California Health Benefits Review Program

Analysis of California Assembly Bill (AB) 2004 Hearing Aids: Minors

A Report to the 2015-2016 California State Legislature

April 16, 2016

CALIFORNIA
HEALTH BENEFITS REVIEW PROGRAM

Key Findings:

Analysis of California Assembly Bill (AB) 2004 Hearing Aids: Minors

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

AT A GLANCE

Assembly Bill (AB) 2004 (introduced February 2016) would require coverage for hearing aids when medically necessary for enrollees under 18 years of age in Department of Managed Health Care (DMHC) plans and California Department of Insurance (CDI) policies.

- **Background on pediatric hearing loss.** Children may experience hearing loss in one or both ears. Nationwide, hearing loss in one ear (unilateral) occurs in about 2.7% of adolescents aged 12 to 19 while hearing loss in both ears (bilateral) is less common at 0.8% of adolescents (Shargorodsky, 2010). This prevalence accounts for congenital hearing loss (present at birth) and acquired.
- **Enrollees covered.** CHBRP estimates that in 2015, all state-regulated coverage (for 25.2 million Californians) would be subject to AB 2004.
- **Impact on expenditures.** CHBRP estimates that AB 2004 would increase total net annual expenditures by $3,599,000 in the first year postmandate.
  - **Shifting costs.** While CHBRP does not anticipate a major increase in utilization, there would be a shift in costs from enrollee out-of-pocket expenditures to costs paid by health plans and policies for medically necessary children's hearing aids and services.
- **Essential Health Benefits (EHBs).** Coverage required by AB 2004 would appear to exceed EHBs as this benefit is not included in the state's benchmark plan.
- **Medical effectiveness.** It is generally accepted that the use of hearing aids improves the hearing of children with hearing loss. A preponderance of evidence suggests that hearing aids are effective in improving speech and language outcomes among children with hearing loss. Early and consistent use of hearing aids is associated with better speech and language outcomes.
- **Benefit coverage.** Currently, CHBRP estimates that in privately funded plans and policies, about 9% of enrollees aged 0 to 17 have coverage for hearing aids and services. In publicly funded plans, CHBRP estimates that 100% of enrollees aged 0 to 17 have coverage for hearing aids and services.
- **Utilization.** Postmandate, CHBRP estimates a modest increase in utilization of hearing aids and related services among enrollees who previously had no coverage for hearing aids and related services (2.4% increase).
- **Public health.** CHBRP expects that speech and language skills would improve for a subset of children with hearing loss who were unable to afford hearing aids premandate. CHBRP estimates that this bill would reduce the financial burden on families currently without coverage for hearing aids who would gain coverage postmandate.
- **Long-term impacts.** It is unknown to what degree AB 2004 would improve the future educational and employment outcomes of children who obtain hearing aids through new coverage. However, it stands to reason that those who need and use hearing aids at a young age would experience improved outcomes as compared with no hearing aid use.

BILL SUMMARY

AB 2004 would require DMHC-regulated plans and CDI-regulated policies issued, amended, or renewed on or after January 1, 2017, to include coverage for hearing aids for enrollees under 18 years when medically necessary. Coverage includes initial assessment, new hearing aids at least every 5 years, new hearing aid(s) if they no longer meet the child's needs or if existing hearing aid(s) are not working, fittings, adjustments, auditory training, and maintenance for hearing aid(s). Hearing aids are defined in the bill as "an electronic device usually worn in or behind the ear of a deaf and hard of hearing person for the purpose of amplifying sound." The bill language does not specify a dollar amount coverage cap.

The bill would add a new section to the Health and Safety Code (1367.72) and to the Insurance Code (10123.72). AB 2004 excludes Medicare supplement, dental-only, and vision-only plans from the Health and Safety code provisions. The bill excludes accident-only, specified disease, hospital indemnity, Medicare supplement, dental-only and vision-only policies from the Insurance Code provision.

CONTEXT FOR BILL CONSIDERATION

Newborn Screening Hearing Program and Coverage of Hearing Screening

Landmark research in the 1990s found that early identification and treatment of hearing loss in children prevented delays in speech, language, and cognitive development, which led to the implementation of universal newborn hearing screening programs in the U.S. (Yoshinaga-Itano, 2003).

The California Newborn Hearing Screening Program requires California hospitals to screen newborns for hearing loss before discharge. The program's goal is to identify infants with hearing loss before three months of

age and subsequently link infants with hearing loss to intervention services by six months of age. The state also screens for hearing loss among school-aged children in public schools.

As for hearing screening more generally, this service is covered as a preventive service among qualified health plans[1] as an essential health benefit.

California Children's Services

California Children's Services (CCS) is a state program that provides coverage for children under age 21 with certain eligible medical conditions, including qualifying hearing loss. Children may qualify for CCS by meeting certain age, residence, medical, and financial requirements. Children in Medi-Cal (both fee-for-service and Medi-Cal managed care) receive medically necessary hearing aid services through this program. Other children may be eligible, as described in the *Policy Context* section.

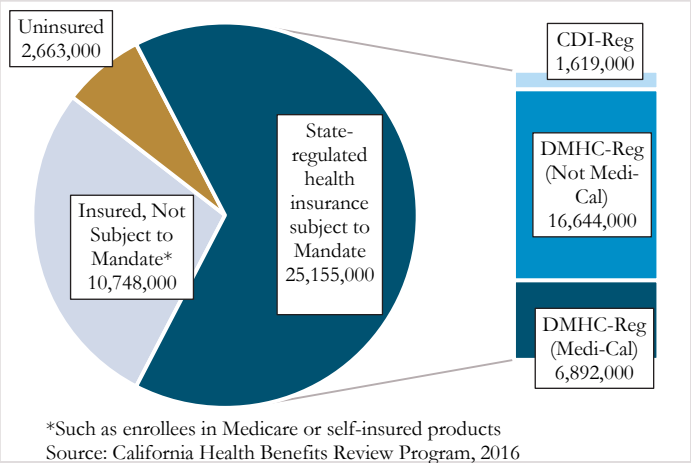
Types of Hearing Aids and Devices Considered

Based on the definition in the bill language, this analysis examines the use of conventional hearing aids and also the non-surgically implanted, wearable bone-conduction hearing aid (BCHA) (including the brand name "BAHA Softband"). Conventional hearing aids capture vibration through microphone(s) and play the sound back in the ear canal. Conversely, BCHA captures vibrations via microphone and transmits to the bones of the skull and thus to the inner ear. For the wearable BCHA, the device is worn on a removable headband, rather than surgically implanted. This analysis did not categorize cochlear implants as hearing aids.

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

INCREMENTAL IMPACT OF ASSEMBLY BILL (AB) 2004

Figure 1. Health Insurance in CA and AB 2004



AB 2004 would apply to all state-regulated insurance (as shown in Figure 1), including DMHC Medi-Cal managed care.

Benefit Coverage

CHBRP estimates that currently, approximately 53.2% of enrollees aged 0 to 17 years in California with health insurance have coverage that is compliant with AB 2004. This estimate includes children in both privately funded and publicly funded health insurance products regulated by DMHC or CDI. CHBRP estimates that approximately:

- 9% of enrollees aged 0 to 17 in privately funded products have coverage for hearing aids and services;
- 100% of enrollees aged 0 to 17 in publicly funded plans have coverage for hearing aids and services.

Postmandate, 100% of enrollees aged 0 to 17 with health insurance would have mandate-compliant coverage of hearing aids.

Utilization

Some evidence suggests that hearing aids are largely price inelastic; in other words, the purchase and use of hearing aids may be largely unaffected by price. CHBRP

estimates that the removal of a cost barrier when coverage is introduced for hearing aids would thus result in a modest increase in utilization of 2.4% among enrollees who *do not have* coverage for hearing aids and services premandate. Coupled with no anticipated hearing aids utilization change among enrollees aged 0 to 17 that *do have* hearing aids coverage premandate, this leads to an overall 1% utilization change (see full *Benefit Coverage, Utilization, and Cost Impacts* section for description). In state-regulated plans and policies (both publicly and privately funded), CHBRP estimates that premandate, there are 20,900 children enrollees (aged 0–17) using hearing aids. This figure includes both those who have coverage for hearing aids and services and those who lack coverage and are paying out-of-pocket for hearing aids. Postmandate, CHBRP estimates 21,100 children enrollees (aged 0-17) would use hearing aids and/or services, which accounts for the modest increase in utilization among enrollees who previously had no coverage for hearing aids. All 21,100 children would have coverage for hearing aids and services as required by the mandate.

Postmandate, CHBRP estimates there would be no change in the average per enrollee cost of hearing aids and services. CHBRP estimates hearing aids and services cost on average $2,023 per enrollee, which includes children who may not have purchased a new hearing aid in the given year, but may use related hearing aid services in that year.

Cost Impacts

CHBRP estimates that AB 2004 would increase total net annual expenditures by $3,599,000 in the first year postmandate. Notably, while CHBRP does not anticipate a major increase in utilization, there would be a shift in costs from enrollee out-of-pocket expenditures to costs paid by health plans and policies.

Postmandate, CHBRP estimates that premiums would remain the same or increase per member per month (PMPM) as follows:

- Publicly funded plans (CalPERS HMO, Medi-Cal managed care plans): $0.00 change PMPM due to current coverage of hearing aids.
- Privately funded DMHC plans: PMPM increases range from $0.05 in the individual market, $0.10 in large group, to $0.13 in small group.
- Privately funded CDI policies: $0.09 PMPM increase in the individual market, $0.12 PMPM increase in large group and $0.13 PMPM increase in small group.

Public Health

Hearing loss may be congenital (present at birth) or acquired later during childhood. Children may experience hearing loss in one or both ears, and may require either one or two hearing aids. Nationwide, hearing loss in one ear (unilateral) occurs in about 2.7% of adolescents aged 12 to 19 while hearing loss in both ears (bilateral) is less common at 0.8% of adolescents (Shargorodsky, 2010). This overall prevalence rate of 3.5% among adolescents includes both congenital and acquired hearing loss. This hearing loss range is greater than the moderate-to-severe range for which hearing aids are most commonly prescribed.

CHBRP projects that AB 2004 would increase the first-time use of hearing aids and services by 200 children (all in the privately funded insurance market) in the first-year postmandate; thus, assuming new coverage is similar to premandate cost sharing, hearing and speech and language skills would be expected to improve for this subset of newly covered children with hearing loss who were unable to afford hearing aids premandate.

No literature was found that discussed the receipt of hearing aids and its effect on ameliorating existing disparities in hearing loss by gender, income, and maternal education (as described in the *Background on Pediatric Hearing Loss and Hearing Aids* section). CHBRP estimates that AB 2004 would reduce the net financial burden of out-of-pocket expenses by approximately $17 million for the families of 21,100 children who use hearing aids and services in the first year, postmandate. CHBRP estimates that the annual out-of-pocket costs for families of the 21,100 newly covered children would decrease from about $1850 to $300.

Medical Effectiveness

It is generally accepted that the use of hearing aids improves the hearing of children with hearing loss. As a result, there have been few recent studies on the impact of hearing aids on hearing in children.

CHBRP concludes that there is a preponderance of evidence from studies with moderately strong research designs that:

- Hearing aids are effective in improving speech outcomes in children. In particular, evidence suggests that earlier age of fitting with hearing aid is associated with greater gains in speech outcomes.

- Hearing aids are effective in improving language development outcomes in children. In particular, risk for language delays in children with hearing loss may be mitigated from an early age of fitting and consistent use of hearing aids.

Conversely, there is insufficient evidence that hearing aids are effective in improving nonverbal outcomes (e.g., motor behavior) in children. There is ambiguous/conflicting evidence that hearing aids are effective in improving personal and social development outcomes in children.

Essential Health Benefits and the Affordable Care Act

The state's benchmark plan, which determines which services are included as a part of California's essential health benefits, does not include coverage for hearing aids.

