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MANDATED BENEFIT REVIEW OF H.B. 3972: AN ACT RELATIVE TO THE PRACTICE OF ACUPUNCTURE

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BENEFIT MANDATE OVERVIEW
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HISTORY OF THE BILL

The Joint Committee on Health Care Financing referred House Bill (H.B.) 3972, "An Act relative to the practice of acupuncture," sponsored by Rep. Pignatelli of Lenox in the 188th General Court (and submitted as H.B. 930 in the 189th General Court), to the Center for Health Information and Analysis (CHIA) for review.[1] Massachusetts General Laws, chapter 3, section 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. 3972 requires health insurance plans to "provide benefits for acupuncture and oriental medicine based diagnosis and treatment in the areas of pain management, post-traumatic stress disorder, substance abuse treatment, and nausea." Further, the bill states that "no third party payer of health care services shall differentiate reimbursement rates for acupuncture services by provider type. Only licensed acupuncturists or medical doctors shall be reimbursed for acupuncture services."

MEDICAL EFFICACY OF ACUPUNCTURE FOR SPECIFIC DIAGNOSES

While there are thousands of published studies on the efficacy of acupuncture, high-quality controlled clinical trials are still needed to evaluate its value for treatment of many symptoms and conditions. However, there is sufficient evidence drawn solely from peer-reviewed western-based research publications to conclude that acupuncture is an effective treatment for a variety of diagnoses included in the bill, including certain pain management conditions, certain cases of nausea and vomiting, and certain substance abuse conditions. There is also evidence acupuncture is an effective treatment when used in conjunction with traditional therapies for certain types of pain management, nausea and vomiting, and substance abuse treatment. Finally, there is little evidence about the effectiveness of acupuncture as a treatment for PTSD, although preliminary studies have suggested that acupuncture may be effective for this condition; additional studies are currently underway to confirm these outcomes. This review found no published studies comparing the relative quality of these services when provided by licensed acupuncturists and by licensed physicians.

CURRENT COVERAGE

According to responses to a carrier survey, acupuncture and oriental medicine based diagnosis and treatment are generally not covered. However, two large carriers, together covering over sixty percent of the commercially covered lives in Massachusetts, allow self-insured employer groups to cover acupuncture benefits, and some carriers cover acupuncture under certain exceptional circumstances with pre-authorization. One large carrier began offering acupuncture as a standard medical benefit in most of its fully-insured policies as of January 2015.

1 The 188th General Court of the Commonwealth of Massachusetts, House Bill 3972, "An Act relative to the practice of acupuncture". Accessed 16 December 2014: https://malegislature.gov/Bills/188/House/H3972. In the 189th General Court of the Commonwealth of Massachusetts, House Bill 930; accessed 16 March 2015: https://malegislature.gov/Bills/189/House/H930.

COST OF IMPLEMENTING THE BILL

If enacted, H.B. 3972 will require all fully-insured commercial health insurance policies in Massachusetts to include coverage for acupuncture services in the areas of pain management, post-traumatic stress disorder (PTSD), nausea, and substance abuse. H.B. 3972 does not limit carriers' ability to apply medical necessity criteria or set coverage limits. 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 $0.38 (0.08%) and $0.76 (0.16%) per year.

The Massachusetts Division of Insurance in consultation with the Health Connector will need to be consulted to provide an analysis of estimated state liability associated with a given proposed mandated benefit bill.

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 the bill sponsor, this review assumes self-insured and fully-insured plans operated by the Group Insurance Commission (GIC) for the benefit of public employees and their dependents would also be subject to the mandate. The proposed benefit mandate would apply to members covered under the relevant plans, regardless of whether they reside within the Commonwealth or merely have their principal place of employment 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) are subject to federal law and not to state-level health insurance benefit mandates. State health benefit mandates do not apply to Medicare and Medicare Advantage plans, the benefits of which are qualified by Medicare. These mandates also do not apply to federally-funded plans including TRICARE (covering military personnel and dependents), the Veterans Administration, and the Federal Employee's Health Benefit Plan. Finally, this bill does not apply to Medicaid/MassHealth.

MEDICAL EFFICACY ASSESSMENT: ACUPUNCTURE

Massachusetts House Bill (H.B.) 3972, submitted in the 188th General Court (and submitted as H.B. 930 in the 189th General Court), requires health insurance plans to "provide benefits for acupuncture and oriental medicine based diagnosis and treatment in the areas of pain management, post-traumatic stress disorder, substance abuse treatment, and nausea.... [N]o third party payer of health care services shall differentiate reimbursement rates for acupuncture services by provider type. Only licensed acupuncturists or medical doctors shall be reimbursed for acupuncture services."[1] M.G.L. c. 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.

ACUPUNCTURE AND RELATED TREATMENTS

Oriental medicine is defined by the National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM)[2] as a "comprehensive health care system encompassing a variety of traditional healthcare therapies that have been used for more than 3,000 years to diagnose and treat illness, prevent disease and improve well-being."[3] Based in part on Traditional Chinese Medicine (TCM)[4] while incorporating methods from other Asian cultures, oriental medicine focuses on balancing the body's energy flow to restore and maintain health. In the United States, the NCCAOM defines oriental medicine to include acupuncture, Chinese herbology, and Asian bodywork therapy (ABT).[5]

Acupuncture is a group of practices in which the skin is stimulated to regulate and remove obstructions to the flow of qi (energy) and blood throughout the body.[6,7] A consensus development conference statement from the National Institutes of Health described acupuncture as:

> [A] component of the health care system of China that can be traced back for at least 2,500 years. The general theory of acupuncture is based on the premise that there are patterns of energy flow (Qi) through the body that are essential for health. Disruptions of this flow are believed to be responsible for disease. Acupuncture may correct imbalances of flow at identifiable points close to the skin."[8]

The World Health Organization (WHO) defines acupuncture to include traditional body needling (puncturing the skin with a needle), moxibustion (the burning on or over the skin of selected herbs), electric acupuncture (electro-acupuncture, or "the application of a pulsating electrical current to acupuncture needles as a means of stimulating the acupoints"),[9] laser acupuncture (photoacupuncture; the use of low energy lasers in place of needles to stimulate acupuncture points), microsystem acupuncture such as ear (auricular), face, hand and scalp acupuncture, and acupressure (the application of pressure at selected sites).[10] Massachusetts state regulations that define acupuncture reflect and expand this definition as "the practice of medicine based upon traditional oriental medical theories…in an attempt to relieve pain or improve bodily function."[11,12]

Chinese herbology, or Chinese herbal medicine, is another of the main components of oriental medicine and TCM.[13] As acupuncture is used to rebalance the body, herbology uses combinations of plant materials formulated for individual patients to restore balance and maintain health.[14,15]

PHYSICIANS AND LICENSED ACUPUNCTURISTS

H.B. 3972 provides that insurers shall reimburse only licensed acupuncturists or medical doctors for acupuncture services. All fully-licensed physicians in Massachusetts may provide acupuncture treatments, as it is within their legal scope of practice.[16] To be eligible for licensure as a non-physician acupuncturist in Massachusetts, new licensees (as of 2009) must fulfill certain academic requirements, and pass examinations to obtain certification from the NCCAOM in either acupuncture or oriental medicine, the latter of which includes both the practices of acupuncture and Chinese herbology.[17,18] This certification requires at least a master's degree from a program certified by the Accreditation Commission for Acupuncture and Oriental Medicine (ACAOM), the only accrediting body recognized by the United States Department of Education.[19] Applicants educated in foreign countries must be approved by the state's Committee on Acupuncture of the Board of Registration in Medicine.[20] In 2012, there were 1053 fully-active licensed acupuncturists in Massachusetts.[21]

To practice herbal therapy in Massachusetts, providers must further obtain NCCAOM certification in herbology, considered a therapy adjunctive to acupuncture.[22] Massachusetts is one of eleven states that include Chinese herbs in the scope of practice for properly certified acupuncturists.[23] Of the licensed acupuncturists in Massachusetts, 529 are certified to use herbology as part of their acupuncture practice. Although these licensed acupuncturists also certified to use herbal medicines are permitted to recommend the use of these substances as part of treatment, the substances themselves are not FDA-approved or regulated by the state. Therefore, the herbal products would not be reimbursed under commercial insurance policies, as they would not meet medical necessity criteria set forth by insurers. Because as a practical matter herbal treatments would not be covered under this proposed mandate, a review of the effectiveness of herbology is not included in this review.

Manual stimulation techniques are within the scope of practice for acupuncturists in Massachusetts. Some of these treatments are also included in the practice scope of other providers licensed in the state, including physical therapists[24] and chiropractors,[25] and are already reimbursed as treatments by at least some insurers when provided by these practitioner types. According to its sponsors, H.B. 3972 is not mandating payment for manual stimulation as a new treatment not otherwise reimbursed; instead, the proposed mandate is intended to expand the payment to licensed acupuncturists for this treatment. This review found no studies quantifying the efficacy of the provision of manual stimulation techniques by acupuncturists specifically or compared to other provider types.

