0.03
High Scenario	\$0.07	\$0.07	\$0.13

4.5. Projected fully-insured population in Massachusetts

Table 12 shows the fully-insured population in Massachusetts age 0 to 64 projected for the next five years. The attached appendix describes the sources of these values.

**Table 12:
Projected Fully-Insured Population in Massachusetts, Age0-64**

<u>Year</u>	<u>Total (0-64)</u>
2017	2,158,712
2018	2,156,403
2019	2,153,622
2020	2,149,554
2021	2,145,579

4.6. Projection of total marginal medical expense

The incremental medical expense calculated in Section 4.4 was projected for the period January 1, 2017 to December 31, 2021 using an annual health care expenditure inflation rate of 4.9 percent annually, based on estimates of inflation for health care services.¹³ The trended incremental PMPM medical expenses were multiplied by the member months displayed in Table 12 to calculate the total projected incremental medical expenses shown in Table 13.

This analysis assumes the bill, if enacted, would be effective January 1, 2017.¹⁴

**Table 13:
Projected Incremental Medical Expense for
Additional Treatments for Cognitive Impairment, 2017 to 2021**

	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>
Low Scenario	\$179,669	\$264,056	\$276,637	\$289,644	\$303,275
Mid Scenario	\$543,574	\$798,877	\$836,941	\$876,293	\$917,531
High Scenario	\$2,846,521	\$4,183,461	\$4,382,789	\$4,588,863	\$4,804,816

4.7. Carrier retention and increase in premium

Assuming an average annual retention rate of 11.0 percent based on CHIA's analysis of health insurance carrier administrative costs and profit in Massachusetts,¹⁵ the increase in medical expense was adjusted upward to approximate the total impact on premiums. Table 14 shows the result.

**Table 14:
Projected Increase in Premiums Due to
Additional Treatments for Cognitive Impairment, 2017 to 2021**

	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>
Low Scenario	\$201,833	\$296,629	\$310,762	\$325,374	\$340,686
Mid Scenario	\$610,628	\$897,425	\$940,184	\$984,391	\$1,030,716
High Scenario	\$3,197,664	\$4,699,526	\$4,923,443	\$5,154,938	\$5,397,530

5. Results

The estimated impact of the proposed mandate on medical expense and premiums appears below. The analysis includes development of a best estimate “mid-level” scenario, as well as a low-level scenario using assumptions that produced a lower estimate, and a high-level scenario using more conservative assumptions that produced a higher estimated impact.

The impact on premiums is based primarily on estimates of the number of ABI patients who would receive services related to incremental cognitive rehabilitation (CRRS) or additional post-acute facility stays to treat cognitive impairment, and the expected number of additional treatments and/or bed-days per additional patient.

Starting in 2020, the federal Affordable Care Act will impose an excise tax, commonly known as the “Cadillac Tax”, on expenditures on health insurance premiums and other relevant items (health savings account contributions, etc.) that exceed specified thresholds. To the extent relevant expenditures exceed those thresholds (in 2020), H.B. 843, by increasing premiums, has the potential to create liability for additional amounts under the tax. Estimating the amount of potential tax liability requires information on the extent to which premiums, notwithstanding the effect of H.B. 843, will exceed or approach the thresholds and is beyond the scope of this analysis.

5.1. Five-year estimated impact

For each year in the five-year analysis period, Table 15 displays the projected net impact of the mandate on medical expense and premiums using a projection of Massachusetts fully-insured membership. Note that the relevant provisions of H.B. 843 are assumed effective January 1, 2017.¹⁶

**Table 15:
Summary Results**

	2017	2018	2019	2020	2021	Weighted Average	5 Yr Total
Members (000s)	2,159	2,156	2,154	2,150	2,146		
Medical Expense Low (\$000s)	\$180	\$264	\$277	\$290	\$303	\$279	\$1,313
Medical Expense Mid (\$000s)	\$544	\$799	\$837	\$876	\$918	\$843	\$3,973
Medical Expense High (\$000s)	\$2,847	\$4,183	\$4,383	\$4,589	\$4,805	\$4,415	\$20,806
Premium Low (\$000s)	\$202	\$297	\$311	\$325	\$341	\$313	\$1,475
Premium Mid (\$000s)	\$611	\$897	\$940	\$984	\$1,031	\$947	\$4,463
Premium High (\$000s)	\$3,198	\$4,700	\$4,923	\$5,155	\$5,398	\$4,960	\$23,373
PMPM Low	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
PMPM Mid	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04
PMPM High	\$0.17	\$0.18	\$0.19	\$0.20	\$0.21	\$0.19	\$0.19
Estimated Monthly Premium	\$463	\$473	\$483	\$493	\$503	\$483	\$483
Premium percent Rise Low	0.002%	0.002%	0.002%	0.003%	0.003%	0.003%	0.003%
Premium percent Rise Mid	0.007%	0.007%	0.008%	0.008%	0.008%	0.008%	0.008%
Premium percent Rise High	0.037%	0.038%	0.039%	0.041%	0.042%	0.040%	0.040%

The low scenario impact is \$313 thousand per year on average; this estimate assumes lower numbers of additional patients, fewer treatments or bed-days per additional patient, and lower unit

costs. The high scenario has an average cost of \$4.96 million per year, and reflects higher assumptions for each of these variables. The middle scenario has average annual costs of \$947 thousand, or an average of 0.008 percent of premium.