Coverage for children's hearing aids and associated services (e.g., replacement, repair) mandated by AB 2004 appears to exceed EHBs, and therefore would appear to trigger the ACA requirement that the state defray the cost of additional benefit coverage for enrollees in qualified health plans (QHPs) in Covered California.

References

Shargorodsky J, Curhan S, Curhan G, Eavey R. Change in Prevalence of Hearing Loss in US Adolesecents. *JAMA*. 2010: 304(7);772-778.

Yoshinaga-Itano C. From Screening to Early Identification and Intervention: Discovering Predictors to Successful Outcomes for Children With Significant Hearing Loss. *Journal of Deaf Studies and Deaf Education*. 2003;Winter;8(1):11-30.

A Report to the California State Legislature

Analysis of California Assembly Bill (AB) 2004 Hearing Aids: Minors

April 16, 2016

California Health Benefits Review Program
1111 Broadway, Suite 1400
Oakland, CA 94607
Tel: 510.287.3876
Fax: 510.763.4253
www.chbrp.org

ABOUT CHBRP

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

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

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

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

(AB) 2004 IMPACTS ON BENEFIT COVERAGE, UTILIZATION, AND COST, 2017

Table 1. AB 2004 Impacts on Benefit Coverage, Utilization, and Cost, 2017

	Premandate	Postmandate	Increase/ Decrease	Change Postmandate
Benefit coverage				
Total enrollees with health insurance subject to state benefit mandates [a]	25,155,000	25,155,000	0	0%
Total enrollees aged 0-17 years with health insurance subject to AB 2004	7,263,000	7,263,000	0	0%
Percentage of enrollees aged 0-17 years with coverage for hearing aids and services (i.e., health insurance compliant with AB 2004) [b]	53.2%	100.0%	46.8%	88.0%
Utilization and cost				
Total enrollees aged 0-17 years subject to AB 2004 using hearing aids and/or related services	20,900	21,100	200	1%
Hearing aid & services count of enrollees aged 0-17 ***with hearing aid coverage*** *(number of enrollees)*				
Hearing aids	5,862	11,018	5,156	88.0%
Hearing aid maintenance & repair	1,068	2,007	939	88.0%
Replacement	39	73	34	88.0%
Ear mold	3,300	6,202	2,902	88.0%
Diagnostic tests, hearing aid checks, fittings and adjustments[c]	5,920	11,127	5,207	88.0%
Hearing aid & services count of enrollees aged 0-17 ***with no hearing aid coverage*** *(number of enrollees)*				
Hearing aids	5,035	0.00	-5,035	-100%
Hearing aid maintenance & repair	917	0.00	-917	-100%
Replacement	33	0.00	-33	-100%
Ear mold	2,834	0.00	-2,834	-100%
Diagnostic tests, hearing aid checks, fittings and adjustments[c]	5,085	0.00	-5,085	-100%
Hearing aid and/or services average cost per user[d]	$2,022.74	$2,022.74	0.000	0%
Expenditures				
Premium expenditures by payer				
Private employers for group insurance	$64,837,024,000	$64,849,987,000	$12,963,000	0.02%
CalPERS HMO employer expenditures [e]	$4,756,143,000	$4,756,143,000	$0	0%
Medi-Cal Managed Care Plan expenditures [f]	$16,670,700,000	$16,670,700,000	$0	0%
Enrollees for individually purchased insurance	$22,073,116,000	$22,076,228,000	$3,112,000	0.01%

Enrollees with group insurance, CalPERS HMOs, Covered California, and Medi-Cal Managed Care [(a) (g)]	$20,496,488,000	$20,500,572,000	$4,084,000	0.02%
Enrollee expenses				
Enrollee out-of-pocket expenses for covered benefits (deductibles, copayments, etc.)	$16,248,327,000	$16,251,294,000	$2,967,000	0.02%
Enrollee expenses for noncovered benefits [(h) (f)]	$19,527,000	$0	-$19,527,000	-100%
Total expenditures[(j)]	$145,101,325,000	$145,104,924,000	$3,599,000	0.002%

Source: California Health Benefits Review Program, 2016.
Notes:
(a) This population includes persons with privately funded and publicly funded (e.g., CalPERS HMOs, Medi-Cal Managed care Plans) health insurance products regulated by DMHC or CDI. Population includes enrollees aged 0 to 64 years and enrollees 65 years or older covered by employment sponsored insurance.
(b) The premandate coverage of 53.2% is a weighted average of enrollees aged 0 to 17 years covered by privately funded (9%) and publicly funded (100%) health insurance products regulated by DMHC and CDI.
(c) Excludes screening as part initial assessment, covered under EHB
(d) The average cost per user of hearing aids and/or services reported here includes all types of users, including those who receive hearing aids and those may only receive hearing services (e.g., diagnostic tests) but do not receive hearing aids in the claim year, 2014 in MarketScan® Commercial Claims and Encounters Database. Note the average cost hearing aids and hearing aid services for just those who receive hearing aids is notably higher at $3,566.
(e) 100% of people aged 0 to 17 years have coverage for hearing aids and services under CalPERS and Medi-Cal managed care.
(f) Does not include enrollees in COHS; 100% of people aged 0 to 17 years have coverage for hearing aids and related services under Medi-Cal.
(g) Premium expenditures by enrollees include employee contributions to employer-sponsored health insurance and enrollee contributions for publicly purchased insurance.
(h) Includes only those expenses that are paid directly by enrollees to providers for services related to the mandated benefit that are not currently covered by insurance. In addition this only includes those expenses that would be newly covered, postmandate. Other components of expenditures in this table include all health care services covered by insurance.
(i) Prior to the mandate, enrollees without coverage for hearing aids incurred an estimated $16,560,000 in out-of-pocket expenses for hearing aids and services. Postmandate, these costs plus administrative costs would be added to health insurance premiums, resulting in a net total of $19,527,000 in increased premium, and a $16,560,000 reduction in out-of-pocket costs for services that are covered by insurance post-mandate. However, the newly covered enrollees would continue to incur $2,967,000 in copayments for the newly covered benefits.
(j) The $3.599 million expenditure increase is from both the modest increased utilization of hearing aids and services and the costs for hearing aids and services that are covered by insurance post-mandate.
Key: CalPERS HMOs=California Public Employees' Retirement System Health Maintenance Organizations; CDI=California Department of Insurance; DMHC=Department of Managed Health; COHS=County Operated Health System

POLICY CONTEXT

The California Assembly Committee on Health has requested that the California Health Benefits Review Program (CHBRP)[2] conduct an evidence-based assessment of the medical, financial, and public health impacts of (AB) 2004, Hearing aids: minors.

If enacted, (AB) 2004 would affect the health insurance of approximately 25.2 million enrollees (65.2% of all Californians). This represents 100% of the 25.2 million Californians who will have health insurance regulated by the state in 2017 that may be subject to any state health benefit mandate law — health insurance regulated by the California Department of Managed Health Care (DMHC) or the California Department of Insurance (CDI). The bill excludes Medicare supplement, dental-only, and vision-only plans from the Health and Safety code provisions and excludes accident-only, specified disease, hospital indemnity, Medicare supplement, dental-only, and vision-only policies from the Insurance Code provisions.

Bill-Specific Analysis of (AB) 2004, Hearing Aids: Minors

Bill Language

(AB) 2004 would require DMHC-regulated plans and CDI-regulated policies issued, amended, or renewed on or after January 1, 2017, to include coverage for hearing aids for all enrollees younger than 18 years when medically necessary. Coverage includes initial assessment, new hearing aids at least every 5 years, new hearing aid(s) if they no longer meet the child's needs or if existing hearing aid(s) are not working, fittings, adjustments, auditory training, and maintenance for hearing aid(s). Hearing aids are defined in the bill as "an electronic device usually worn in or behind the ear of a deaf and hard of hearing person for the purpose of amplifying sound." The bill requires coverage, but does not specify the level of coverage required or a dollar amount cap on coverage (e.g., $2,000 in coverage over 5 years). The bill would add a new section to the Health and Safety Code (1367.72) and to the Insurance Code (10123.72). AB 2004 excludes Medicare supplement, dental-only, and vision-only plans from the Health and Safety code provisions. The bill excludes accident-only, specified disease, hospital indemnity, Medicare supplement, dental-only, and vision-only policies from the Insurance Code provision. The full text of (AB) 2004 can be found in Appendix A.

Analytic Approach and Key Assumptions

The following are key assumptions used in the analysis of AB 2004:

- The bill language defines hearing aids as "an electronic device usually worn in or behind the ear of a deaf and hard of hearing person for the purpose of amplifying sound." Based on this definition, the analysis includes conventional air conduction hearing aids as these are most commonly used by children with hearing loss (Gabbard and Schryer, 2003; Palmer and Ortmann, 2005). The CHBRP analysis also includes the non-surgical bone conduction hearing aid (BCHA).[3] The wearable BCHA is a vibratory transducer (device that transmits vibrations) attached to a removable headband; the device presses against the skull bone to transmit sound waves via bone to the inner ear.

[2] CHBRP's authorizing statute is available at www.chbrp.org/docs/authorizing_statute.pdf.
[3] Based on input from content expert, Margaret Winter. Personal communication with Margaret Winter, March 11, 2016.

- The analysis does not include surgically implanted BCHAs or cochlear implants as they are not "worn," but surgically implanted.
- While adjuvant therapy, such as speech therapy, is often coupled with hearing aid usage for children with hearing loss, this analysis does not incorporate the costs of adjuvant therapy, as that is outside the scope of the costs for this bill.

Interaction with Existing Requirements

AB 2004 may interact and align with the following state and federal mandates or provisions.

California law and regulations

California law requires screening for hearing loss among children, first at birth in the Newborn Hearing Screening Program and subsequently at school-age (for students in the public school system) (NCSL, 2011).[4,5,6] For more information about these programs, please see *Background on Pediatric Hearing Loss and Hearing Aids*.

There is no existing law mandating any kind of coverage for hearing aids for private insurance. However, for children 21 and under in Medi-Cal and children who meet certain qualifications including a qualifying hearing loss, hearing aids are covered through California Children's Services (CCS). CCS is a state program that provides coverage for children under age 21 with certain eligible medical conditions, including hearing loss. Children may also qualify for CCS by meeting certain age, residence, medical, and financial requirements.[7,8]

The eligibility criteria are:

- **Age:** Child must be under 21;
- **Residence:** Child must be California resident;
- **Medical condition:** Child has a medical condition that is covered by CCS, as determined by the California Code of Regulations;[9]
- **Financial and other:** Child and family meets one of the following criteria:
    - Family income of $40,000 or less;
    - Out-of-pocket medical expenses expected to be more than 20 percent of family's adjusted gross income;
    - A need for an evaluation to find out if there is a health problem covered by CCS;
    - Child was adopted with a known health problem that is covered by CCS;
    - Child has a need for the Medical Therapy Program (a state program that provides services for children who have handicapping conditions, generally due to neurological or musculoskeletal disorders);
    - Medi-Cal, with full benefits.

For children who meet the stated criteria, CCS covers qualifying hearing loss as defined by the California Code of Regulations.[10]

[4] Cal. Health and Safety Code § 123975
[5] Cal. Health and Safety Code § 124115 et seq.
[6] California Code of Regulations, Title 17, Section 2952 (c)(1)
[7] Medi-Cal Provider Manual. Part 2 – Audiology and Hearing Aids (AUD), California Children's Services (CCS) Program.
[8] http://www.dhcs.ca.gov/services/ccs/Pages/qualify.aspx
[9] California Code of Regulations, Title 22, Article 1, Sections 41811 through 41876.
[10] 22 CCR § 41518 § 41518. Diseases of the Ear and Mastoid Process.