EFFICACY OF ACUPUNCTURE

In its 2002 review of controlled clinical trials for acupuncture treatments, the WHO wrote:

> [A]cupuncture is widely used in health care systems in the countries of [Asia]; it is officially recognized by governments and well received by the general public…. [However], scepticism about its effectiveness continues to exist in countries where modern Western medicine is the foundation of health care, especially in those where acupuncture has not yet been widely practised. People question whether acupuncture has a true therapeutic effect, or whether it works merely through the placebo effect, the power of suggestion, or the enthusiasm with which patients wish for a cure. There is therefore a need for scientific studies that evaluate the effectiveness of acupuncture under controlled clinical conditions.[26]

The National Center for Complementary and Integrative Health (NCCIH) in the National Institutes of Health (NIH) further states that:

> [i]n spite of the widespread use of TCM [Traditional Chinese Medicine] in China and its use in the West, rigorous scientific evidence of its effectiveness is limited. TCM can be difficult for researchers to study because its treatments are often complex and are based on ideas very different from those of modern Western medicine.

According to the American Academy of Medical Acupuncture, "Western allopathic medicine treats diagnoses, and diagnoses are often established by fairly objective…standards. [In contrast, oriental medicine] is based not only on diagnostic evaluations derived from subjective signs and symptoms but on an accurate assessment of a patient's nature/constitution."[27]

Western studies

There are thousands of clinical reviews on the efficacy of the various practices of acupuncture and its impact on specific diseases or symptoms. Many of these, especially older studies, are of low quality, or rely on samples too small to allow generalizable conclusions. However, over time, efforts to evaluate the efficacy of acupuncture and related treatments using the same scientific techniques employed to assess western medical treatments have expanded and improved. This review, therefore, focuses on such evidence-based guidelines, meta-analyses, randomized control trials, and systematic reviews. While acupuncture encompasses a broad set of techniques, the studies included here are focused specifically on needling. The research included generally compares acupuncture to:

1. No treatment.
2. Simulated or so-called "sham acupuncture"[28] which mimics acupuncture but does not pierce the skin or use traditional[29] points. This comparison is often used to determine if the effect of treatment is due to acupuncture itself, or to a placebo effect, in which a patient experiences a benefit attributable not to the treatment, but to the patient's belief that the intervention will be beneficial.[30]
3. Other medical treatments.
4. Acupuncture in addition to other medical treatments, versus other medical treatments alone (acupuncture as an adjunctive treatment).

The following table summarizes a selection of studies focused on the four diagnostic categories in the bill (pain management, post-traumatic stress disorder, substance abuse treatment, and nausea). The table's symbols indicate that research has concluded that, for some conditions:

- \+ Acupuncture is more effective than the comparative treatment or no treatment as defined in the table columns. For example, for the treatment of TMJ, acupuncture is more effective than sham acupuncture and more effective than other therapies used for the condition.
- = Acupuncture and sham acupuncture are effective treatments, but neither is more effective than the other (e.g. for neck pain).
- ✓ Acupuncture may be an effective adjunctive treatment when used in conjunction with more traditional therapies (e.g., for chronic pain management).
- ? Research is not yet conclusive or the reviewed studies may be contradictory (e.g., for lateral elbow pain).
- \- Acupuncture has not been shown to be an effective treatment.

Blank table cells indicate that no research was identified evaluating needle acupuncture.

CONCLUSION OF SELECTED EVIDENCE FOR THE EFFICACY OF ACUPUNCTURE

	Needle acupuncture compared to:			
Condition	**No treatment**	**Sham acupuncture**	**Other treatments**	**Adjunctive treatment**
Pain management				
Chronic pain [31, 32, 33]	+	+	+	✓
Back pain [34, 35, 36, 37]	+			✓
Lateral elbow pain [38, 39]		?	?	
Neck pain [40]	?	=		
Shoulder pain [41, 42, 43]		?	?	?
Fibromyalgia [44]	+	+		
Peripheral joint osteoarthritis [45]	+	?	+	✓
Rheumatoid arthritis [46, 47, 48]		=		-
Temporomandibular joint dysfunction (TMJ) [49]		+		+
Migraine headache [50, 51]	+	=	+	
Tension headache [52]	+	+	?	
Nausea and vomiting				
Chemotherapy-induced nausea and vomiting [53]		?		✓
Postoperative nausea and vomiting [54]	+	+	=	
Substance abuse treatment				
Alcohol dependence [55]		=	?	
Cocaine dependence [56]		=		-
Opioid dependence [57, 58]	?	?		✓
Smoking cessation/abstinence [59]	+	=	?	

? Ambiguous, conflicting or insufficient evidence	+ More effective	= As effective	✓ Effective	- Not sufficient

Non-western studies

The studies in the table were summarized from research published in peer-reviewed journals of western medicine. If this review is expanded to include research conducted outside of western medicine journals, the list of conditions for which acupuncture has been shown to be effective is considerably longer. For example, in 2002, the World Health Organization published a significant report on acupuncture that reviewed almost 300 studies. It included studies from around the world, focusing specifically on controlled clinical trials published up to 1999.[60]

With regard to pain management, the WHO report concluded that acupuncture has been proven as an effective treatment for facial pain (including craniomandibular disorders), headache, knee pain, low back pain, neck pain, dental and temporomandibular dysfunction, shoulder periarthritis, postoperative pain, rheumatoid arthritis, sciatica, sprains, and tennis elbow.[61] In some cases, according to this report, "the proportion of chronic pain relieved by acupuncture is generally in the range 55–85%, which compares favourably with that of potent drugs (morphine helps in 70% of cases) and far outweighs the placebo effect (30–35%)."[62] The WHO also concluded that acupuncture has shown a "therapeutic effect" but further proof is needed in the areas of abdominal pain (in acute gastroenteritis or due to gastrointestinal spasm), eye pain (due to subconjunctival injection), fibromyalgia and fasciitis, labor pain, post-herpetic neuralgia, osteoarthritis, pain due to endoscopic examination, thromboangiitis obliterans pain, postextubation pain in children, acute spine pain, and temporomandibular joint dysfunction (TMJ).

The WHO report stated that acupuncture has been proven effective in treating nausea and vomiting, as well as morning sickness. It concluded acupuncture has shown a "therapeutic effect" in treating substance abuse disorders, but further proof is needed regarding its effectiveness for alcohol dependence and detoxification and opium, cocaine, heroin, and tobacco dependence.

Treatment for PTSD

This review found only one systematic review of the use of acupuncture for post-traumatic stress disorder (PTSD), as "the research evaluating acupuncture for PTSD is still in its infancy."[63] This study concluded that acupuncture may be effective for the treatment of PTSD, but that further studies are needed to confirm these outcomes.[64] To this end, the U.S. Department of Defense and Department of Veterans Affairs are currently conducting comparative research on the effectiveness of acupuncture for the treatment of PTSD, as well as for pain and quality of life in veterans with PTSD.[65] Additionally, education and training programs are currently being offered to military health care providers, and the U.S. Air Force operates the Air Force Acupuncture Center at Joint Base Andrews in Maryland.[66,67] There is some evidence from small studies that the treatment has been shown to be effective, including one study which found acupuncture to have a "large treatment effect" compared to no treatment (using patients on treatment wait-lists as comparison), and equal to the results of patients treated with cognitive behavioral therapy.[68]

Summary of the efficacy of acupuncture

The treatment and techniques of acupuncture forming the basis of Traditional Chinese Medicine stem from a philosophy, culture, and history very different from those of the western system of medicine.[69] All of the treatments within this system have not yet been evaluated with the methods or approach used in the western system. A comprehensive and conclusive review of the efficacy of acupuncture is not possible in the scope of this analysis. While there are thousands of published studies on acupuncture, high-quality controlled clinical trials are still needed to evaluate its value for treatment of many symptoms and conditions.

However, there is sufficient evidence drawn solely from peer-reviewed western-based research publications to conclude that acupuncture is an effective treatment for a variety of diagnoses included in H.B. 3972, including certain pain management conditions, certain cases of nausea and vomiting, and certain substance abuse conditions. And while some of the evidence is contradictory and some researchers have called for additional studies, the balance of research has shown acupuncture to be an effective treatment when used ***in conjunction*** with traditional therapies for certain types of pain management, nausea and vomiting, and substance abuse treatment. Finally, there is little evidence about the effectiveness of acupuncture as a treatment for PTSD, although preliminary studies have suggested that acupuncture may be effective for this condition; additional studies are currently underway to confirm these outcomes. This review found no published studies comparing the relative quality of these services when provided by licensed acupuncturists and by licensed physicians.

ENDNOTES

1 The 188th General Court of the Commonwealth of Massachusetts, House Bill 3972, "An Act relative to the practice of acupuncture". Accessed 16 December 2014: https://malegislature.gov/Bills/188/House/H3972. In the 189th General Court of the Commonwealth of Massachusetts, House Bill 930; accessed 16 March 2015: https://malegislature.gov/Bills/189/House/H930.

2 National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM): About Us Home. Accessed 13 January 2015: http://www.nccaom.org/about/about-us-home.

> The NCCAOM is the only national organization that validates entry-level competency in the practice of acupuncture and Oriental medicine (AOM) through professional certification. NCCAOM certification or a passing score on the NCCAOM certification examinations are documentation of competency for licensure as an acupuncturist by 43 states plus the District of Columbia which represents 98% of the states that regulate acupuncture.

3 National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM): Certification Programs Fact Sheets, The NCCAOM Certification in Oriental Medicine Fact Sheet. Accessed 12 January 2015: http://www.nccaom.org/certification-programs-fact-sheets.