Finally, the impact of the proposed law on any one individual, employer-group, or carrier may vary from the overall results depending on the current level of benefits each receives or provides, and on how the benefits will change under the mandate.

5.2. Impact on the GIC

The proposed mandate is assumed to apply to both fully-insured and self-insured plans operated for state and local employees by the GIC, with an effective date for all GIC policies on July 1, 2017.

Because the benefit offerings of GIC plans are similar to those of most other commercial plans in Massachusetts, the estimated PMPM effect of the proposed mandate on GIC medical expense is not expected to differ from that calculated for the other fully-insured plans in Massachusetts. This is consistent with carrier survey responses which, in general, did not indicate differences in coverage for the GIC.

To estimate the medical expense separately for the GIC, the PMPM medical expense for the general fully-insured population was applied to the GIC membership starting in July of 2017.

Table 16 breaks out the GIC-only fully-insured membership and the GIC self-insured membership, and the corresponding incremental medical expense and premium. Note that the total medical expense and premium values for the general fully-insured membership displayed in Table 16 also include the GIC fully-insured membership. Finally, the proposed mandate is assumed to require the GIC to implement the provisions on July 1, 2017; therefore, the results in 2017 are approximately one-half of an annual value.

**Table 16:
GIC Summary Results**

	2017	2018	2019	2020	2021	Weighted Average	5 Yr Total
GIC Fully-Insured							
Members (000s)	54	54	54	54	54		
Medical Expense Low (\$000s)	\$3	\$7	\$7	\$7	\$8	\$7	\$31
Medical Expense Mid (\$000s)	\$10	\$20	\$21	\$22	\$23	\$21	\$95
Medical Expense High (\$000s)	\$50	\$105	\$110	\$115	\$120	\$111	\$499
Premium Low (\$000s)	\$4	\$7	\$8	\$8	\$9	\$8	\$35
Premium Mid (\$000s)	\$11	\$22	\$24	\$25	\$26	\$24	\$107
Premium High (\$000s)	\$56	\$118	\$123	\$129	\$135	\$125	\$560
GIC Self-Insured							
Members (000s)	270	270	269	269	268		
Medical Expense Low (\$000s)	\$16	\$33	\$35	\$36	\$38	\$35	\$157
Medical Expense Mid (\$000s)	\$48	\$100	\$105	\$109	\$115	\$106	\$476
Medical Expense High (\$000s)	\$250	\$523	\$548	\$573	\$600	\$554	\$2,493

Appendix A: Membership Affected by the Proposed Mandate

Membership potentially affected by a proposed mandate may include Massachusetts residents with fully-insured employer-sponsored health insurance issued by a Massachusetts licensed company (including through the GIC), non-residents with fully-insured employer-sponsored insurance issued in Massachusetts, Massachusetts residents with individual (direct) health insurance coverage, and lives covered by GIC self-insured coverage. Membership projections for 2017 to 2021 are derived from the following sources.

The 2014 Massachusetts All Payer Claim Database (MA-APCD) formed the base for the projections. The MA-APCD provided fully-insured and self-insured membership by insurance carrier. The MA-APCD was also used to estimate the number of non-residents covered by a Massachusetts policy. These are typically cases in which a non-resident works for a Massachusetts employer offering employer-sponsored coverage. Adjustments were made to the data for membership not in the MA-APCD, based on published membership reports available from the Massachusetts Center for Health Information and Analysis (CHIA) and the Massachusetts Division of Insurance (DOI).

CHIA publishes a quarterly enrollment trends report and supporting databook (enrollment-trends-july-2016-databook¹⁷), which provides enrollment data for Massachusetts residents by insurance carrier for most carriers (some small carriers are excluded). CHIA uses supplemental information beyond the data in the MA-APCD to develop their enrollment trends reports and provided Compass with details on where they used supplemental carrier information for their December 2014 reported enrollment. The supplemental data was used to adjust the resident totals from the MA-APCD.

The DOI published two reports titled Quarterly Report of Health Maintenance Organization Membership in Closed Network Health Plans as of December 31, 2014¹⁸ and Massachusetts Division of Insurance Annual Report Membership in MEDICAL Insured Preferred Provider Plans by County as of December 31, 2014.¹⁹ These reports describe fully- insured covered members for licensed Massachusetts insurers where the member's primary residence is in Massachusetts. The DOI reporting includes all insurance carriers and was used to supplement the MA-APCD membership for small carriers not in the MA-APCD.

The distribution of members by age and gender was estimated using MA-APCD population distribution ratios and was checked for reasonableness and validated against the U.S. Census.²⁰ Membership was projected forward from the 2014 base year to 2015 using the American Community Survey,²¹ and then from 2015 through 2021 using Census Bureau population growth rate estimates by age and gender.²²

Projections for the GIC self-insured lives were developed using GIC base data for 2013,²³ 2014,²⁴ and 2015,²⁵ and the same projected growth rates from the Census Bureau that were used for the Massachusetts population. Breakdowns of the GIC self-insured lives by gender and age were based on the Census Bureau distributions.