Medi-Cal recipients under age 21 must be referred to CCS for hearing loss services, including hearing aids,[11] both for fee-for-service and managed care. For Medi-Cal beneficiaries in county organized health system (COHS) plans, the COHS plans, rather than CCS, provide hearing services.[12,13,14]

Having private insurance does not preclude a child from receiving services through CCS. If they meet the previously mentioned requirements, children with private insurance may receive coverage through CCS for certain conditions (e.g., hearing loss) that their insurance does not cover or for services that meet the out-of-pocket medical expense eligibility above.[15]

Similar requirements in other states

Sixteen states (CO, CT, DE, KY, LA, MN, MD, MA, MN, MS, NJ, NM, NC, OK, OR, TN) require that health benefit plans cover hearing aids for children (ASHA, 2016). Three states — Arkansas, New Hampshire, and Rhode Island — require that plans cover hearing aids for adults and children. Wisconsin requires coverage for both hearing aids and cochlear implants for children.

Of the 16 states that mandate coverage of hearing aids for children, California's proposed legislation is most similar to Colorado's law which requires plans to cover hearing aids for children younger than 18 years when medically necessary. Under Colorado's law, coverage includes new hearing aid(s) every five years, a new hearing aid when alterations to the existing hearing aid(s) cannot meet the needs of the child, and services and supplies such as the initial assessment, fitting, adjustments, and auditory training.[16]

Affordable Care Act

The Affordable Care Act (ACA) has impacted health insurance in California, expanding the Medi-Cal program[17] and making subsidized and nonsubsidized health insurance available through Covered California, the state's health insurance marketplace.[18]

A number of ACA provisions have the potential to or do interact with state benefit mandates. Below is an analysis of how AB 2004 may interact with requirements of the ACA, including the requirement for certain health insurance to cover essential health benefits (EHBs).[19]

Essential Health Benefits

State health insurance marketplaces, such as Covered California, are responsible for certifying and selling qualified health plans (QHPs)[20] in the small-group and individual markets. Health insurance offered in Covered California is required to at least meet the minimum standard of benefits as defined by the ACA

[11] Medi-Cal Provider Manual. Part 2 – Audiology and Hearing Aids (AUD)
[12] Email correspondence with DHCS, March 24, 2016.
[13] These COHS counties are Marin, Napa, San Mateo, Solano, Santa Barbara, and Yolo.
[14] CHBRP analyses exclude COHS plans.
[15] Personal communication with Margaret Winters, March 15, 2016.
[16] Colorado Rev. Stat. §10-16-104
[17] The Medi-Cal expansion is to 133% of the federal poverty level (FPL) — 138% with a 5% income disregard.
[18] The ACA requires the establishment of health insurance exchanges in every state, now referred to as health insurance marketplaces.
[19] The ACA requires nongrandfathered small-group and individual market health insurance — including but not limited to QHPs sold in Covered California — to cover 10 specified categories of EHBs. Resources on EHBs and other ACA impacts are available on the CHBRP website: http://www.chbrp.org/other_publications/index.php.
[20] In California, QHPs are nongrandfathered small-group and individual market DMHC-regulated plans and CDI-regulated policies sold in Covered California, the state's health insurance marketplace.

as essential health benefits (EHBs), and available in the Kaiser Foundation Health Plan Small Group Health Maintenance Organization (HMO) 30 plan, the state's benchmark plan for federal EHBs.[21,22]

States may require such QHPs to offer benefits that exceed EHBs.[23] However, a state that chooses to do so must make payments to defray the cost of those additionally mandated benefits, either by paying the purchaser directly or by paying the QHP.[24,25] On the other hand, "state rules related to provider types, cost-sharing, or reimbursement methods" would *not meet* the definition of state benefit mandates that could exceed EHBs.[26]

AB 2004 and EHBs

The state's benchmark plan (Kaiser Foundation Health Plan Small Group HMO 30) does cover hearing screenings and exams as a preventive care service. However, the benchmark plan does not cover hearing aids for children or adults. Thus, this service would not be considered an essential health benefit for the state of California.

Coverage of hearing aids for children younger than 18 years and associated services, as mandated by AB 2004, would require coverage for a new benefit that appears to exceed EHBs in California. This would appear to trigger the ACA requirement that the state defray the cost of additional benefit coverage for enrollees in QHPs in Covered California.

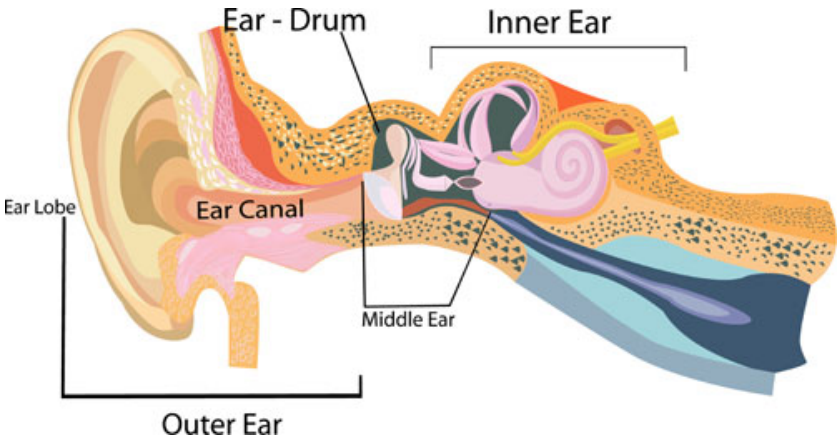
[21] The U.S. Department of Health and Human Services (HHS) has allowed each state to define its own EHBs for 2014 and 2015 by selecting one of a set of specified benchmark plan options. CCIIO, Essential Health Benefits Bulletin. Available at: cciio.cms.gov/resources/files/Files2/12162011/essential_health_benefits_bulletin.pdf.
[22] H&SC §1367.005; IC Section 10112.27.
[23] ACA § 1311(d)(3).
[24] State benefit mandates enacted on or before December 31, 2011, may be included in a state's EHBs, according to the U.S. Department of Health and Human Services (HHS). Patient Protection and Affordable Care Act: Standards Related to Essential Health Benefits, Actuarial Value, and Accreditation. Final Rule. Federal Register, Vol. 78, No. 37. February 25, 2013. Available at: www.gpo.gov\fdsys\pkg\FR-2013-02-25\pdf\2013-04084.pdf.
[25] However, as laid out in the Final Rule on EHBs HHS released in February 2013, state benefit mandates enacted on or before December 31, 2011, would be included in a state's EHBs and there would be no requirement that the state defray the costs of those state mandated benefits. For state benefit mandates enacted after December 31, 2011, that are identified as exceeding EHBs, the state would be required to defray the cost.
[26] Essential Health Benefits. Final Rule. A state's health insurance marketplace would be responsible for determining when a state benefit mandate exceeds EHBs, and QHP issuers would be responsible for calculating the cost that must be defrayed.

BACKGROUND ON PEDIATRIC HEARING LOSS AND HEARING AIDS

Types of Hearing Loss

There are three types of hearing loss: conductive, sensorineural, and mixed. Sensorineural hearing loss occurs when there is damage to the inner ear hair cells or a damaged hearing nerve. Conductive hearing loss, affecting the outer ear and middle ear, is usually transient unlike sensorineural loss, which is generally permanent (CDC, 2015a).

Most hearing loss is sensorineural and is attributed to congenital causes (present at birth) or acquired during childhood. About 50% of congenital hearing loss cases are due to genetic causes, 25% of cases are due to maternal illness during pregnancy, premature birth, or complications after birth. The causes are unknown for the remaining 25% of cases (CDC, 2015b). Reasons for acquired hearing loss include excessive noise, injury, certain medications, tumors, jaundice, meningitis, or problems with blood circulation (Boyle et al., 2011; Shargorodsky et al., 2015).



Source: CDC, 2015a

Hearing loss can range from “mild” to “profound” and can be unilateral or bilateral (one or both ears). The following table (Table 2) describes the degrees of hearing loss and examples of audible words at different levels of loss. In the U.S., hearing aids are usually indicated for children with unilateral or bilateral moderate-to-severe hearing loss leading to speech or articulation disorders (Paludetti et al., 2012), although children with mild or profound hearing loss may meet clinical recommendations for hearing aids.[27]

[27] Based on input from content expert, Margaret Winter. Personal communication with Margaret Winter, April 7, 2016.

Table 2. Degrees and Descriptions of Hearing Loss

Degree of Hearing Loss Decibel Level (dB)	Description of Loss (Words heard according to degree of loss)
Normal-Slight: -10–25 dB	Normal hearing range not requiring a hearing aid
Example of Loss:	*Freddie thought he should find a whistle.*
Mild: 26–40 dB	Cannot hear a whispered conversation in a quiet atmosphere at close range.
Example of Loss:	*Freddie though- -e ‘”ould -ind a whi’”le.*
Moderate: 41–55 dB	Cannot hear normal conversation in a quiet atmosphere at close range.
Example of Loss:	*-reddie ”ough- -e ‘”ould -i” a ”i’”le.*
Severe: 56–90 dB	Cannot hear speech; can only hear loud noises such as a vacuum cleaner or lawn mower at close range.
Example of Loss:	*‘”e‘”ie ‘”ou‘” -e ‘”ou‘” -i‘” a ‘”i’”le.*
Profound: 91+ dB	Cannot hear speech; may only hear extremely loud noises such as a chain saw at close range or the vibrating component of loud sound.
Example of Loss:	*LOUDsoft LOUD soft soft LOUD soft LOUDsoft*

Source: California Health Benefits Review Program, 2016. Adapted from American Academy of Otolaryngology—Head and Neck Surgery Foundation, 2006; and the American Speech-Language-Hearing Association, 2016a; and the Wyoming Early Hearing Detection and Intervention program.

California Hearing Screening Programs

California Newborn Hearing Screening Program

Landmark research in the 1990s found that early identification and treatment of hearing loss in children prevented delays in speech, language, and cognitive development, which led to the implementation of the universal newborn hearing screening programs (NHSP) in the U.S. (Yoshinaga-Itano, 2003a). The California Newborn Hearing Screening Program requires California hospitals to screen newborns for hearing loss before discharge (DHCS, 2016). The most recent data (2013) showed that 97% of live births in California were screened, and, of those, 0.2% (909 infants) were diagnosed with hearing loss by age 6 months (CDPH, 2015).

The program’s goal is to identify infants with hearing loss before three months of age and subsequently link those infants to intervention services by six months of age (DHCS, 2016). Infants who fail the initial screening in the hospital setting are referred for up to two more rescreenings prior to three months of age. Those who do not pass the final screening are referred to California Children’s Services for a diagnostic hearing evaluation. In addition to screening and diagnosis for hearing loss, the NHSP connects families of newly diagnosed infants with community support services (including services provided based on the requirements of the Individuals with Disabilities Education Act), assists with assessing the family’s insurance coverage or, if eligible, facilitates enrollment in the California Children Services and Early Start Programs (DHCS, 2016).

Public School Hearing Screening Programs

Public screening programs for hearing loss in school-aged children also identify those with previously undiagnosed loss and acquired hearing loss. Specifically, California requires school-aged children to be screened twice during their public education tenure. The first screening occurs in kindergarten or first grade, and a follow-up screening occurs in second, fifth, eighth, tenth or eleventh grade. School audiometrists, public health nurses, or credentialed school nurses conduct the screenings. If a child fails the hearing test, the school must provide to the parents or guardians a written notice of the results and provide a recommendation for medical and audiological follow-up evaluations.