4 U.S. National Institutes of Health, National Center for Complementary and Integrative Health (NCCIH): Traditional Chinese Medicine: An Introduction. Updated 10 January 2014; accessed 13 January 2015: http://nccam.nih.gov/health/whatiscam/chinesemed.htm.

> The ancient beliefs on which TCM is based include the following:
>
> - The human body is a miniature version of the larger, surrounding universe.
> - Harmony between two opposing yet complementary forces, called yin and yang, supports health, and disease results from an imbalance between these forces.
> - Five elements—fire, earth, wood, metal, and water—symbolically represent all phenomena, including the stages of human life, and explain the functioning of the body and how it changes during disease.
> - Qi, a vital energy that flows through the body, performs multiple functions in maintaining health.

5 Op. cit. NCCAOM: Certification Programs Fact Sheets, The NCCAOM Certification in Oriental Medicine Fact Sheet.

6 Academy of Classical Oriental Sciences (ACOS). Chinese Acupuncture. Accessed 14 January 2015: http://www.acos.org/articles/chinese-acupuncture/.

7 World Health Organization (WHO) Scientific Group on International Acupuncture Nomenclature. A proposed standard international acupuncture nomenclature. Published 1991; accessed 14 January 2015: http://apps.who.int/iris/bitstream/10665/40001/1/9241544171_eng.pdf.

8 National Institutes of Health (NIH) Consensus Development Program Archive: Acupuncture. NIH Consensus Statement Online 1997 Nov 3-5; 15(5):1-34. Accessed 26 January 2015: http://consensus.nih.gov/1997/1997acupuncture107html.htm.

9 Dharmananda S. Electro-Acupuncture. Institute for Traditional Medicine, Portland, Oregon. Accessed 23 February 2015: http://www.itmonline.org/arts/electro.htm.

10 WHO Programme on Traditional Medicines. Acupuncture: Review and analysis of reports on controlled clinical trials. Published 2002; accessed 13 January 2015: http://apps.who.int/iris/handle/10665/42414#sthash.Gxi8eVZx.dpuf.

11 Massachusetts Department of Health and Human Services, Board of Registration in Medicine (MA-BRM): Definition of the Practice of Acupuncture. Accessed 16 December 2014: http://www.mass.gov/eohhs/gov/departments/borim/acupuncture/practice-of-acupuncture.html.

> A. Acupuncture shall include, but not be limited to:
>
> - Auricular, hand, nose, face, foot and/or scalp acupuncture therapy;
> - Stimulation to acupuncture points and channels by use of any of the following:
>   - Needles, moxibustion, cupping, thermal methods, magnets, gwua-sha, scraping techniques, acupatches, herbal poultices, ion cord linking acupuncture devices with wires, hot and cold packs, TDP (electro magnetic wave therapy), and lasers.
>   - Manual stimulation, including stimulation by an instrument or mechanical device that does not pierce the skin); massage, acupressure, reflexology, shiatsu and tui na.
>   - Electrical stimulation including electro-acupuncture, percutaneous and transcutaneous electrical nerve stimulation.
>
> B. Acupuncture diagnostic technique shall include but not be limited to the use of observation, listening, smelling, inquiring, palpation, pulses, tongue, physiognomy, five element correspondences, ryodoraku, akabani, German electro-acupuncture, Kirlian photography and thermography.

12 243 Code of Massachusetts Regulations (CMR 5.00): The Practice of Acupuncture. Accessed 13 January 2015: http://www.mass.gov/courts/docs/lawlib/230-249cmr/243cmr5.pdf.

13 Op. cit. NCCIH: Traditional Chinese Medicine: An Introduction.

14 WHO, Programme on Traditional Medicines. Guidelines for the Assessment of Herbal Medicines. Published 1991; accessed 13 January 2015: http://apps.who.int/iris/bitstream/10665/58865/1/WHO_TRM_91.4.pdf?ua=1.

15 NCCAOM: Certification Programs Fact Sheets, The NCCAOM Certification in Chinese Herbology. Accessed 13 January 2015: http://www.nccaom.org/certification-programs-fact-sheets.

16 243 Code of Massachusetts Regulations (CMR 2.00): Licensing and the Practice of Medicine, 2.07: General Provisions Governing the Practice of Medicine. Accessed 13 January 2015: http://www.mass.gov/courts/docs/lawlib/230-249cmr/243cmr5.pdf.

> (1) Acupuncture. Acupuncture is the practice of medicine and may be performed only by a full [physician] licensee or by an acupuncturist duly licensed and registered in the Commonwealth.

17 MA-BRM: Acupuncture, Full Licensing Requirements. Accessed 16 December 2014: http://www.mass.gov/eohhs/gov/departments/borim/acupuncture/licensing/requirements.html.

18 National Certification Commission on Acupuncture and Oriental Medicine (NCCAOM): Diplomate of Oriental Medicine. Accessed 16 December 2014: http://www.nccaom.org/consumers/oriental-medicine-certification.

19 Accreditation Commission for Acupuncture and Oriental Medicine (ACAOM): Acupuncture and Oriental Medicine. Accessed 16 December 2014: http://www.acaom.org/.

20 *Op. cit.* 243 CMR 5.00: The Practice of Acupuncture.

21 NCCAOM: 2013 Job Analysis: Number of Acupuncturists Provided by State Licensing Boards. Accessed 12 January 2015: http://www.nccaom.org/regulatory-affairs/state-licensure-map.

22 *Op. cit.* 243 CMR 5.00: The Practice of Acupuncture.

23 NCCAOM: States That Include Chinese Herbs in the Scope of Practice for Acupuncturists. Accessed 12 January 2015: http://www.nccaom.org/regulatory-affairs/state-licensure-map.

24 Massachusetts General Laws Chapter 112 Section 23A: Registration of Certain Professions and Occupations, Definitions. Accessed 13 February 2015: https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXVI/Chapter112/Section23A.

25 Massachusetts General Laws Chapter 112 Section 89: Registration of Certain Professions and Occupations, Definitions. Accessed 13 February 2015: https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXVI/Chapter112/Section89.

26 *Op. cit.* WHO, Programme on Traditional Medicines. Acupuncture: Review and analysis of reports on controlled clinical trials.

27 American Academy of Medical Acupuncture: General Information. Accessed 26 January 2015: http://www.medicalacupuncture.org/ForPatients/GeneralInformation.aspx.

28 *Op. cit.* WHO, Programme on Traditional Medicines. Acupuncture: Review and analysis of reports on controlled clinical trials.

29 Traditional (classical and extraordinary) acupuncture points follow along the meridians, or life-paths, along which energy (qi) flows according to Traditional Chinese Medicine.

ACOS: The Chinese Medicine Meridian System. Accessed 14 January 2015: http://www.acos.org/articles/the-chinese-medicine-meridian-system/.

30 Recent research explored the underlying neural mechanisms that impact the effectiveness of acupuncture. One NCCAM-funded study found that while both traditional and simulated acupuncture increase the brain's production of pain-reducing chemicals (opioids), traditional acupuncture also appears to help the brain to produce receptors for these chemicals, increasing the body's ability to use these chemicals more effectively.

Harris RE, Zubieta J-K, Scott DJ, et al. Traditional Chinese acupuncture and placebo (sham) acupuncture are differentiated by their effects on μ-opioid receptors (MORs). NeuroImage. 2009; 47(3):1077–1085. Accessed 15 January 2015: https://nccih.nih.gov/research/results/spotlight/110209.htm.

31 Vickers AJ, Cronin AM, Maschino AC, et. al. Acupuncture for chronic pain: individual patient data meta-analysis. Arch Intern Med. 2012 Oct 22;172(19):1444-53. Accessed 14 January 2015: http://www.ncbi.nlm.nih.gov/pubmed/22965186.

32 Ezzo J, Berman B, Hadhazy VA, et. al. Is acupuncture effective for the treatment of chronic pain? A systematic review. Pain. 2000 Jun;86(3):217-25. Accessed 22 January 2015: http://www.sciencedirect.com/science/article/pii/S0304395999003048.

33 Richardson PH et al. Acupuncture for the treatment of pain—a review of evaluation research. Pain, 1986, 24:15–40. Accessed 22 January 2015: http://psycnet.apa.org/psycinfo/1987-13507-001.

34 Furlan A, Yazdi F, Tsertsvadze A, et al. Complementary and Alternative Therapies for Back Pain II. Evidence Report/ Technology Assessment No. 194. Prepared by the University of Ottawa Evidence-based Practice Center under Contract No. 290-2007-10059-I (EPCIII). AHRQ Publication No. 10(11)E007. Rockville, MD: Agency for Healthcare Research and Quality. 2010. Accessed 13 January 2015: http://www.ncbi.nlm.nih.gov/books/NBK56295/.

35 Cherkin DC, Sherman KJ, Avins AL, et al. A Randomized Trial Comparing Acupuncture, Simulated Acupuncture, and Usual Care for Chronic Low Back Pain. Archives of Internal Medicine. 2009;169[9]:858–866. Accessed 14 January 2015 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2832641/.

36 *Op. cit.* Furlan A, Yazdi F, Tsertsvadze A, et al. Complementary and Alternative Therapies for Back Pain II.

37 Chou R, Qaseem A, Snow V, et. al.; Clinical Efficacy Assessment Subcommittee of the American College of Physicians; American College of Physicians; American Pain Society Low Back Pain Guidelines Panel. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Ann Intern Med. 2007 Oct 2;147(7):478-91. Accessed 22 January 2015: http://annals.org/article.aspx?articleid=736814.