Endnotes

- ¹ The 189th General Court of the Commonwealth of Massachusetts, House Bill 843, “An act relative to cognitive rehabilitation.” Accessed 26 April 2016: <https://malegislature.gov/Bills/189/House/H843>.
- ² Interview with Douglas Katz, MD, Department of Neurology, Boston University Medical Center, April 2016.
- ³ 42 U.S.Code 18022.
- ⁴ 45 CFR 156.100.
- ⁵ CMS.gov. Information on Essential Health Benefits (EHB) Benchmark Plans. Accessed 12 September 2016: <https://www.cms.gov/ccio/resources/data-resources/ehb.html>.
- ⁶ M.G.L. c.175 §47X, M.G.L. c.176A §8Y, M.G.L. c. 176B §4Y, M.G.L. c. 176G §4N, M.G.L. c. 32A §17J.
- ⁷ Interview with Douglas Katz, MD, April 2016.
- ⁸ Hackman H, LaVecchia F, Kamen D, et al. 2014 Epidemiology Report: Acquired Brain Injury in Massachusetts. Appendixes B2-B5. Accessed 20 May 2016: <http://www.mass.gov/eohhs/consumer/disability-services/services-by-type/head-injury/acquired-brain-injury-in-massachusetts.html>.
- ⁹ *Op cit.* Hackman H, LaVecchia F, Kamen D, et al., 2014 Epidemiology Report: Acquired Brain Injury in Massachusetts.
- ¹⁰ Rabinowitz AR, Levin HS. Cognitive Sequelae of Traumatic Brain Injury. *PsychiatrClin North Am.* 2014 Mar; 37(1): 1–11. Accessed 18 May 2016: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3927143/>.
- ¹¹ Kelly-Hayes M, Robertson JT, Broderick JP, et. al. AHA Scientific Statement: The American Heart Association Stroke Outcome Classification. *Stroke.* 1998; 29: 1274-1280. Accessed 18 May 2016: <http://stroke.ahajournals.org/content/29/6/1274.full>.
- ¹² *Op. cit.* Hackman H, LaVecchia F, Kamen D, et al., 2014 Epidemiology Report: Acquired Brain Injury in Massachusetts.
- ¹³ Centers for Medicare and Medicaid Services (CMS), Office of the Actuary. National Health Expenditure Data, NHE Projections 2015-2025 - Forecast Summary. Accessed 27 April 2016: <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html>.
- ¹⁴ The analysis assumes the mandate would be effective for policies issued and renewed on or after January 1, 2017. The impact of the mandate on cost in 2017 was estimated at 71.3 percent of the annual cost, using an assumed renewal distribution by month, by market segment, and by the Massachusetts market segment composition.
- ¹⁵ Massachusetts Center for Health Information and Analysis. Annual Report on the Massachusetts Health Care System, September 2015. Accessed 19 January 2016: <http://www.chiamass.gov/annual-report>.
- ¹⁶ *Ibid.*
- ¹⁷ Center for Health Information and Analysis. Estimates of fully insured and self insured membership by insurance carrier. Accessed 22 September 2016: www.chiamass.gov/enrollment-in-health-insurance/.
- ¹⁸ Massachusetts Division of Insurance. HMO Group Membership and HMO Individual Membership <http://www.mass.gov/ocabr/docs/doi/managed-care/hmo/4q14dist-group.pdf>, <http://www.mass.gov/ocabr/docs/doi/managed-care/hmo/4q14dist-individual.pdf>
- ¹⁹ Massachusetts Division. Membership in MEDICAL Insured Preferred Provider Plans by County. Accessed 22 September 2016: <http://www.mass.gov/ocabr/docs/doi/managed-care/prefprov/2014-prefprov2.pdf>.
- ²⁰ U.S. Census Bureau. Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2015. Accessed 28 April 2016: <http://www.census.gov/popest/data/state/totals/2015/index.html>.
- ²¹ American Factfinder U.S. Census Bureau. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015. Accessed 22 September 2016: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2015_PEPANNRES&src=pt

Methodology described <http://www.census.gov/popest/methodology/2015-natstcopr-meth.pdf>.

²² U.S. Census Bureau. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2015. Accessed 28 April 2016: <http://www.census.gov/popest/data/state/totals/2015/index.html>.

²³ Group Insurance Commission. GIC Health Plan Membership by Insured Status FY2013. Accessed 28 March 2016: <http://www.mass.gov/anf/docs/gic/annual-report/annualreportfy2013.pdf>.

²⁴ Group Insurance Commission. GIC Health Plan Membership by Insured Status FY2014. Accessed 28 March 2016: <http://www.mass.gov/anf/docs/gic/annual-report/fy2014annual-report.pdf>.

²⁵ Group Insurance Commission, Group Insurance Commission Fiscal Year 2015 Annual Report. Accessed 25 January 2016: <http://www.mass.gov/anf/docs/gic/annual-report/gic-annual-reportfy15.pdf>.