Prevalence and Incidence of Hearing Loss in Children

National

According to the Centers for Disease Control and Prevention, estimating the total number of children with hearing loss is dependent on the age groups studied and the definition of hearing loss (CDC, 2015c). Various national surveys[28] and programs track the incidence[29] and prevalence[30] of children with hearing loss using different age groups (e.g., cohorts of newborns, aged 8 years, aged 3-17 years); different definitions (e.g., moderate-to-profound loss, affected by hearing loss), and different methods (e.g., self-report, administrative records, audiometric evaluations) (Mehra et al., 2009). These differences make it difficult to calculate an overall prevalence rate for children under age 19 years. The literature frequently notes that the *incidence* of moderate-to-profound pediatric hearing loss ranges between 1 and 5 per 1,000 children (0.1% to 0.5%) (Boyle et al., 2011; HLAC, 2016; NIDCD, 2016). Other sources report *prevalence* rates between 3.1% to 5.3% and up to 15% of children (aged 6-19 years and 12-19 years, respectively) with a hearing loss of at least 16dB (slight loss) in one or both ears (Niskar et al., 1998; Shargorodsky et al., 2010). *The lower and upper thresholds for hearing loss in these studies include children who would be unlikely to use hearing aids (i.e., some of those within the normal/slight/mild loss range [16 dB], who might use FM systems, and those who experience profound loss [91+dB], who might be candidates for cochlear implants)* (Table 2).

California

CHBRP found no registry or recent survey data that estimated overall hearing loss in California's pediatric population, but the CDC Early Hearing and Detection Intervention program showed an incidence rate of 1.9 per 1,000 California newborns screened in 2013 with hearing loss (reported via California NHSP). Additionally, there are several state agencies that provide services to support many of California's children with hearing loss including the California Department of Developmental Services (serving about 4,954 children with "hearing problems") and the California Department of Education (serving about 16,150[31] "hard of hearing/deaf" children) (CDE, 2016; DDS, 2015).

[28] National Health and Nutrition Examination Survey (NHANES III), Metropolitan Atlanta Developmental Disabilities Surveillance Program, National Health Information Survey, Early Hearing Detection and Intervention Program, etc.
[29] Incidence is the number of new cases identified in a specified timeframe (e.g., number of new cases of flu in August).
[30] Prevalence is the number of all active cases identified in a specific timeframe (e.g., all cases of flu in August).
[31] Personal communication, N. Sager, March 2016.

Children may experience hearing loss in one or both ears, and so will require either one or two hearing aids. CHBRP finds the following prevalence estimate most relevant to the analysis of AB 2004: Nationwide, hearing loss in one ear (unilateral) occurs in about 2.7% of adolescents aged 12 to 19 while hearing loss in both ears (bilateral) is less common at 0.8% of adolescents (Shargorodsky, 2010). This overall prevalence rate of 3.5% includes children with unilateral and bilateral loss of at least 16 dB that is congenital or acquired. This hearing loss range is greater than the range for which hearing aids are most commonly prescribed, and thus, overstates the number of youth as likely users of hearing aids.

Types and Costs of Hearing Aids

Costs and Ability to Pay

Hearing aids generally cost between $1500-$4000 per ear depending on the technology and enhancements selected by the patient. Patients also incur costs for hearing aid-related services such as fittings, repairs, and related audiometry testing. Families of children with hearing loss experience additional costs associated with more frequent fittings of new ear molds necessary to accommodate the child's growth (up to 4 times per year for infants/toddlers[32]). Muñoz et al. reported that the most important challenges to parents in obtaining pediatric hearing aids was the ability to pay, accepting the need for hearing aids, and wait time for a pediatric audiologist. Their 2007-2010 survey results indicated that, despite the cost challenge, only a minority of parents were unable to obtain hearing aids for their child (4 of 333 respondents or 1.2%). Thirty-seven percent reported having insurance coverage for hearing aids and about one-half of children were fitted with loaner hearing aids prior to purchasing their own (California does not have a hearing aid loaner program unlike Colorado, Idaho, or Kansas; however, some hearing aid manufacturers provide the loaner service) (Muñoz et al., 2013). Other sources of hearing aid assistance, for those who meet eligibility criteria, include charities and California Children's Services[33] (Muñoz et al., 2013).

In summary, cost may pose a final barrier wherein a minority of children who need hearing aids go without hearing aids because they cannot afford them. In other cases, families may shoulder a financial burden to acquire medically necessary hearing aids for children.

Types of Hearing Aids

There are five basic categories of hearing aids (Table 3), all of which are customized for each user by the manufacturer and audiologist. Due to improved technology, the electronics used in hearing aids are usually digital rather than analog;[34] however, either can be used in any type of hearing aid. In general, hearing aids include a microphone, amplifier, receiver, and battery (volume controls are optional, and can be activated or de-activated in the programming software (American Hearing Research Foundation, 2012). *Digital aids* convert sound waves into numerical codes (i.e., binary code) before amplifying them. The coding allows the audiologist to program the aid to accommodate a variety of types, degrees, and configurations of hearing and to help the user hear and understand in a variety of settings (i.e., classrooms, noisy restaurants, etc.). Digital aids also have the ability to focus on sounds coming from a specific direction (NIDCD, 2015).

[32] Personal communication, M. Winters, March 2016.
[33] http://www.dhcs.ca.gov/services/ccs/Pages/qualify.aspx
[34] Personal communication, M. Winters, March 2016.

Hearing aid fittings

Children who are prescribed hearing aids visit an audiologist who works with the child's parents or guardians to select an appropriate hearing aid. The type of insurance coverage for hearing aids, if any, may impact the type of hearing aid they select. The audiologist takes impressions of the child's ears to make custom ear molds for the child's hearing aid. After the hearing aid is selected and ordered, the child returns for a fitting. This requires taking measurements of the child's ear canal volume, programming the hearing aids using manufacturer software, and adjusting the hearing aid to the child's ear canal volume, verifying the amplification to appropriate target values and validation of the fitting through observation, questionnaires, assessment of sound detection and speech comprehension. For young children, hearing aid checks and assessments are needed frequently with ear molds being recast 3-4 times per year). When children are well established with a stable hearing and amplification, they are likely to need checks and assessments about twice annually and adolescents are likely to need annual checks.

Table 3. Description of Categories of Hearing Aids

Type of Aid	Description		$ Range*
BTE: Behind-the-ear	Hard plastic cases that fit behind the ear and connect by tubing to a plastic customized ear mold that fits into the outer ear. Least expensive, easiest to adjust, less feedback, fewest problems with wax or infections. Suitable for mild to profound hearing loss. *BTE are considered the most appropriate hearing aid for young children since they accommodate the widest range of loss, and, since as the child grows, ear molds can be replaced frequently without having to re-case an in-the-ear instrument.*		$1580-$2769
RIC/RITE: Receiver in canal/Receiver-in-the ear	Similar in appearance to BTE, but the speaker is placed inside the canal via thin wires instead of acoustic tubes. Suitable for mild to severe loss. Controls are easy to manipulate. Wax and moisture build up may occur and users may feel "plugged" while wearing. May be appropriate for children since ear molds can be recast as the child grows.		$1694-$2993
ITE: In-the-ear	The aid, contained in a custom shell, fits in outer ear bowl and part of the ear canal. They are suitable for mild to severe hearing loss. Low profile hearing aids are described as half-shell shapes that fit in the lower half of the outer ear and are large enough to accommodate volume wheels and program push buttons. Requires dexterity to adjust and remove; not recommended for young children who would require new custom shells to assure proper fit as they grow.		$1600-$2757
ITC/CIC: In-the-canal/ Completely-in-canal	Fits entirely inside the canal. The least visible aids are completely-in-the-canal (CIC). These are very small and can be hard for some people to adjust and remove. Both can be used for mild to moderately severe hearing loss and are generally not recommended for young children or people with severe to profound hearing loss due to limited power and volume and because the smallest aids can be a choking hazard for infants and toddlers.		$1695-$2958
BCHA: Bone conduction hearing aid	Vibratory transducer is attached to a removable headband and presses through the scalp against the skull bone to transmit vibrations (sound waves) via bone to the inner ear. *Ideal candidates are children with aural atresia (structural deficits to middle ear), absent external ears, chronic middle ear drainage or unilateral profound sensorineural hearing loss where conventional hearing aids are contraindicated and who are too young for surgical application of bone conduction implants.*		$4000

Sources: California Health Benefits Review Program, 2016. Photos from American Speech-Language-Hearing Association. Descriptions from the American Hearing Research Foundation, NIDCD and personal communication with M. Winters.
Note: Extended Wear Hearing Aids are another newer option for adults. They are placed nonsurgically in the ear canal by an audiologist and worn continuously for several months until replaced with a new aid.
* Estimated range in costs obtained from AARP Hearing Aid Styles: Pros and Cons, 2014, and personal communication with M. Winters, April 5, 2016 (for BCHA estimate).

Social Determinants of Health[35] and Disparities[36] in Hearing Loss

Per statute, CHBRP now includes discussion of disparities under the broader umbrella of social determinants of health (SDoH). SDoH include factors outside of the traditional medical care system that influence health status and health outcomes. CHBRP considers the full range of SDoH and related disparities (e.g., income, education, and social construct around age, race/ethnicity, gender, and gender identity/sexual orientation) that are relevant to this bill and where evidence is available. In the case of AB 2004, evidence shows that disparities exist in prevalence of pediatric hearing loss by gender and race/ethnicity. No data were found regarding the utilization of hearing aids in the pediatric population by race/ethnicity or gender.

Disparities in Pediatric Hearing Loss

CHBRP reviewed several sources to identify potential disparities in the prevalence of pediatric hearing loss. The 2005-2006 National Health and Nutrition Examination Survey (NHANES) used interviews and performed audiometric evaluations on children aged 12 to 19 years to determine level of hearing loss (moderate to profound) in the pediatric cohort. The National Health Interview Survey (NHIS) included a nationally representative cohort of children aged 3 to 17 years to estimate the prevalence of moderate-to-profound hearing loss. The NHIS data presented here are aggregated between 1991-2008 (Boyle et al., 2011). The 2010 Metropolitan Atlanta Developmental Disabilities Surveillance Program (MADDSP) monitored only children aged 8 years using administrative data from multiple education and health records and reported on those with moderate-to-profound hearing loss (Van Naarden Braun et al., 2015).

Gender

Most studies found that pediatric hearing loss is more prevalent among males than females (Mehra et al,, 2009). For example, a study using NHIS data found that the prevalence of self-reported moderate-to-profound pediatric hearing loss in males was 0.42% compared with 0.35% in females (Boyle et al., 2011). A study using MADDSP data on eight-year-olds in the Atlanta region reported a mean hearing loss prevalence rate of 1.5% for males compared with 1.2% for females between 1991 and 2010. And Shargorodsky et al. (using NHANES data) reported that among 12- to 19-year-olds, hearing loss among males was 21.8% compared to females at 17.1%. The NHANES study included those with a slight hearing loss (16dB or greater) rather than moderate or greater loss, and focused on older children who would have higher rates of acquired loss; thus, the discrepancy between studies.

Income

Boyle et al. (2011) found that a higher proportion of children who were poor and who were covered by public insurance suffered from hearing loss, but that the differences were not statistically significant. For instance, the prevalence of moderate-to-profound hearing loss in children living below 200% FPL was

[35] CHBRP defines social determinants of health as conditions in which people are born, grow, live, work, learn, and age. These social determinants of health (economic factors, social factors, education, physical environment) are shaped by the distribution of money, power, and resources and impacted by policy (adapted from CDC, 2014; Healthy People 2020, 2015). See SDoH white paper for further information. Available at: http://www.chbrp.org/analysis_methodology/docs/Incorporating%20Relevant%20Social%20%20Determinants%20of%20Health%20in%20CHBRP%20Analyses%20Final%2003252016.pdf.

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

0.47% compared with 0.32% for those at or above 200% FPL. [37] Additionally, hard-of-hearing children with private insurance had the lowest prevalence rate of hearing loss (0.34%), followed by those who were uninsured (0.44%). Those who had Medicaid/CHIP insurance had the highest rate of hearing loss (0.77%) (Boyle et al., 2011).These findings are from the National Health Interview Survey using parent reports of their child's moderate-to-profound hearing loss. While there is no explanation of why rates may be higher in poor children, the same pattern was found in the distribution of ADHD, learning disabilities, intellectual disabilities, seizures, and other developmental delays included in the study.