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[39] Green S, Buchbinder R, Barnsley L, et. al. Acupuncture for lateral elbow pain. Cochrane Database of Systematic Reviews 2002, Issue 1. Accessed 21 January 2015: http://summaries.cochrane.org/CD003527/MUSKEL_acupuncture-for-elbow-pain.

[40] *Op. cit.* Furlan A, Yazdi F, Tsertsvadze A, et al. Complementary and Alternative Therapies for Back Pain II.

[41] Molsberger AF, Schneider T, Gotthardt H, et. al. German Randomized Acupuncture Trial for chronic shoulder pain (GRASP) - a pragmatic, controlled, patient-blinded, multi-centre trial in an outpatient care environment. Pain. 2010 Oct;151(1):146-54. Epub 2010 Jul 23. Accessed 21 January 2015: http://www.ncbi.nlm.nih.gov/pubmed/20655660.

[42] Vas J, Ortega C, Olmo V. Single-point acupuncture and physiotherapy for the treatment of painful shoulder: a multicentre randomized controlled trial. Rheumatology (Oxford). 2008 Jun;47(6):887-93. Epub 2008 Apr 10. Accessed 21 January 2015: http://www.ncbi.nlm.nih.gov/pubmed/18403402.

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> Western Medicine is closely linked to the scientific method and emphasizes empirically measurable biochemical processes that drive disease, its treatment, and health. WM is primarily concerned with the material aspect of the body and views all medical phenomena as cause-effect sequences, relying on rigorous scientific studies and research that seek empirical proof to all phenomena. To remedy disease, Western Medicine relies on drugs, radiation, and/or surgery to treat symptoms and disease.
>
> TCM favors a holistic approach, views the universe and body philosophically and develops inductive tools and methods with such principles to guide restoring the total balance of the body. The Chinese approach is based on a philosophic-scientific approach as compared to WM's cause-and-effect approach. In TCM theory, the correct balance between Yin and Yang make up the vital energy, 'Qi', an essential life-sustaining substance of which all things are made. Disease or illness is caused by the imbalance of Yin and Yang, which may be brought about by external agents and internal dysfunctions. To remedy disease or illness, TCM practitioners prescribe harmony-restoration treatments in the form of herbal medicine, acupuncture, moxibustion, massage, and other treatments.

CENTER FOR HEALTH
INFORMATION AND ANALYSIS

APPENDIX

Actuarial Assessment of House Bill 3972 Submitted to the 188th General Court: "An act relative to the practice of acupuncture"

Prepared for
Commonwealth of Massachusetts
Center for Health Information and Analysis

April 2015

Prepared by
Compass Health Analytics, Inc.

Actuarial Assessment of House Bill 3972
Submitted to the 188th General Court:
"An act relative to the practice of acupuncture"

Table of Contents

This report was prepared by Andrea Clark, MS, Amy Raslevich, MPP, MBA, Kamini Silva, FSA, MAAA, Larry Hart, James Highland, PhD, Lars Loren, JD, and Jennifer Becher, FSA, MAAA.

Actuarial Assessment of House Bill 3972
Submitted to the 188th General Court:
"An act relative to the practice of acupuncture"

Executive Summary

Massachusetts House Bill (H.B.) 3972, submitted in the 188th General Court (and submitted as H.B. 930 in the 189th General Court), requires health insurance plans to "provide benefits for acupuncture and oriental medicine based diagnosis and treatment in the areas of pain management, post-traumatic stress disorder, substance abuse treatment, and nausea."[1] Further, the bill states that "no third party payer of health care services shall differentiate reimbursement rates for acupuncture services by provider type. Only licensed acupuncturists or medical doctors shall be reimbursed for acupuncture services."[2]

Massachusetts General Laws (M.G.L.) c.3 §38C charges the Massachusetts Center for Health Information and Analysis (CHIA) with, among other duties, 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

Oriental medicine is defined by the National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM)[3] as a "comprehensive health care system encompassing a variety of traditional healthcare therapies that have been used for more than 3,000 years to diagnose and treat illness, prevent disease and improve well-being."[4] Based in part on Traditional Chinese Medicine (TCM)[5] while incorporating methods and theories from other Asian cultures, oriental medicine focuses on optimizing and balancing a body's energy flow to restore and maintain health. In the United States, the NCCAOM defines oriental medicine to include acupuncture, Chinese herbology, and Asian bodywork therapy (ABT).[6]

Acupuncture is a group of practices in which the skin is stimulated in order to regulate and remove obstructions to the flow of qi (energy) and blood throughout the body.[7,8] A consensus development conference statement from the National Institutes of Health described acupuncture as "a component of the health care system of China that can be traced back for at least 2,500 years. The general theory of acupuncture is based on the premise that there are patterns of energy flow (Qi) through the body that are essential for health. Disruptions of this flow are believed to be responsible for disease. Acupuncture may correct imbalances of flow at identifiable points close to the skin."[9] The World Health Organization (WHO) defines acupuncture to include traditional body needling, moxibustion (the burning on or over the skin of selected herbs), electric acupuncture (electro-acupuncture), laser acupuncture (photoacupuncture), microsystem acupuncture such as

ear (auricular), face, hand, and scalp acupuncture, and acupressure (the application of pressure at selected sites).[10] This definition is reflected and expanded in the Massachusetts state regulations that define acupuncture as "the practice of medicine based upon traditional oriental medical theories…in an attempt to relieve pain or improve bodily function."[11,12]

According to survey responses from ten of the largest commercial health insurance carriers in Massachusetts, acupuncture and oriental medicine based diagnosis and treatment (OMBDT) are generally not covered medical benefits. If enacted, H.B. 3972 will require all fully-insured commercial health insurance coverage in Massachusetts to include coverage for these services in the areas of pain management, post-traumatic stress disorder (PTSD), nausea, and substance abuse when performed by a licensed acupuncturist or physician. H.B. 3972 does not restrict carriers' ability to apply medical necessity criteria or set coverage limits.

Analysis

Compass estimated the impact of H.B. 3972 with the following steps:

- Estimate the base year (calendar 2012) cost per user per year of acupuncture services in Massachusetts.
- Apply an estimated patient cost sharing factor based on carrier claim experience.
- Estimate the number of fully commercially insured acupuncture users per year during the base year.
- Adjust the estimated users per year for the proportion of acupuncture services comprised by the four specific areas of treatment covered by the mandate.
- Calculate the proposed mandate's incremental effect on carrier medical expenses.
- Estimate the impact of insurer's retention (administrative costs and profit).
- Estimate the fully-insured Massachusetts population under age 65, projected for the next five years (2016 to 2020).
- Project the estimated cost over the next five years.

The analysis requires assumptions about the services covered by the bill, current and future levels of demand for acupuncture services, provider fee effects, and the extent and effect of carrier coverage limits. To adjust for these sources of uncertainty, the analysis produces a range of incremental impact estimates based on varying these parameters.

Summary results

Table ES-1 summarizes the estimated effect of H.B. 3972 on premiums for fully-insured plans over five years. This analysis estimates that the mandate, if enacted as drafted for the 188th General Court, would increase fully-insured premiums by as much as 0.16 percent on average over the next five years; a more likely increase is in the range of 0.12 percent, equivalent to an average annual expenditure of $15.5 million over the period 2016 to 2020.

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 ES-1:
Summary Results

	2016	2017	2018	2019	2020	Weighted Average	5 Yr Total
Members (000s)	2,329	2,305	2,279	2,253	2,226		
Medical Expense Low ($000s)	$8,106	$8,374	$8,721	$9,147	$9,589	$9,347	$43,936
Medical Expense Mid ($000s)	$12,158	$12,560	$13,081	$13,721	$14,383	$14,021	$65,904
Medical Expense High ($000s)	$16,211	$16,747	$17,441	$18,294	$19,177	$18,694	$87,871
Premium Low ($000s)	$8,979	$9,276	$9,661	$10,133	$10,622	$10,355	$48,672
Premium Mid ($000s)	$13,469	$13,914	$14,491	$15,200	$15,933	$15,532	$73,007
Premium High ($000s)	$17,959	$18,552	$19,321	$20,266	$21,244	$20,709	$97,343
PMPM Low	$0.23	$0.34	$0.35	$0.37	$0.40	$0.38	$0.38
PMPM Mid	$0.34	$0.50	$0.53	$0.56	$0.60	$0.57	$0.57
PMPM High	$0.45	$0.67	$0.71	$0.75	$0.80	$0.76	$0.76
Estimated Monthly Premium	$473	$487	$501	$515	$530	$487	$487
Premium % Rise Low	0.05%	0.07%	0.07%	0.07%	0.07%	0.08%	0.08%
Premium % Rise Mid	0.07%	0.10%	0.11%	0.11%	0.11%	0.12%	0.12%
Premium % Rise High	0.10%	0.14%	0.14%	0.15%	0.15%	0.16%	0.16%

Executive Summary Endnotes

[1] The 188th General Court of the Commonwealth of Massachusetts, House Bill 3972, "An Act relative to the practice of acupuncture". Accessed 16 December 2014: https://malegislature.gov/Bills/188/House/H3972. In the 189th General Court of the Commonwealth of Massachusetts, House Bill 930; accessed 16 March 2015: https://malegislature.gov/Bills/189/House/H930.