Race/ethnicity

CHBRP found ambiguous evidence about racial/ethnic disparities in the prevalence of pediatric hearing loss. Two studies reported that prevalence rates of moderate-to-profound hearing loss was lowest among Hispanics (Boyle et al., 2011; Shargorodsky et al., 2010). One study showed non-Hispanic whites with a higher prevalence of pediatric hearing loss than non-Hispanic blacks (0.44% and 0.35%, respectively) (Boyle et al., 2011), while two other studies found no significant difference between the two groups (Shargorodsky et al., 2010; Van Naarden Braun et al., 2015).

[37] FPL=Federal Poverty Level

MEDICAL EFFECTIVENESS

Interventions to treat hearing loss in children involve fitting children with hearing aids, and providing educational interventions for children and their caregivers. Hearing aids help children with hearing loss by amplifying sounds. In the United States, the federal Individuals with Disabilities Education Act (IDEA) requires local school districts to provide educational interventions to children with hearing loss. These interventions include training in the use of hearing aids and auditory, speech, and language development. Families of children with hearing loss are often given counseling and training in stimulation of speech and communication.

Interventions may also include sign language training. Most intervention programs for hearing loss among young children provide a combination of home- and school-based services (Carney and Moeller, 1998).

Research Approach and Methods

CHBRP's medical effectiveness review for AB 2004 builds upon the review conducted by CHBRP for AB 368 (2007). Studies of the medical effectiveness of hearing aids were identified through searches of the following databases: PubMed, the Cochrane databases, PsycInfo, Web of Science, and CINAHL. The search was limited to abstracts of peer-reviewed studies of children with hearing loss, defined as subjects aged 0 to 18 years. The search was limited to studies of children with hearing loss because AB 2004 would require health plans to cover hearings aids only for children and because characteristics of hearing loss in children and adults differ (CHBRP, 2007). These differences suggest that findings from studies of adults with hearing loss should not be generalized to children with hearing loss.

The CHBRP medical effectiveness review for AB 2004 focuses on traditional air conduction hearing aids because they are the type of hearing aids most frequently used by children with hearing loss (Gabbard and Schryer, 2003; Palmer and Ortmann, 2005).[38] AB 2004 may also apply to bone conduction hearing aids and vibrotactile aids, wearable devices that are used by persons who are not helped by air conduction hearing aids.[39] The review does not assess the effects of surgically implanted bone-conduction hearing aids (BCHAs) or cochlear implants because AB 2004 only addresses wearable devices designed for the ear. With the exception of the wearable BCHA, surgically implanted BCHAs and cochlear implants combine a surgical implant with an external microphone and sound processor. The review also does not examine frequency modulation (FM) systems that are used in combination with hearing aids to improve children's ability to hear teachers or other speakers, because school districts typically supply these devices to children.[40] In addition, this review does not evaluate the effectiveness of screening for hearing loss or the quality of the educational interventions provided to children with hearing loss and their families, because AB 2004 only addresses coverage for hearing aids.

A more thorough description of the methods used to conduct the medical effectiveness review and the process used to grade the evidence for each outcome measure may be found in Appendix B.

[38] CHBRP searched for more current data on the types of hearing aids used by children but did not identify any more recent studies.
[39] Gabbard and Schryer (2003), Gatehouse (2002), and Palmer and Ortmann (2005) provide further information about bone conduction hearing aids, bone-anchored hearing aids, and cochlear implants.
[40] Palmer and Ortmann (2005) describe FM systems and other assistive listening devices.

Methodological Considerations

It is generally accepted that the use of hearing aids improves the hearing of children with hearing loss. As a result, there have been few recent studies on the impact of hearing aids on hearing in children. As noted, the current review builds upon the review conducted by CHBRP for AB 368 (2007); key findings of studies noted previously are summarized, and more current literature is included where available. The review examines three major categories of recent studies on children with hearing loss: (1) studies of the relationship between age at initial diagnosis and treatment of hearing loss, and children's speech, language, and social development; (2) studies of the effect of wearing a hearing aid in the opposite ear from a cochlear implant, and (3) studies of wearable BCHAs.

The literature review did not discover any randomized controlled trials (RCTs) of children with hearing loss that assess the effects of early diagnosis and treatment of hearing loss, or the effectiveness of using a hearing aid in the opposite ear from a cochlear implant, or wearable BCHA. The barriers to conducting RCTs of hearing loss treatments for children are formidable, resulting in a research base that is not as rigorous and thereby limiting the certainty of conclusions drawn from the literature. All of the studies of the effectiveness of early diagnosis and treatment were observational studies that did not include control groups of children with hearing loss who did not receive hearing aids or other interventions.

Study Findings

CHBRP's review of the literature on the effects of hearing aids on children with hearing loss suggests that early treatment of hearing loss is associated with improvement in language, verbal, nonverbal, and social development outcomes. These findings relate to AB 2004, because if health plans cover hearing aids for children, more children may have access to hearing aids at a younger age.

Findings for Quality of Life in Children

Speech outcomes

The 2007 CHBRP review found a preponderance of evidence suggesting that early diagnosis and treatment of hearing loss decreases the age at which children begin to form syllables and improves the intelligibility of their speech.

CHBRP found no recent studies examining the effect of hearing aids on speech outcomes in children.

The preponderance of evidence from moderate research designs suggests that early treatment of hearing loss by hearing aids is effective in improving speech outcomes in children.

Figure 2. Speech Outcomes Summary

Treatment	Conclusion
Evidence about speech outcomes	Preponderance of evidence that hearing aids affect speech outcomes in children.

CHBRP concludes that there is a preponderance of evidence from studies with moderately strong research designs that suggests that earlier age of fitting with hearing aid is associated with greater gains in speech outcomes. The reason for a rating of moderate is due to a lack of studies with strong research designs (e.g., RCTs).

Language development outcomes

The 2007 CHBRP report on hearing aids in children described several studies that assessed the impact of early treatment of hearing loss via hearing aids on language development outcomes. CHBRP found a preponderance of evidence that children treated for hearing loss at a younger age had statistically significant improvement in receptive vocabulary and verbal reasoning compared to children at later stages that did not have statistically significant language development outcomes. The report also cites studies demonstrating that children fitted with hearing aids at younger ages had significantly larger vocabularies, asked a significantly higher proportion of questions in conversation, and spoke significantly more words per minute as measured by one of two instruments.

CHBRP identified two more recent studies (Tomblin et al., 2014; Tomblin et al., 2015) that found mild-to-severe hearing loss places children at risk for delays in language development, but those risks are moderated by the provision of early and consistent access to well-fit hearing aids that provide optimized audibility.

Overall, the preponderance of evidence suggests that early diagnosis and treatment of hearing loss improves language development.

Figure 3. Language Development Outcomes Summary

Treatment	Conclusion
Evidence about language development outcomes	Preponderance of evidence that hearing aids improve language development outcomes in children.

CHBRP concludes that there is a preponderance of evidence from studies with moderately strong research designs that hearing aids is are effective in improving language development outcomes in children. In particular, risk for language delays in children with hearing loss may be mitigated from early age of fitting and consistent use of hearing aids. The reason for a rating of moderate is due to a lack of studies with strong research designs (e.g., RCTs).

Nonverbal interaction outcomes

Three studies identified by CHBRP in 2007 demonstrated an association between early diagnosis of hearing loss and treatment and more advanced nonverbal interactions (such as observation, imitation, discrimination among objects, and motor behavior) for children with hearing aids, although two out of three of these studies' observations were not statistically significant.

CHBRP found no recent studies examining the effect of hearing aids on nonverbal interaction in children.

Thus, there is a preponderance of evidence suggests that early diagnosis and treatment are associated with small, nonsignificant gains in nonverbal understanding and interaction.

Figure 4. Nonverbal Outcomes Summary

Treatment	Conclusion
Evidence about nonverbal outcomes	Preponderance of evidence that hearing aids affect nonverbal outcomes in children.

CHBRP concludes that there is a preponderance of evidence that suggest hearing aids are effective in improving nonverbal outcomes in children.

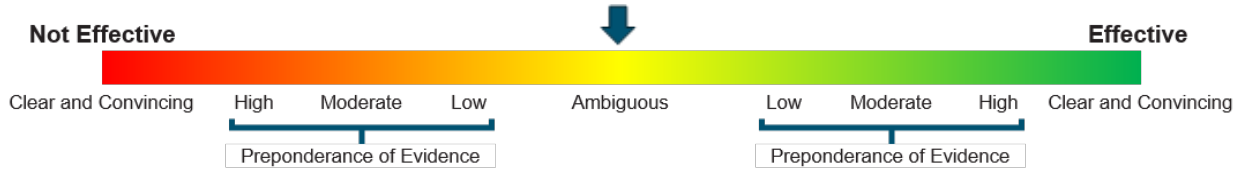
Personal/social development outcomes

In 2007, CHBRP identified several studies with a lack of significant and consistent findings investigating the effects of age at intervention to treat hearing loss on children's personal and social development. CHBRP found no recent studies examining the effect of hearing aids on personal and social development in children.

The lack of significant and consistent findings indicates that the evidence of effect of early diagnosis and treatment of hearing loss on personal/social development is ambiguous. Please note that the absence of evidence is not "evidence of no effect" — positive or negative impacts could result, but current evidence is insufficient to ascertain outcomes.

Figure 5. Personal/Social Development Outcomes Summary

Treatment	Conclusion
Evidence about language development outcomes	Ambiguous/conflicting evidence that hearing aids affect personal and social outcomes in children.



CHBRP concludes that there is ambiguous/conflicting evidence that hearing aids are effective in improving personal and social development outcomes in children. CHBRP notes that the absence of evidence does not mean there is no effect; it means the effect is unknown.

Findings for Hearing Aid use with Cochlear Implants and Wearable BCHA

Studies of the effects of using a hearing aid in the opposite ear from a cochlear implant

Cochlear implants are used by children with severe-to-profound hearing loss that have one or more ears in which hearing is too poor to derive benefit from a hearing aid. Whereas a hearing aid amplifies sounds to improve the ear's ability to hear them, a cochlear implant bypasses the damaged portions of the ear and directly stimulates the auditory nerve. Cochlear implants consist of an implanted electrode array that is attached to an external device that amplifies sound, processes speech, stimulates the auditory nerve, and transmits signals to the implanted electrode array. Children who receive cochlear implants must undergo extensive speech therapy because the process of hearing with a cochlear implant differs from normal hearing or using a hearing aid (NIDCD, 2006).

The 2007 CHBRP report found several studies that assessed the impact of using a hearing aid in the opposite ear from a cochlear implant.[41] These studies are pertinent to AB 2004 because having health insurance coverage for hearing aids may increase the likelihood that children with cochlear implants would be fitted with a hearing aid in the opposite ear. Several previous studies found that using a hearing aid with a cochlear implant was associated with a statistically significant improvement in speech recognition (Ching et al., 2001; Ching et al., 2005; Holt et al., 2005). In contrast, one study reported that using a hearing aid with a cochlear implant had no effect on speech recognition, but instead found that bilateral cochlear implants were associated with better speech recognition than were unilateral cochlear implants (Litovsky et al., 2006).

Overall, the preponderance of the evidence suggests that using a hearing aid with a cochlear implant improves speech recognition, but may not be as effective as bilateral cochlear implants for children who are candidates for bilateral cochlear implants. CHBRP found no recent studies examining the effect of using a hearing aid in the opposite ear from a cochlear implant on speech recognition.