[2] *Ibid.* Additionally, Section 1 of the bill requires the Department of Public Health to establish a commission on acupuncture and wellness.

[3] National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM): About Us Home. Accessed 13 January 2015: http://www.nccaom.org/about/about-us-home.

> The NCCAOM is the only national organization that validates entry-level competency in the practice of acupuncture and Oriental medicine (AOM) through professional certification. NCCAOM certification or a passing score on the NCCAOM certification examinations are documentation of competency for licensure as an acupuncturist by 43 states plus the District of Columbia which represents 98% of the states that regulate acupuncture.

[4] National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM): Certification Programs Fact Sheets, The NCCAOM Certification in Oriental Medicine Fact Sheet. Accessed 12 January 2015: http://www.nccaom.org/certification-programs-fact-sheets.

[5] U.S. National Institutes of Health, National Center for Complementary and Integrative Health (NCCIH): Traditional Chinese Medicine: An Introduction. Updated 10 January 2014; accessed 13 January 2015: http://nccam.nih.gov/health/whatiscam/chinesemed.htm.

The beliefs on which TCM is based include the following:

- The human body is a miniature version of the larger, surrounding universe.
- Harmony between two opposing yet complementary forces, called yin and yang, supports health, and disease results from an imbalance between these forces.
- Five elements—fire, earth, wood, metal, and water—symbolically represent all phenomena, including the stages of human life, and explain the functioning of the body and how it changes during disease.
- Qi, a vital energy that flows through the body, performs multiple functions in maintaining health.

[6] *Op. cit.* NCCAOM: Certification Programs Fact Sheets, The NCCAOM Certification in Oriental Medicine Fact Sheet.

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[11] Massachusetts Department of Health and Human Services, Board of Registration in Medicine (MA-BRM): Definition of the Practice of Acupuncture. Accessed 16 December 2014: http://www.mass.gov/eohhs/gov/departments/borim/acupuncture/practice-of-acupuncture.html.

A. Acupuncture shall include, but not be limited to:

- Auricular, hand, nose, face, foot and/or scalp acupuncture therapy;
- Stimulation to acupuncture points and channels by use of any of the following:

- Needles, moxibustion, cupping, thermal methods, magnets, gwua-sha, scraping techniques, acupatches, herbal poultices, ion cord linking acupuncture devices with wires, hot and cold packs, TDP (electro magnetic wave therapy), and lasers.
- Manual stimulation, including stimulation by an instrument or mechanical device that does not pierce the skin); massage, acupressure, reflexology, shiatsu and tui na.
- Electrical stimulation including electro-acupuncture, percutaneous and transcutaneous electrical nerve stimulation.

B. Acupuncture diagnostic technique shall include but not be limited to the use of observation, listening, smelling, inquiring, palpation, pulses, tongue, physiognomy, five element correspondences, ryodoraku, akabani, German electro-acupuncture, Kirlian photography and thermography.

[12] 243 Code of Massachusetts Regulations (CMR 5.00): The Practice of Acupuncture. Accessed 13 January 2015: http://www.mass.gov/courts/docs/lawlib/230-249cmr/243cmr5.pdf.

Actuarial Assessment of House Bill 3972 Submitted to the 188th General Court: "An act relative to the practice of acupuncture"

1. Introduction

Massachusetts House Bill (H.B.) 3972, submitted in the 188th General Court (and submitted as H.B. 930 in the 189th General Court), requires health insurance plans to "provide benefits for acupuncture and oriental medicine based diagnosis and treatment in the areas of pain management, post-traumatic stress disorder, substance abuse treatment, and nausea."[1] Further, the bill states that "no third party payer of health care services shall differentiate reimbursement rates for acupuncture services by provider type. Only licensed acupuncturists or medical doctors shall be reimbursed for acupuncture services."[2]

Massachusetts General Laws (M.G.L.) c.3 §38C charges the Massachusetts Center for Health Information and Analysis (CHIA) with, among other duties, 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.

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

Section 2 of this analysis outlines the relevant provisions of the bill. Section 3 summarizes the methodology used for the estimate. Section 4 describes the calculations; results are presented in Section 5.

2. Interpretation of H.B. 3972

The following subsections describe the relevant provisions of H.B. 3972, as drafted for the 188th General Court.

2.1. Plans affected by the proposed mandate

The bill amends the statutes that regulate insurers providing health insurance in Massachusetts. The bill includes six relevant sections, five of which address statutes dealing with a particular type of health insurance policy:

- Section 2: Accident and sickness insurance policies (creating M.G.L. c. 175, § 47EE)
- Section 3: Medicare supplement policies (creating M.G.L. c. 175, §205A)

- Section 4: Contracts with non-profit hospital service corporations (creating M.G.L. c. 176A, § 8GG)
- Section 5: Certificates under medical service agreements (creating M.G.L. c. 176B, §4GG)
- Section 6: Health maintenance contracts (creating M.G.L. 176G, § 4Y)

Based on the sponsor's responses to questions about the scope of the bill, this analysis assumes the bill was intended to apply also to all plans, fully-insured and self-insured, offered by the Group Insurance Commission (GIC) for the benefit of state and local employees and their dependents.

Section 7 of the bill limits the third-party reimbursement of acupuncture services to services provided by licensed acupuncturists or physicians, and requires insurers to reimburse licensed acupuncturists and physicians at the same rate for acupuncture services. It does not modify a particular section of the Massachusetts statutes, but based on the sponsor's response to questions about the intent of the bill, this analysis assumes Section 7 applies to the insurance types addressed in the other sections and to GIC plans.

The bill requires coverage for members under the relevant Massachusetts-licensed plans, regardless of whether they reside within the Commonwealth or merely have their principal place of employment in the Commonwealth.

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

Acupuncture is a group of practices in which the skin is stimulated in order to regulate and remove obstructions to the flow of qi (energy) and blood throughout the body.[3,4] A consensus development conference statement from the National Institutes of Health described acupuncture as "a component of the health care system of China that can be traced back for at least 2,500 years. The general theory of acupuncture is based on the premise that there are patterns of energy flow (Qi) through the body that are essential for health. Disruptions of this flow are believed to be responsible for disease. Acupuncture may correct imbalances of flow at identifiable points close to the skin."[5] The World Health Organization (WHO) defines acupuncture to include traditional body needling, moxibustion (the burning on or over the skin of selected herbs), electric acupuncture (electro-acupuncture), laser acupuncture (photoacupuncture), microsystem acupuncture such as ear (auricular), face, hand, and scalp acupuncture, and acupressure (the application of pressure at selected sites).[6] This definition is reflected and expanded in the Massachusetts state regulations that define acupuncture as "the practice of medicine based upon traditional oriental medical theories…in an attempt to relieve pain or improve bodily function."[7,8]

Oriental medicine is defined by the National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM)[9] as a "comprehensive health care system encompassing a variety of traditional healthcare therapies that have been used for more than 3,000 years to diagnose and treat illness, prevent disease and improve well-being."[10] Based in part on Traditional Chinese Medicine (TCM)[11] while incorporating methods and theories from other Asian cultures, oriental medicine focuses on optimizing and balancing a body's energy flow to restore and maintain health. In the United States, the NCCAOM defines oriental medicine to include acupuncture, Chinese herbology, and Asian bodywork therapy (ABT).[12]

Chinese herbology, or Chinese herbal medicine, is another of the main components of oriental medicine and TCM.[13] To practice herbal therapy in Massachusetts, providers must obtain an additional NCCAOM certification in herbology, which is considered an adjunctive therapy to acupuncture in the state.[14] Those licensed acupuncturists certified to practice herbology are permitted to recommend the use of these substances as part of treatment, but the substances themselves are not FDA-approved or regulated by the state of Massachusetts. Therefore, the costs of herbal products are not reimbursed under commercial insurance policies as they do not meet current medical necessity criteria, resulting in a zero dollar incremental cost for purposes of this analysis.

All fully-licensed physicians in Massachusetts are able to provide acupuncture treatments, as it is contained within their defined scope of practice.[15] As noted above, Section 7 of H.B. 3972 requires third party payers of health care claims to reimburse all providers of acupuncture at the same rate and limits the practice of acupuncture to licensed acupuncturists and physicians, thus requiring fee parity for physicians and licensed acupuncturists.

This analysis defines the services mandated by H.B. 3972 as acupuncture services (as defined above), additional manual stimulation techniques (e.g., tui na and scraping techniques such as gua sha), and office visits for patient evaluation and management within the Massachusetts scope of practice for acupuncturists. The analysis estimates incremental cost to the Massachusetts fully-insured commercial health care market for mandated coverage of these services when performed by licensed acupuncturists and physicians for pain management, nausea, substance abuse, or post-traumatic stress disorder (PTSD).

2.3. Existing laws affecting the cost of H.B. 3972

This analysis has uncovered no current Massachusetts insurance mandates regarding insurance coverage for acupuncture or related treatments or services provided specifically by licensed acupuncturists. In addition, no existing federal mandates related to the specific subject matter of this bill have been identified.

3. Methodology

3.1. Steps in the analysis

Compass estimated the impact of H.B. 3972 with the following steps:

- Estimate the base year (calendar 2012) cost per user per year of acupuncture services in Massachusetts.
- Apply an estimated patient cost-sharing factor based on carrier claim experience.
- Estimate the number of fully commercially insured acupuncture users per year during the base year.
- Adjust the estimated users per year for the proportion of acupuncture services comprised by the four specific areas of treatment covered by the mandate.
- Calculate the proposed mandate's incremental effect on carrier medical expenses.
- Estimate the impact of insurer's retention (administrative costs and profit).
- Estimate the fully-insured Massachusetts population under age 65, projected for the next five years (2016 to 2020).
- Project the estimated cost over the next five years.

3.2. Data sources

The primary data sources used in the analysis were:

- Responses from the bill's sponsors or legislative staff to written questions regarding legislative intent
- Information from providers, cited as appropriate
- Information from a survey of private health insurance carriers in Massachusetts
- Academic literature and government reports, including population data, cited as appropriate
- Massachusetts insurer claim data from CHIA's Massachusetts All Payer Claim Database (APCD) for calendar years 2009 to 2012, for plans covering the majority of the under-65 insured population[16]

The following subsection and the step-by-step description of the estimation process address limitations in some of these sources and the uncertainties they contribute to the cost estimate.

3.3. Limitations

This analysis relies primarily on a careful assessment of the demand for and cost of acupuncture services described in H.B. 3972. The estimates draw on 2012 statewide data on cost and utilization of privately insured acupuncture services and national survey data regarding demand for

acupuncture and other complementary and alternative medical services. The estimates of incremental costs for the proposed mandate for 2016 to 2020 require assumptions about:

- The scope of services covered by the bill
- The current level of demand for acupuncture services for the four specific areas of treatment included in the bill and the expected change in that demand attributable to mandated coverage
- Current carrier contracting practices
- The extent of coverage for these services in the absence of the proposed mandate
- The extent and effect of carrier medical necessity criteria, cost sharing, and coverage limits

These uncertainties are addressed by modeling a reasonable range of assumptions based on informed judgment.

4. Analysis

To estimate the impact of the proposed legislation, the following calculations were executed. 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.

This analysis estimates the potential increase in medical expense due to the proposed mandate for a baseline period of calendar 2012. Simplified somewhat, that baseline cost calculation is:

	Average cost per user per year of acupuncture treatment for commercially-insured individuals in Massachusetts with coverage in 2012
x	Cost sharing factor
x	Number of incremental users per year
x	Proportion of users using services falling within H.B. 3972's covered areas of treatment
=	Estimated total incremental 2012 carrier claim expense

The components are multiplied together to estimate a total 2012 incremental carrier claim expense which is then divided by the 2012 fully-insured commercial enrollment (member months), yielding a per-member per-month (PMPM) cost estimate. That baseline PMPM cost estimate is the starting point for the calculations for the final forward-looking projections (2016 to 2020).

4.1. Average cost per user per year

According to survey responses from ten of the largest commercial health insurance carriers in Massachusetts, acupuncture and oriental medicine based diagnosis and treatment (OMBDT) are generally not covered medical benefits. However, two large carriers, together covering over sixty percent of the commercially covered lives in Massachusetts, allow self-insured employer groups to

cover acupuncture benefits, and some carriers cover acupuncture under certain exceptional circumstances with pre-authorization.[i] Data for one carrier in the latter group with significant acupuncture claim volume were used in this analysis. To estimate average cost per user per year of acupuncture services, Compass analyzed calendar 2012 Massachusetts APCD claims for services provided by acupuncturists and specific acupuncture services[ii] provided by physicians for that carrier and the two large carriers allowing the coverage for self-insured groups. Table 1 summarizes the results:

Table 1:
2012 Allowed Cost per User per Year of Acupuncture Treatment for Three Major Carriers

	Cost Per User Per Year
Carrier #1	$522
Carrier #2	$777
Carrier #3	$1,354

Translating these raw empirical results into a reasonable cost per user per year range for modeling the proposed mandate cost required an upward adjustment to Carrier #1's result and a downward adjustment to Carrier #3's, resulting in a slight narrowing of the range used for the analysis.

Carrier #1's claim activity showed that only the needling services component of acupuncture was covered in most cases. As noted in Section 2, this analysis assumes coverage for needling services, additional manual techniques, and office visits is required by the provisions of H.B. 3972. To adjust Carrier #1's cost per user per year to reflect coverage of non-needling manual therapies and office visits, Compass multiplied Carrier #1's user counts for needling services by the ratio of Carrier #3's user counts for non-needling manual therapies and office visits to Carrier #3's user count for needling services. That is, if Carrier #3 had 120 allowed users of non-needling codes in 2012 and

[i] As discussed below, one large carrier began including acupuncture services as a core medical benefit in most fully-insured plans as of January 1, 2015. No data are available for the new coverage.

[ii] There are four Current Procedural Terminology (CPT) professional procedure codes specific to the practice of acupuncture:

> **97810:** Acupuncture, 1 or more needles; without electrical stimulation, initial 15 minutes of personal one-on-one contact with the patient
> **97811:** without electrical stimulation, each additional 15 minutes of personal one-on-one contact with the patient, with re-insertion of needle(s)
> **97813:** with electrical stimulation, initial 15 minutes of personal one-on-one contact with the patient
> **97814:** with electrical stimulation, each additional 15 minutes of personal one-on-one contact with the patient, with re-insertion of needle(s)
> (Source: Abraham M, Ahlman J, et al. CPT: Current Procedural Terminology, 2014. American Medical Association, Chicago, IL, 2013; p. 601.)

These procedures are referred to as the "needling" services or procedures throughout. While other procedures are within the scope of practice for acupuncturists in the state of Massachusetts, the procedure codes for those services are not specific to the practice of acupuncture. Therefore, those services can only reliably be attributed to the practice of acupuncture, and identified as potential incremental costs of H.B. 3972, when performed by licensed acupuncturists. Those services are referred to throughout as the "non-needling" services or procedures and office visits.

100 users of needling codes, Compass multiplied Carrier #1's needling services user count by 1.2 to derive an adjusted non-needling services user count. The adjusted Carrier #1 user counts were then multiplied by Carrier #1's actual cost per user per year for non-needling acupuncture services to derive an all-services cost per user of $612.

As is clear in Table 1, Carrier #3's 2012 acupuncture benefit cost significantly more per user than Carrier #1's and Carrier #2's. Both Carrier #3's allowed unit cost (approximately $40 vs. approximately $25-$30), and units per user were significantly higher. Noting that Carrier #3 only covers acupuncture for self-insured contracts at the client's request suggests a downward adjustment to Carrier #3's cost per user per year as the high-end cost scenario, as the coverage carriers will offer under the mandate to their fully-insured customers will likely be more constrained. Assuming that smaller carriers entering the acupuncture market will likely face the higher of the two fee levels, Compass adjusted Carrier #3's cost per user by applying Carrier #3's observed unit cost to the lower units per user observed for Carrier #2. This calculation resulted in an estimated cost per user per year of $1206.

These results were translated into the low, medium, and high cost scenario cost per user per year assumptions appearing in Table 2.

Table 2:
Estimated Allowed Cost per User per Year of Acupuncture Treatment for Commercially Fully-Insured Members

	Cost Per User Per Year
Low Scenario	$600
Medium Scenario	$900
High Scenario	$1200

4.2. Cost sharing

The vast majority of acupuncture claims in the APCD were covered by two of the largest commercial carriers in Massachusetts. Self-insured large employer contracts comprised substantially all of this volume. Over the period 2009 to 2012, cost sharing for acupuncture claims was approximately 20 percent for one carrier and 30 percent for the other.

A 2012 analysis by Compass of 2010 Massachusetts carrier data for chiropractic services under fully-insured contracts provided a benchmark cost-sharing factor for fully-insured plans covering similar services of 34 percent (vs. 24 percent for self-insured contracts), suggesting the above results for acupuncture services are not anomalous.

Large employer contracts, such as those most likely to self-insure, typically have lower levels of cost sharing than average, suggesting 30 percent, the higher of the two observed acupuncture cost-sharing rates, as a reasonable cost sharing factor when coverage is expanded across the entire market.

4.3. Penetration: Users per year

In 2007, the U.S. Centers for Disease Control and Prevention's National Center for Health Statistic's (NCHS) National Health Interview Survey (NHIS) gathered data on the use of complementary and alternative medicine (CAM), including acupuncture services.[17] In a National Health Statistics Report published in December 2008, NCHS reported an annual prevalence rate for acupuncture services for adults 18 years of age and older of 1.4 percent[18] and a child annual prevalence rate of 0.2 percent.[19] A weighted average of the two results yields an all-ages prevalence rate for acupuncture services of 1.1 percent. NCHS additionally reported that for adults under 65 years of age, prevalence rates for acupuncture and a group of other CAM services[iii] were effectively the same for privately-insured and uninsured individuals (3.9 percent for the privately insured vs. 4.0 percent for the uninsured),[20] suggesting the utilization increase effects of acupuncture coverage are small.

A 2012 acupuncture penetration rate (unique users per year divided by average monthly membership) was calculated from Massachusetts APCD data for a single carrier that provided member months for contracts with acupuncture coverage to Compass. The resulting penetration rate was significantly smaller than the 2007 NHIS result (0.6 percent). However, because this carrier accounted for only four percent of the 2012 acupuncture claim volume, this analysis proceeds using a penetration rate based on the 2007 NHIS results of one percent, or 25,325 fully-insured users under age 65 in 2012.