[41] The 2007 report for AB 368 also summarizes studies related to the effect of using a hearing aid in conjunction with a cochlear implant on the localization of sound, and impact of using a hearing aid in conjunction with a cochlear implant on children's functional performance during activities of daily living. Though evidence for improvement in localization was ambiguous, CHBRP found that use of a hearing aid in conjunction with a cochlear implant is effective at improving functional performance during activities of daily living.

Figure 6. Effectiveness of Using a Hearing Aid with Cochlear Implant Summary

Treatment	Conclusion
Evidence about hearing aid use with a cochlear implant	Preponderance evidence that hearing aid use with a cochlear implant is medically effective in children who are candidates for bilateral cochlear implants, but may not be as effective as bilateral cochlear implants.

CHBRP concludes that there is a preponderance of evidence that hearing aid use with a cochlear implant improves outcomes for children but may not be as effective as bilateral cochlear implants for children who are candidates for bilateral cochlear implants.

Studies of the effects of using wearable BCHA

The wearable BCHA is an alternative to the surgically-implanted bone-conduction hearing aid (BCHA) implantation for children that are too young for an implant because the thickness of the temporal bone is too small and because of problems with osseo-integration of the titanium implant in the immature bone (Verhagen et al., 2008). CHBRP interprets AB 2004 to require health plans to cover wearable BCHAs because they are external, wearable devices.

CHBRP found two cohort studies conducted outside of the U.S. that evaluated the effects of wearable BCHAs for children with bilateral aural atresia (failure of the development of the external auditory canal in both ears, such that it cannot accommodate a standard hearing aid). The studies found that the wearable BCHA is as effective for hearing rehabilitation and auditory development (Fan et al., 2014; Verhagen et al., 2008). One study found the wearable BCHA to be as effective as the conventional bone conductor with a spring clamping steel headband (Verhagen et al., 2008). Neither study assessed adverse effects associated with use of the wearable BCHA. Further limitations of these studies include low statistical power due to small sample sizes, and limited data assessing language development outcomes (Verhagen et al., 2008).

Figure 7. Effectiveness of Using a wearable BCHA

Treatment	Conclusion
ɪidence about use of wearable BCHA	eponderance of evidence that use of a wearable BCHA is medica ɛctive in children.

CHBRP concludes that there is a preponderance of evidence from studies with moderate designs that suggest the wearable BCHA is effective for hearing rehabilitation and auditory development.

BENEFIT COVERAGE, UTILIZATION, AND COST IMPACTS

CHBRP estimates AB 2004's impact on hearing aid coverage, utilization, and cost for enrollees aged 0 to 17 years in both the DMHC- and CDI-regulated markets, as well as publicly funded plans (including CalPERS and Medi-Cal Managed Care Plans that are subject to the Knox-Keene Health Care Service Plan Act). CHBRP determined current coverage of hearing aids for children aged 0 to 17 by surveying the seven largest providers of health insurance in California.

All hearing aid service product codes were identified with the assistance of a content expert. The following were excluded as they identify services not covered by AB 2004: implants (including cochlear), battery and cord replacements, and hearing screening. Hearing aid product codes (HCPCs) were used to extract data from Truven's MarketScan® Commercial Claims and Encounters Database. For this analysis, CHBRP includes the following types of hearing aids:

- Behind-the-ear (BTE);
- Receiver in canal/receiver-in-the ear (RIC/RITE);
- In-the-ear (ITE);
- In-the-canal/completely-in-canal (ITC/CIC);
- Wearable (non-surgically implanted) bone conduction hearing aid (BCHA).

Because all children already qualify for initial assessment hearing screening under Essential Health Benefits (EHB) requirements, costs associated with screening were excluded from the bill analysis. The 2014 MarketScan® data were used to develop baseline cost and utilization information for hearing aids for 0-17 year olds. CHBRP identified four categories of hearing aid services within the claims data:

- Hearing Aids;
- Maintenance & Repairs (excludes ear molds);
- Replacements;
- Diagnostic tests, hearing aid checks, fittings and adjustments (excludes screening as part initial assessment, covered under EHB); and
- Ear Molds.

From this claims database, utilization and unit cost information were identified for each service category. Where coverage is not offered by the health plan, the enrollee is responsible for the cost of hearing aids, which is a likely barrier to utilization. This removal of financial responsibility for the full cost of hearing aids when pediatric hearing aids coverage is introduced might thus result in utilization uptake. There are, however, no data sources that show by how much hearing aid utilization increases when coverage for hearing aids is mandated; in other words, there have not been longitudinal studies examining changes in utilization before and after legislation has been implemented in other states. CHBRP thus used content expert input and information in the peer-reviewed literature to estimate likely utilization change that would occur if AB 2004 were to be enacted. These sources all consistently suggested that the price elasticity of demand for hearing aids among children is largely price inelastic (see *Postmandate Utilization* below and Appendix C for more detail), which means families are not likely to forgo obtaining hearing aids for their children due to cost and there are programs, such as CCS and charities, available to families meeting financial requirements. With the body of evidence available, CHBRP estimates that the removal of a cost barrier when coverage is introduced for hearing aids would thus result in a modest increase in utilization of 2.4% among enrollees who *do not have* coverage for hearing aids and related services premandate. Separate from utilization change due to cost, and not to be overlooked, is that cost of hearing aids and services has been shown to pose a financial burden to families obtaining hearing aids (Limb et al, 2010;

Muñoz et al, 2013). The financial load that is lifted off of families when coverage for hearing aids is offered by carriers is seen in the estimates of out-of-pocket cost shifts for hearing aids and services presented in this section and discussed in greater detail in *Public Health Impacts*.

This section reports the potential incremental impact of AB 2004 on estimated baseline benefit coverage, utilization, and overall cost. For further details on the underlying data sources and methods, please see Appendix C.

Benefit Coverage

Premandate (Baseline) Benefit Coverage

In 2017, CHBRP estimates there will be 25,155,000 total enrollees with health insurance subject to AB 2004; of these, 7,263,000 are enrollees aged 0 to 17 years old.

Current law does not require coverage for hearing aids as part of a basic contract or offered as an optional benefit to groups or individuals. Current coverage of hearing aids for children aged 0 to 17 was determined by a survey of the seven largest providers of health insurance in California. Responses to this survey represent 73% of enrollees in the privately funded market subject to state mandates.

Based on the responses, approximately 53.2% of enrollees aged 0 to 17 years in California with health insurance have coverage that is compliant with AB 2004. This estimate includes children in both privately funded and publicly funded (e.g., CalPERS HMO, Medi-Cal Managed care) health insurance products regulated by DMHC or CDI. Coverage of hearing aids for privately funded and publicly funded health insurance products varies widely:

- Per CHBRP's carrier survey, approximately 9% of enrollees aged 0 to 17 in privately funded products have coverage for hearing aids and services.
- 100% of enrollees aged 0 to 17 have hearing aids coverage for hearing aids and services under CalPERS and 100% of enrollees aged 0 to 17 have coverage under Medi-Cal.

While children covered by Medi-Cal are included in the mandate, these enrollees currently receive coverage for hearing aids through the California Children's Services (CCS) program. Enrollees who are privately insured, but who meet certain financial qualifications, can also receive coverage for hearing aids through CCS or other charitable organizations (see *Policy Context* for more information).

Postmandate Benefit Coverage

Postmandate, 100% of enrollees aged 0 to 17 with health insurance would have mandate-compliant coverage of hearing aids and services; premandate this figure was 53.2%, reflecting a 88% change postmandate (see Table 1).

Utilization

Premandate (Baseline) Utilization

Using 2014 MarketScan® Commercial Claims and Encounters Database, CHBRP estimated premandate utilization. CHBRP applied the utilization rates estimated from MarketScan® data to all enrollees that currently have coverage and thus assumed enrollees in public and private insurance have the same utilization rates.

There are 20,900 users aged 0 to 17 of hearing aids and/or services in one year. Broken down by service type and for children who are covered and noncovered for hearing aids, there are approximately 5,862 covered enrollees using hearing aids and/or services, 1,068 covered enrollees using hearing aid maintenance and repair, 3,300 covered enrollees who receive follow-up ear molds, 5,920 covered enrollees using diagnostic tests, hearing aid checks, fittings and adjustments (screening that is not initial assessment), and approximately 39 covered enrollees who replace hearing aids during this one-year period. Per CHBRP's assumption that utilization premandate for noncovered enrollees is lower than utilization for covered enrollees, there are approximately 5,035 noncovered enrollees using hearing aids and/or services, 917 noncovered enrollees using hearing aid maintenance and repair, 2,834 non-covered enrollees who receive follow-up ear molds, 5,085 noncovered enrollees using diagnostic tests, hearing aid checks, fittings and adjustments (screening that is not initial assessment), and approximately 33 noncovered enrollees who replace hearing aids in the one-year period.

Postmandate Utilization

CHBRP found enrollees aged 0 to 17 years outside of Medi-Cal and CalPERS largely currently lack coverage for hearing aids (approximately 9% of enrollees in privately funded insurance, per CHBRP's carrier survey, have coverage premandate versus 100% for Medi-Cal and CalPERS). Where coverage is not offered by the health plan (either as part of a basic plan or as an optional rider), the enrollee is responsible for the cost of hearing aids and thus pays for the hearing aid devices and related services out-of-pocket. Studies that suggest hearing aids are largely price inelastic (Amlani, 2010; Amlani and De Silva, 2005), and the use of pediatric services are largely unaffected by price. Goldman and Grossman (1978) find the price elasticity of demand for pediatric visits is between −0.03 and −0.06 (i.e., inelastic). Similarly, Wolfson et al. (1982) found no relationship between user fees/cost sharing and the use of services for disabled children, suggesting the presence of a disability makes it less likely to reduce the use of medical services and parents are likely less inclined to risk their child's health by foregoing medical services. Yet, it is still quite possible that the introduction of coverage for a previously uncovered service would result in an increase in demand (Eichner, 1998). The removal of cost as a barrier when coverage is introduced for hearing aids would thus result in utilization uptake. Applying a price elasticity of –0.03 to an assumed 80% reduction in cost to the enrollee when coverage is offered to those who did not have coverage before, CHBRP estimates an increase in utilization of 2.4% (–.03*80%) among enrollees who did not have coverage for hearing aids and services premandate and have coverage postmandate (see Appendix B for more detail).

Translated into utilization change in the first 12 months of enactment of the mandate for all enrollees aged 0 to 17 subject to AB 2004 using hearing aids, CHBRP estimates postmandate, there would be an increase of 1% in utilization overall. This reflects the utilization increase that occurs for enrollees who were not covered premandate and would have coverage postmandate. Noncovered enrollees premandate shift into covered enrollees postmandate (see Table 1). Postmandate, it is estimated that this shift would result in increases of 5,156 covered enrollees using hearing aid and/or services, 939 covered enrollees using hearing aid maintenance and repair, 2,902 covered enrollees enrollees who receive follow-up ear molds, 5207 covered enrollees using diagnostic tests, hearing aid checks, fittings and adjustments (screening that is not initial assessment), and approximately 34 covered enrollees replacing hearing aids over a one-year period.

Impact on access and health treatment/service availability

AB 2004 would increase coverage for hearing aids to those who currently do not have coverage for hearing aids and services, but estimates that utilization would increase only moderately. Per CHBRP's content expert and the literature, it appears families generally will acquire hearing aids for their children despite the costs, per the price elasticity of demand studies on hearing aids and services for children,

even if there exists a financial burden on them (Amlani, 2010; Amlani and De Silva, 2005; Eichner, 1998; Goldman & Grossman, 1978; Wolfson et al., 1982). CHBRP estimates the current supply of hearing aids would be able to meet the demand. CHBRP estimates there would be no change postmandate in the service availability of obtaining hearing aids and thus there would be no shortage of these products caused by AB 2004.