One carrier comprising approximately 18 percent of the fully commercially insured Massachusetts health insurance membership began offering acupuncture coverage in most of its fully-insured plans as of January 1, 2015. Based on the carrier's survey response regarding plans excluding this coverage, Compass estimated that approximately 85 percent of the carrier's fully-insured membership receives the acupuncture coverage. Utilization by these members, therefore, is not an incremental cost of the proposed mandate. Applying this adjustment decreases the estimated number of incremental users to 21,428.

4.4. Adjustment for services within the defined areas of treatment

While H.B. 3972 mandates acupuncture coverage for "treatment in the areas of pain management, post-traumatic stress disorder, substance abuse treatment, and nausea,"[21] the acupuncture coverage offered in 2012 by the carriers included in this analysis was not limited based on defined areas of treatment.

To adjust for services in other areas of treatment, Compass reviewed the principal diagnosis codes reported for APCD claims for acupuncture needling services during the period 2009 to 2012. Based on the results, summarized in Table 3, Compass applied a downward adjustment of 20 percent to the incremental user count to account for cases not covered under the language of the bill.

[iii] "Alternative medical systems", defined to include acupuncture, ayurveda, homeopathic treatment, naturopathy, and traditional healers. The 1.1 percent prevalence rate reported above is for acupuncture services specifically. The private insurance vs. uninsured result was only reported for more aggregated categories of service, including alternative medical systems.

Table 3:
2009-2012 APCD Needling Codes Allowed Expenses
by Principal Diagnosis Type

	Service Dates in 2012	Service Dates 2009-2012
Pain, SA, & Nausea[iv]	81%	79%
Other Diagnoses	19%	21%

4.5. Fee parity

Section 7 of H.B. 3972 states that "no third party payer of health care services shall differentiate reimbursement rates for acupuncture services by provider type", and further provides that licensed acupuncturists and physicians will be the only reimbursable provider types under the mandate.[22] Only the provider networks of the two carriers offering acupuncture coverage to self-insured groups in the base year are subject to incremental costs resulting from this provision, as other carriers would be credentialing and contracting with acupuncture providers with the fee parity provision of H.B. 3972 already in place.

Of the two affected carriers, one stated in its response to the carrier survey that all acupuncture providers are contracted individually by an outside vendor. Massachusetts 2012 APCD data for this carrier showed no material acupuncture services volume for physicians. As the best information available indicates any acupuncture credentialing and contracting with physicians would take place after the implementation of the fee parity provision of H.B. 3972, this analysis assumes the incremental impact of fee parity on this carrier is immaterial.

The other affected carrier stated in its response to the carrier survey that acupuncture services fees are the same for physicians and licensed acupuncturists in their network. Therefore, the incremental cost of the fee parity provision for this carrier is zero.

4.6. Net increase in base year carrier medical expense

For each scenario, multiplying the estimated cost per user per year by estimated incremental users per year in the four covered treatment areas and the cost sharing factor, and dividing the result by the projected fully-insured membership yields the medical expense per member per month (PMPM) displayed in Table 4.

Table 4:
Estimate of Increase in Base-Year Carrier Medical Expense PMPM

Low Scenario	$0.24
Middle Scenario	$0.36
High Scenario	$0.47

[iv] There were no paid claims with a principal diagnosis of PTSD.

The base-year middle scenario PMPM of $0.36 is equivalent to annual medical claim spending of approximately $10.8 million.

4.7. Net increase in base year premium

Assuming an average retention rate of 9.7 percent, based on CHIA's analysis of administrative costs and profit in Massachusetts,[23] the increase in medical expense was adjusted upward to approximate the total impact on premiums. Table 5 shows the result.

Table 5:
Estimate of Increase in Base-Year Carrier Medical Expense PMPM

Low Scenario	$0.26
Middle Scenario	$0.39
High Scenario	$0.52

The middle scenario baseline (2012) PMPM of $0.39 is equivalent to annual spending of approximately $12 million.

4.8. Projected fully-insured population in Massachusetts

Table 6 shows the fully-insured population in Massachusetts ages 0-64 projected for the next five years. Appendix A describes the sources of these values.

Table 6:
Projected Fully-Insured Population in Massachusetts, Ages 0-64

Year	Total (0-64)
2016	2,329,040
2017	2,304,658
2018	2,279,367
2019	2,253,405
2020	2,226,328

4.9. Projection

The calculated incremental premium PMPMs from Section 4.7 were adjusted for medical inflation and multiplied by the member months from Section 4.8 to derive projected incremental costs. The results of these calculations are presented in the next section.

5. Results

The results of the estimated impact of the mandate are outlined below. 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.

5.1. Five-year estimated impact

For each year in the five-year analysis period, Table 7 displays the projected net impact of the proposed mandate on medical expense and premiums using a projection of Massachusetts fully-insured membership. The baseline (2012) PMPM cost for the incremental acupuncture services was projected forward to the study period of 2016 to 2020 using the Center for Medicare and Medicaid Services' (CMS) projected annual privately-insured physician services cost trends for the period.[24] The 2016 estimate is pro-rated to account for contract renewal dates after January 1. This analysis estimates that the mandate, if enacted, would increase fully-insured premiums by as much as 0.16 percent on average over the next five years; a more likely increase is in the range of 0.12 percent. The five-year average annual impact on premium spending is $15.5 million.

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 the benefits would change under the proposed mandate.

Table 7:
Summary Results

	2016	2017	2018	2019	2020	Weighted Average	5 Yr Total
Members (000s)	2,329	2,305	2,279	2,253	2,226		
Medical Expense Low ($000s)	$8,106	$8,374	$8,721	$9,147	$9,589	$9,347	$43,936
Medical Expense Mid ($000s)	$12,158	$12,560	$13,081	$13,721	$14,383	$14,021	$65,904
Medical Expense High ($000s)	$16,211	$16,747	$17,441	$18,294	$19,177	$18,694	$87,871
Premium Low ($000s)	$8,979	$9,276	$9,661	$10,133	$10,622	$10,355	$48,672
Premium Mid ($000s)	$13,469	$13,914	$14,491	$15,200	$15,933	$15,532	$73,007
Premium High ($000s)	$17,959	$18,552	$19,321	$20,266	$21,244	$20,709	$97,343
PMPM Low	$0.23	$0.34	$0.35	$0.37	$0.40	$0.38	$0.38
PMPM Mid	$0.34	$0.50	$0.53	$0.56	$0.60	$0.57	$0.57
PMPM High	$0.45	$0.67	$0.71	$0.75	$0.80	$0.76	$0.76
Estimated Monthly Premium	$473	$487	$501	$515	$530	$487	$487
Premium % Rise Low	0.05%	0.07%	0.07%	0.07%	0.07%	0.08%	0.08%
Premium % Rise Mid	0.07%	0.10%	0.11%	0.11%	0.11%	0.12%	0.12%
Premium % Rise High	0.10%	0.14%	0.14%	0.15%	0.15%	0.16%	0.16%

5.2. Impact on the GIC

Because the benefit offerings of GIC plans are similar to most other commercial plans in Massachusetts, and cover acupuncture treatment similarly to other carriers, the estimated PMPM effect of the proposed mandate on GIC coverage is not expected to differ from that calculated for the other fully-insured plans in Massachusetts. To calculate the medical expense separately for the self-insured portion of the GIC, the medical expense per member per month was applied to the GIC self-

insured membership; Table 8 displays the results. Note that the total medical expense and premium numbers displayed in Table 7 include the GIC fully-insured membership.

Table 8:
GIC Self-Insured Summary Results

	2016	2017	2018	2019	2020	Average	5 Yr Total
Members (000s)	263	263	263	262	262		
Medical Expense Low ($000s)	$324	$956	$1,005	$1,065	$1,127	$995	$4,478
Medical Expense Mid ($000s)	$486	$1,434	$1,508	$1,597	$1,691	$1,493	$6,717
Medical Expense High ($000s)	$648	$1,912	$2,011	$2,130	$2,255	$1,991	$8,956

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, in some cases, lives covered by GIC self-insured coverage. Membership projections for 2016 to 2020 are derived from the following sources.

Total Massachusetts population estimates for 2012, 2013, and 2014 from U. S. Census Bureau data[25] form the base for the projections. Distributions by gender and age, also from the Census Bureau,[26] were applied to these totals. Projected growth rates for each gender/age category were estimated from Census Bureau population projections to 2030.[27] The resulting growth rates were then applied to the base amounts to project the total Massachusetts population for 2016 to 2020.

The number of Massachusetts residents with employer-sponsored or individual (direct) health insurance coverage was estimated using Census Bureau data on health insurance coverage status and type of coverage[28] applied to the population projections.

To estimate the number of Massachusetts residents with fully-insured employer-sponsored coverage, projected estimates of the percentage of employer-based coverage that is fully-insured were developed using historical data from the Medical Expenditure Panel Survey Insurance Component Tables.[29]

To estimate the number of non-residents covered by a Massachusetts policy – typically cases in which a non-resident works for a Massachusetts employer offering employer-sponsored coverage – the number of lives with fully-insured employer-sponsored coverage was increased by the ratio of the total number of individual tax returns filed in Massachusetts by residents[30] and non-residents[31] to the total number of individual tax returns filed in Massachusetts by residents.