Per-Unit Cost

Premandate (Baseline) and Postmandate Per-Unit Cost

Based on MarketScan® Commercial Claims and Encounters Database CHBRP estimates hearing aids and/or services cost on average $2,023 per enrollee. Because this cost is the average per user, where children might use two hearing aids the average cost per enrollee reflects the cost of both units. Also, this average cost per user of hearing aids and/or services includes all types of users, including those who receive hearing aids and those may only receive hearing services (e.g., diagnostic tests) but do not receive hearing aids in the 2014 MarketScan® Commercial Claims and Encounters Database. Thus, the average cost hearing aids and hearing aid services for just those who receive hearing aids was calculated and found to be notably higher at $3,566. Postmandate, CHBRP estimates there would be no change in the average per enrollee cost of hearing aids and services.

Premiums and Expenditures

Premandate (Baseline) Premiums and Expenditures

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

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

- Large group: $598.20 and $774.18
- Small group: $564.31 and $762.53
- Individual market: $536.35 and $474.28

Total current annual expenditures for all DMHC-regulated plans and CDI-regulated policies is $145,101,324,000.

Postmandate Expenditures

Changes in total expenditures

AB 2004 would increase total net annual expenditures from $145,101,325,000 to $145,104,924,000, or a $3,599,000 increase. This is due to an increase in total health insurance premiums paid by employers and enrollees for the change in covered benefits for hearing aids due to a modest increase in expected utilization of 2.4% for those obtaining insurance coverage for hearing aids and services and from costs that would shift from out-of-pocket expenditures to covered benefits for all those who are newly covered post-mandate. Prior to the mandate, enrollees without coverage for hearing aids incurred an estimated $16,560,000 in out-of-pocket expenses for hearing aids and services. Postmandate, these costs plus

administrative costs would be added to health insurance premiums, resulting in a net total of $19,527,000 in increased premium, and a $16,560,000 reduction in out-of-pocket costs for services that are now covered by insurance. However, the newly covered enrollees would continue to incur $2,967,000 in copayments for the newly covered benefits.

Postmandate premium expenditures and PMPM amounts per category of payer

Increases in insurance premiums as a result of AB 2004 would vary by market segment. Note that the total population in Table 5 reflects all the enrollees in health plans subject to AB 2004.

Overall, across plan type, CHBRP estimates a 0.0156% increase in premium expenditures, which translates into an increase of 0.0025% in total expenditures. For commercial plans regulated by DMHC, large-group premiums are estimated to increase by 0.0183%, for small group by 0.0275%, and for individual by 0.0127%. Expenditures for large group increase by 0.0025%, for small group by 0.0049%, and for individual by 0.0022%. Among publicly funded DMHC-regulated health plans, total expenditures for CalPERS HMOs, Medi-Cal Managed Care (under 65 years), and Medi-Cal Managed Care (over 65 years) does not change postmandate. For commercial plans regulated by CDI, large-group premiums are estimated to increase by 0.0186%, for small group by 0.0223%, and for individual by 0.0249%. Expenditures for large group increase by 0.0028%, for small group by 0.0038%, and for individual by 0.0043%.

Potential cost offsets or savings in the first 12 months after enactment

CHBRP estimates there would be no cost offsets or savings in the first 12 months after enactment.

Postmandate administrative expenses and other expenses

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

Related Considerations for Policymakers

Cost of exceeding essential health benefits

As explained in the *Policy Context* section, hearing aids are not included in California's EHB package. As also explained in the *Policy Context* section, a state enacting a benefit mandate that exceeds essential health benefits (EHBs) would be required to defray the cost incurred by enrollees in qualified health plans (QHPs). Coverage for hearing aids, as would be required if AB 2004 were to become law, would appear to exceed EHBs and so the state may be required to defray associated costs.

Final rules released by the U.S. Department of Health and Human Services (HHS) clarify that QHP issuers are responsible for calculating the cost that must be defrayed but left state flexibility in terms of the calculation; it could be based on "either a statewide average or each issuer's actual cost."[42] CHBRP is unaware that California has yet identified which option it will use, and the number of 2017 QHPs enrollees

[42] Essential Health Benefits. Final Rule. 12843.

is not yet known. However, CHBRP is able to estimate, the same way it estimates the mandate's marginal cost, the PMPM premium associated with a mandate exceeding EHBs. Should the value of exceeding EHBs be calculated in this way, CHBRP estimates that the state would be required to defray the following amounts due to AB 2004:

- $0.13 PMPM for each QHP enrollee in a small-group DMHC-regulated plan
- $0.05 PMPM for each QHP enrollee in an individual market DMHC-regulated plan
- $0.12 PMPM for each QHP enrollee in a small-group CDI-regulated policy
- $0.08 PMPM for each QHP enrollee in an individual market CDI-regulated policy

Postmandate Changes in Uninsured and Public Program Enrollment

Changes in the number of uninsured persons[43]

CHBRP estimates premium increases of less than 0.03% for each market segment; this premium increase would not have a measurable impact on the number of persons who are uninsured. CHBRP does not anticipate loss of health insurance, changes in availability of the benefit beyond those subject to the mandate, changes in offer rates of health insurance, changes in employer contribution rates, changes in take-up of health insurance by employees, or purchase of individual market policies, due to the small size of the increase in premiums after the mandate.

Changes in public program enrollment

Due to the lack of available data on enrollment in CCS, CHBRP is unable to estimate the impact that the mandate would have on enrollment and utilization of covered benefits in the publicly funded insurance market. As described in earlier in this report, CCS covers hearing aids and services for children who meet certain age, residence, medical, and financial requirements, whether he or she has public or private insurance as long as other qualifications are met. Thus, there is likely a group of privately insured enrollees who qualify and use CCS for hearing aids who would no longer use CCS postmandate.

How Lack of Benefit Coverage Results in Cost Shifts to Other Payers

Because enrollees in public programs already have hearing aid coverage, there is no expected cost shifting to occur from the public programs into the privately insured market nor would these public programs incur a cost as a result of the mandated offering. However, there may be cost shifting from the public programs to the private insurers where privately insured enrollees who qualify and use CCS for hearing aids who would no longer use CCS postmandate and thus reduce CCS expenditures. Due to the lack of data on the group of privately insured children who use CCS, CHBRP is unable to assess this quantitatively.

[43] See also CHBRP's *Criteria and Methods for Estimating the Impact of Mandates on the Number of Uninsured*, available at http://www.chbrp.org/analysis_methodology/cost_impact_analysis.php.

Table 4. Baseline (Premandate) Per Member Per Month Premiums and Total Expenditures by Market Segment, California, 2017

	DMHC-Regulated						CDI-Regulated			
	Privately Funded Plans (by Market) [a]			Publicly Funded Plans			Privately Funded Plans (by Market) [a]			
	Large Group	*Small Group*	*Individual*	*CalPERS HMOs*[b]	*MCMC (Under 65)* [c]	*MCMC (65+)* [c]	*Large Group*	*Small Group*	*Individual*	**Total**
Enrollee counts										
Total enrollees in plans/policies subject to state mandates[d]	9,138,000	2,805,000	3,840,000	861,000	6,331,000	561,000	309,000	731,000	579,000	25,155,000
Total enrollees aged 0-17 with health insurance subject to AB 2004	2,287,000	702,000	396,000	215,000	3,301,000	0	78,000	183,000	101,000	7,263,000
Premium costs										
Average portion of premium paid by employer	$444.39	$309.74	$0.00	$460.33	$180.00	$445.00	$523.71	$426.22	$0.00	$86,263,866,000
Average portion of premium paid by employee	$109.27	$160.90	$423.95	$115.08	$0.00	$0.00	$138.66	$159.06	$365.22	$42,569,604,000
Total premium	**$553.67**	**$470.64**	**$423.95**	**$575.41**	**$180.00**	**$445.00**	**$662.37**	**$585.28**	**$365.22**	**$128,833,470,000**
Enrollee expenses										
Enrollee expenses for covered benefits (deductibles, copays, etc.)	$44.43	$93.55	$112.36	$31.43	$0.00	$0.00	$111.69	$177.13	$108.98	$16,248,327,000
Enrollee expenses for benefits not covered [e]	$0.10	$0.12	$0.05	$0.00	$0.00	$0.00	$0.12	$0.12	$0.08	$19,527,000
Total expenditures	**$598.20**	**$564.31**	**$536.35**	**$606.84**	**$180.00**	**$445.00**	**$774.18**	**$762.53**	**$474.28**	**$145,101,324,000**

Source: California Health Benefits Review Program, 2015.

Notes: (a) Includes enrollees with grandfathered and nongrandfathered health insurance, both on Covered California and outside the health insurance marketplace.

(b) As of September 30, 2015, 57%, or 462,580 CalPERS members were state retirees, state employees, or their dependents. CHBRP assumes the same ratio for 2017.

(c) Medi-Cal Managed Care Plan expenditures for members over 65 include those who are also Medicare beneficiaries. This population does not include enrollees in COHS..

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

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

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

Table 5. Impacts of the Mandate on Per Member Per Month Premiums and Total Expenditures by Market Segment, California, 2017

	DMHC-Regulated						CDI-Regulated			
	Privately Funded Plans (by Market) [a]			Publicly Funded Plans			Privately Funded Plans (by Market) [a]			
	Large Group	*Small Group*	*Individual*	*CalPERS HMOs* [b]	*MCMC (Under 65)* [c]	*MCMC (65+)* [c]	*Large Group*	*Small Group*	*Individual*	**Total**
Enrollee counts										
Total enrollees in plans/policies subject to state mandates[d]	9,138,000	2,805,000	3,840,000	861,000	6,331,000	561,000	309,000	731,000	579,000	25,155,000
Total enrollees aged 0-17 with health insurance subject to AB 2004	2,287,000	702,000	396,000	215,000	3,301,000	0	78,000	183,000	101,000	7,263,000
Premium costs										
Average portion of premium paid by employer	$0.08	$0.09	$0.00	$0.00	$0.00	$0.00	$0.10	$0.10	$0.00	$12,964,000
Average portion of premium paid by employee	$0.02	$0.04	$0.05	$0.00	$0.00	$0.00	$0.03	$0.04	$0.09	$7,196,000
Total premium	$0.10	$0.13	$0.05	$0.00	$0.00	$0.00	$0.12	$0.13	$0.09	**$20,160,000**
Enrollee expenses										
Enrollee expenses for covered benefits (deductibles, copays, etc.)	$0.02	$0.02	$0.01	$0.00	$0.00	$0.00	$0.02	$0.02	$0.01	$2,967,000
Enrollee expenses for benefits not covered [e]	-$0.10	-$0.12	-$0.05	$0.00	$0.00	$0.00	-$0.12	-$0.12	-$0.08	-$19,527,000
Total expenditures	$0.01	$0.03	$0.01	$0.00	$0.00	$0.00	$0.02	$0.03	$0.02	**$3,600,000**
Postmandate percent change										
Insured premiums	0.0183%	0.0275%	0.0127%	0.0000%	0.0000%	0.0000%	0.0186%	0.0223%	0.0249%	0.0156%
Total expenditures	0.0025%	0.0049%	0.0022%	0.0000%	0.0000%	0.0000%	0.0028%	0.0038%	0.0043%	0.0025%

Source: California Health Benefits Review Program, 2015.

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

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

(c) Medi-Cal Managed Care Plan expenditures for members over 65 include those who are also Medicare beneficiaries. This population does not include enrollees in COHS.

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

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

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

PUBLIC HEALTH IMPACTS

AB 2004 would require state-regulated plans and policies to cover hearing aids for enrollees under age 18 when medically necessary and to replace hearing aids at least every 5 years or sooner when an existing hearing aid no longer meets the child's needs (see Appendix A for full bill text).

This Public Health section estimates the short-term impact[44] of AB 2004 on mandate-relevant health outcomes, potential side effects, social determinants of health around education and employment, financial burden, and economic loss in the short term. See the Long-Term Impact of AB 2004 for discussion of economic loss, educational attainment, and employment opportunities beyond the first 12 months of the bill implementation.