The number of residents with individual (direct) coverage was adjusted further to subtract the estimated number of people previously covered by Commonwealth Care who moved into MassHealth due to expanded Medicaid eligibility under the Affordable Care Act.[32]

Projections for the GIC self-insured lives were developed using GIC base data for 2012[33], 2013,[34] and 2014[35] 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 188th General Court of the Commonwealth of Massachusetts, House Bill 3972, "An Act relative to the practice of acupuncture". Accessed 16 December 2014: https://malegislature.gov/Bills/188/House/H3972. In the 189th General Court of the Commonwealth of Massachusetts, House Bill 930; accessed 16 March 2015: https://malegislature.gov/Bills/189/House/H930.

[2] *Ibid.* Additionally, Section 1 of the bill requires the Department of Public Health to establish a commission on acupuncture and wellness.

[3] Academy of Classical Oriental Sciences (ACOS). Chinese Acupuncture. Accessed 14 January 2015: http://www.acos.org/articles/chinese-acupuncture/.

[4] World Health Organization (WHO) Scientific Group on International Acupuncture Nomenclature. A proposed standard international acupuncture nomenclature. Published 1991; accessed 14 January 2015: http://apps.who.int/iris/bitstream/10665/40001/1/9241544171_eng.pdf.

[5] National Institutes of Health (NIH) Consensus Development Program Archive: Acupuncture. NIH Consensus Statement Online 1997 Nov 3-5; 15(5):1-34. Accessed 26 January 2015: http://consensus.nih.gov/1997/1997acupuncture107html.htm.

[6] WHO Programme on Traditional Medicines. Acupuncture: Review and analysis of reports on controlled clinical trials. Published 2002; accessed 13 January 2015: http://apps.who.int/iris/handle/10665/42414#sthash.Gxi8eVZx.dpuf.

[7] Massachusetts Department of Health and Human Services, Board of Registration in Medicine (MA-BRM): Definition of the Practice of Acupuncture. Accessed 16 December 2014: http://www.mass.gov/eohhs/gov/departments/borim/acupuncture/practice-of-acupuncture.html.

A. Acupuncture shall include, but not be limited to:

- Auricular, hand, nose, face, foot and/or scalp acupuncture therapy;
- Stimulation to acupuncture points and channels by use of any of the following:
  - Needles, moxibustion, cupping, thermal methods, magnets, gwua-sha, scraping techniques, acupatches, herbal poultices, ion cord linking acupuncture devices with wires, hot and cold packs, TDP (electro magnetic wave therapy), and lasers.
  - Manual stimulation, including stimulation by an instrument or mechanical device that does not pierce the skin); massage, acupressure, reflexology, shiatsu and tui na.
  - Electrical stimulation including electro-acupuncture, percutaneous and transcutaneous electrical nerve stimulation.

B. Acupuncture diagnostic technique shall include but not be limited to the use of observation, listening, smelling, inquiring, palpation, pulses, tongue, physiognomy, five element correspondences, ryodoraku, akabani, German electro-acupuncture, Kirlian photography and thermography.

[8] 243 Code of Massachusetts Regulations (CMR 5.00): The Practice of Acupuncture. Accessed 13 January 2015: http://www.mass.gov/courts/docs/lawlib/230-249cmr/243cmr5.pdf.

[9] National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM): About Us Home. Accessed 13 January 2015: http://www.nccaom.org/about/about-us-home.

> The NCCAOM is the only national organization that validates entry-level competency in the practice of acupuncture and Oriental medicine (AOM) through professional certification. NCCAOM certification or a passing score on the NCCAOM certification examinations are documentation of competency for licensure as an acupuncturist by 43 states plus the District of Columbia which represents 98% of the states that regulate acupuncture.

[10] National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM): Certification Programs Fact Sheets, The NCCAOM Certification in Oriental Medicine Fact Sheet. Accessed 12 January 2015: http://www.nccaom.org/certification-programs-fact-sheets.

[11] U.S. National Institutes of Health, National Center for Complementary and Integrative Health (NCCIH): Traditional Chinese Medicine: An Introduction. Updated 10 January 2014; accessed 13 January 2015: http://nccam.nih.gov/health/whatiscam/chinesemed.htm.

The ancient beliefs on which TCM is based include the following:

- The human body is a miniature version of the larger, surrounding universe.
- Harmony between two opposing yet complementary forces, called yin and yang, supports health, and disease results from an imbalance between these forces.
- Five elements—fire, earth, wood, metal, and water—symbolically represent all phenomena, including the stages of human life, and explain the functioning of the body and how it changes during disease.
- Qi, a vital energy that flows through the body, performs multiple functions in maintaining health.

[12] *Op. cit.* NCCAOM: Certification Programs Fact Sheets, The NCCAOM Certification in Oriental Medicine Fact Sheet.

[13] *Op. cit.* NCCIH: Traditional Chinese Medicine: An Introduction.

[14] *Op. cit.* 243 CMR 5.00: The Practice of Acupuncture.

[15] 243 Code of Massachusetts Regulations (CMR 2.00): Licensing and the Practice of Medicine, 2.07: General Provisions Governing the Practice of Medicine. Accessed 13 January 2015: http://www.mass.gov/courts/docs/lawlib/230-249cmr/243cmr5.pdf.

> (1) Acupuncture. Acupuncture is the practice of medicine and may be performed only by a full [physician] licensee or by an acupuncturist duly licensed and registered in the Commonwealth.

[16] More information can be found at http://www.mass.gov/chia/researcher/hcf-data-resources/apcd/.

[17] Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. National health statistics reports; no. 12. Hyattsville, MD; National Center for Health Statistics. 2008. Accessed 2 February 2015: http://www.cdc.gov/nchs/data/nhsr/nhsr012.pdf.

[18] *Ibid.*

[19] *Ibid.*

[20] *Ibid.*

[21] *Op. cit.* The 188th General Court of the Commonwealth of Massachusetts. Bill H. 3972: An act relative to the practice of acupuncture.

[22] *Ibid*.

[23] Massachusetts Center for Health Information and Analysis. Annual Report on the Massachusetts Health Care Market, September 2014. Accessed 16 February 2015: http://www.mass.gov/chia/docs/r/pubs/14/chia-annual-report-2014.pdf.

[24] Centers for Medicare and Medicaid Services. National Health Expenditure (NHE) Amounts by Type of Expenditure and Source of Funds: Calendar Years 1960-2023 in PROJECTIONS format. Accessed 4 February 2015: http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html; Downloads; NHE Historical and Projections 1960-2023 [ZIP, 80KB].

[25] U.S. Census Bureau. Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2014. Accessed 23 January 2015: http://www.census.gov/popest/data/state/totals/2014/index.html.

[26] U.S. Census Bureau. Annual Estimates of the Resident Population by Single Year of Age and Sex for the United States, States, and Puerto Rico Commonwealth: April 1, 2010 to July 1, 2012. Accessed 23 January 2014: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

[27] U.S. Census Bureau. File 4. Interim State Projections of Population by Single Year of Age and Sex: July 1, 2004 to 2030, U.S. Census Bureau, Population Division, Interim State Population Projections, 2005. Accessed 23 January 2014: http://www.census.gov/population/projections/data/state/projectionsagesex.html.

[28] U.S. Census Bureau. Table HIB-4. Health Insurance Coverage Status and Type of Coverage by State All People: 1999 to 2012. Accessed 23 January 2014: http://www.census.gov/hhes/www/hlthins/data/historical/HIB_tables.html.

[29] Agency for Healthcare Research and Quality. Percent of private-sector enrollees that are enrolled in self-insured plans at establishments that offer health insurance by firm size and State (Table II.B.2.b.1), years 1996-2012: 1996 (Revised March 2000), 1997 (March 2000), 1998 (August 2000), 1999 (August 2001), 2000 (August 2002), 2001 (August 2003), 2002 (July 2004), 2003 (July 2005), 2004 (July 2006), 2005 (July 2007), 2006 (July 2008), 2008 (July 2009), 2009 (July 2010), 2010 (July 2011), 2011 (July 2012), 2012 (July 2013),2013(July 2014). Medical Expenditure Panel Survey Insurance Component Tables. Generated using MEPSnet/IC. Accessed 31 January 2015: http://www.meps.ahrq.gov/mepsweb/data_stats/MEPSnetIC.jsp.

[30] IRS. Table 2. Individual Income and Tax Data, by State and Size of Adjusted Gross Income, Tax Year 2010. Accessed 6 March 2014: http://www.irs.gov/uac/SOI-Tax-Stats---Historic-Table-2.

[31] Massachusetts Department of Revenue. Massachusetts Personal Income Tax Paid by Non-Resident by State for TY2010. Accessed 23 January 2014: http://www.mass.gov/dor/tax-professionals/news-and-reports/statistical-reports/.

[32] Massachusetts Budget and Policy Center. THE GOVERNOR'S FY 2015 HOUSE 1 BUDGET PROPOSAL. Accessed 5 January 2015: http://www.massbudget.org/reports/pdf/FY 2015 GAA - Brief Final.pdf Accessed January 2015

[33] Group Insurance Commission, Group Insurance Commission Fiscal Year 2012 Annual Report. Accessed 14 March 2014: http://www.mass.gov/anf/docs/gic/annual-report/arfy2012.pdf.

[34] Group Insurance Commission. GIC Health Plan Membership by Insured Status FY2013. Accessed 22 January 2014: http://www.mass.gov/anf/employee-insurance-and-retirement-benefits/annual-reports/annual-report-fy-2013-financial-and-trend.html.

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