Estimated Public Health Outcomes

Early diagnosis and treatment for hearing loss in children is an important step to producing better speech and language outcomes (Yoshinaga-Itano and Apuzzo, 1998a). Close to 100% of newborns in California are screened at birth for hearing loss through the Newborn Hearing Screening Program; for those infants diagnosed with hearing loss, early treatment with hearing aids and/or therapy are available. For children who acquire hearing loss later in childhood, hearing screening tests are obtained through a clinician's office or through the public education system; referrals are made to audiologists for those requiring diagnostic testing.

Once a child is determined to have hearing loss, delays in obtaining hearing aids can occur. In a survey of 352 U.S. parents with young children diagnosed with hearing loss, Muñoz et al. (2013) found three primary challenges to parents in obtaining timely hearing aid fittings for their children. The top three reasons included problems paying for hearing aids (30%), problems paying for ear molds (17%), and problems accepting the need for hearing aids (21%). Thirty-five percent reported no problems at all. Sixty-four percent of those surveyed reported incomes of greater than $60,000 and 37% reported purchasing hearing aids through private insurance (Muñoz et al., 2013).

As presented in the *Medical Effectiveness* section, there is a preponderance of evidence that early diagnosis and treatment of hearing loss with hearing aids significantly improves the intelligibility of children's speech, and language development. Evidence also showed that gains in nonverbal understanding and interactions and improvements in personal/social development in children with hearing aids did not reach statistical significance. It is noted that, for many hard of hearing children, there is a synergistic relationship between hearing aids and adjuvant speech and language therapy or other educational interventions; each component is necessary to achieve the improved outcomes sought by the patients and their families (CHBRP, 2007).

As presented in the *Benefit Coverage, Utilization, and Cost Impacts* section, an additional 200 children needing hearing aids or services would be newly covered under AB 2004 postmandate (20,900 children using hearing aids and services premandate to 21,100 children postmandate). For some, this permits first-time use of hearing aids, and for all newly covered hearing aid users, it permits more repairs, replacements, testing, and recasted ear molds, which improve the effectiveness the hearing aids. All of these newly covered children would be in privately funded health insurance plans or policies since Medi-Cal and CalPERS currently cover hearing aids and services.

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

CHBRP projects that AB 2004 would ameliorate a key barrier to the important, timely acquisition of hearing aids for children diagnosed with hearing loss. An estimated 130 children would obtain hearing aids and 70 would use services (e.g., repair or replacement) resulting in a total of 200 children becoming first-time users (all in the privately funded insurance market) in the first-year, postmandate. Thus, assuming new coverage terms are similar to premandate cost-sharing terms, hearing and speech and language skills would be expected to improve for this subset of newly covered children with hearing loss who were unable to afford hearing aids or timely repairs/replacements premandate. (See *Estimated Impact on Financial Burden* section for further discussion.)

Common Difficulties Associated with Hearing Aids

When data are available, CHBRP estimates the marginal change in relevant harms associated with interventions affected by the proposed mandate. In the case of AB 2004, hearing aids **do not** produce harms, but there are several common problems associated with the use of hearing aids. These include discomfort from the user's voice sounding too loud (occlusion effect), feedback from the hearing aid, background noise, a buzzing sound with cellphone use, and feeling physically uncomfortable. Many of these problems can be attenuated through adjustments performed by an audiologist. Additionally, perceived social stigma associated with hearing aids may inhibit consistent use by children (Kent and Smith, 2006). Despite these issues with hearing aids, the benefits for most users clearly outweigh the side effects.

Social Determinants of Health and Disparities

CHBRP defines social determinants of health (SDoH) as conditions in which people are born, grow, live, work, learn, and age. These social determinants of health (e.g., economic factors, social factors, education, physical environment) are shaped by the distribution of money, power, and resources and impacted by policy (adapted from CDC, 2014; Healthy People 2020, 2015). These factors generally occur prior to or outside of the health care system and are highly correlated with downstream events such as avoidable illnesses and premature death. However, the relationship between SDoH and health status/outcomes is complex and, periodically, health outcomes can influence SDoH.[45] CHBRP presents the full range of SDoH (e.g., income, education, or social construct around age, race/ethnicity, gender, and gender identity/sexual orientation) that are relevant to AB 2004 and where evidence is available.

See the *Long-Term Impact of AB 2004* section for discussion about outcomes related to children's educational attainment and future employment.

No literature was found that discussed the receipt of hearing aids and its effect on ameliorating existing disparities in hearing loss by gender, income, and maternal education (as described in the *Background on Pediatric Hearing Loss and Hearing Aids* section).

[45] For more information about SDoH see CHBRP's publication *Incorporating Relevant Social Determinants of Health into CHBRP Benefit Mandate Analyses. Available at: http://www.chbrp.org/analysis_methodology/docs/Incorporating%20Relevant%20Social%20%20Determinants%20of%20Health%20in%20CHBRP%20Analyses%20Final%2003252016.pdf*

Estimated Impact on Financial Burden

When possible, CHBRP estimates the marginal impact of mandates on financial burden, defined as uncovered medical expenses paid by the enrollee as well as out-of-pocket expenses (e.g., deductibles, copayments, and coinsurance). AB 2004 would decrease the financial burden for families of those enrollees who are newly covered and use hearing aids in several ways.

The Benefit Coverage, Utilization, and Cost analysis estimates that of the 21,100 newly covered children using hearing aids, the families of 200 children would be able to purchase otherwise unaffordable hearing aids due to new coverage. CHBRP estimates that the annual out-of-pocket costs for families of the 21,100 newly covered children would decrease from about $1850 to $300. CHBRP estimates that almost $20 million in expenses borne by previously uncovered enrollees would shift to insurance carriers postmandate. A study by Gallaudet Research Institute found that, of hard of hearing students in California, 17% have a sibling who is also hard of hearing or deaf (Gallaudet Research Institute, 2011). For those families with more than one child who uses hearing aid(s), AB 2004 would bring them additional savings. (These estimates hold true postmandate, assuming that new coverage meets or exceeds current levels of coverage, usually around $1,000 cap every 3 to 5 years; AB 2004 does not require a specific level of cost-sharing.)

In the first year, postmandate, CHBRP estimates that AB 2004 would reduce the net financial burden of uncovered expenses by approximately $17 million for the families of 21,100 children who use hearing aids and services.

LONG-TERM IMPACT OF AB 2004

In this section, CHBRP estimates the long-term impact[46] of AB 2004, defined as impacts occurring beyond the first 12 months of implementation. These estimates are qualitative and based on the existing evidence available in the literature. CHBRP does not provide quantitative estimates of long-term impacts because of unknown improvements in clinical care, changes in prices, implementation of other complementary or conflicting policies, and other unexpected factors.

Long-Term Utilization and Cost Impacts

Utilization Impacts

In the 12 months following enactment, CHBRP estimates AB 2004 would result in increase in utilization of hearing aids among children aged 0 to 17 years of 1% in utilization overall, which reflects the utilization increase that occurs for enrollees who were not covered premandate and would have coverage postmandate. The noncovered enrollees premandate who turn into covered enrollees postmandate would remain covered beyond the 12 months and the utilization rates of hearing aids and related services among children who need them is unlikely to change. However, it is possible there may be shifts in utilization for more costly hearing aid devices given it is possible that with the new coverage postmandate, families opt to choose more costly models than they would if paying fully out of pocket. It is also possible that health plans would apply caps on the covered amount for hearing aids or change their cost-sharing parameters.

Cost Impact

As discussed above, CHBRP estimates AB 2004 would have minimal impacts on utilization. Premium expenditures by payer increase with AB 2004. However, as technology changes, it is possible that unit costs of these devices change. In the absence of data on likely changes to unit cost of hearing aids, the long-term impact is not quantifiable.

Also, the legislation does not preclude the imposition of a coverage cap on devices and services or delineate the parameters around reimbursement for providers. Per CHBRP's content expert, currently there exists variation in how insurance carriers pay providers and subsequently how enrollees pay the difference: for example, providers might be reimbursed a flat rate per interval (e.g., $1000 every 3 years per ear) or in other cases paid a percentage of the cost the carrier considers usual and customary, etc. Also, while most health plans currently do not offer coverage for hearing aids, it is common for many to have relationships with vendors to provide a discount to their members or subscribers (and thus affect cost) and these relationships are likely to change post-mandate. Due to the uncertainty in how the mandate would affect the way carriers chose and impose coverage limits and how it would shift provider-vendor relationships and thus costs, CHBRP is unable to estimate impacts of these changes.

Long-Term Public Health Impacts

When possible, CHBRP estimates the long-term effects of a proposed mandate (beyond CHBRP's 12-month analytic timeframe) to capture possible impacts to the public's health, including impacts on premature death and economic loss.

[46] See also CHBRP's *Criteria and Guidelines for the Analysis of Long-Term Impacts on Healthcare Costs and Public Health*, available at http://www.chbrp.org/analysis_methodology/cost_impact_analysis.php

In the case of AB 2004, CHBRP estimates the change in coverage could improve the quality and effectiveness of the hearing aids used by children over the course of their development into adulthood. Because hearing aids are costly for most families who pay out of pocket, hearing aid maintenance and replacement may not occur as frequently as recommended by audiologists or other providers. Thus, in the long term, CHBRP expects that pediatric hearing aid maintenance and replacement would occur more frequently than premandate, resulting in improved quality and effectiveness.

Impacts on the Social Determinants of Health and Disparities

CHBRP defines social determinants of health (SDoH) as conditions in which people are born, grow, live, work, learn, and age. These social determinants of health (e.g., economic factors, social factors, education, physical environment) are shaped by the distribution of money, power, and resources and impacted by policy (adapted from ; CDC, 2014; Healthy People 2020, 2015). These factors generally occur prior to or outside of the health care system and are highly correlated with downstream events such as avoidable illnesses and premature death. However, the relationship between SDOH and health status/outcomes is complex; periodically, health outcomes can influence SDOH.[47]

Educational Attainment and Employment Status

The provision of hearing aids through AB 2004 may contribute to success in school and employment, thereby influencing two powerful social determinants of health. The *Medical Effectiveness* section established that the preponderance of evidence suggests that early diagnosis and treatment of hearing loss improves language development. Several studies have established that communication skills, especially spoken language, are moderately or strongly associated with college readiness and success in college or vocational training programs.

For instance, a study of hard of hearing high school students (who used a validated survey to rate their communication ability, including spoken language) found that those who had higher communication scores also had higher ACT scores, although the association was weak (Convertino et al., 2009). The evidence was stronger in Cuculik's study of graduation from technical school among 905 deaf students (Cuculik and Kelly, 2003). They found that students with stronger language skills had the highest overall graduation rates compared to students with weaker language skills. Furthermore, students with higher language skills performed well across degree categories, regardless of curriculum requirements and difficulty.

Other societal risk factors associated with pediatric hearing loss, such as low birth weight, blood lead levels above 10 ug/dL,,nutritional (thiamine and iodine) deficiencies and low income would not be affected by AB 2004 (Vasconcellos et al., 2014).

It is unknown the degree to which the passage of AB 2004 would improve the future educational attainment and employment status of children who obtain hearing aids through the new coverage. However, it stands to reason, that for those who use hearing aids at a young age and maintain their communication skills into adulthood would experience improved outcomes as compared with no hearing aid use.

[47] For more information about SDoH see CHBRP's publication: *Incorporating Relevant Social Determinants of Health into CHBRP Benefit Mandate Analyses. Available at: http://www.chbrp.org/analysis_methodology/docs/Incorporating%20Relevant%20Social%20%20Determinants%20of%20Health%20in%20CHBRP%20Analyses%20Final%2003252016.pdf*

Impacts on Economic Loss

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

Estimates of the lifetime costs associated with hearing loss typically focus on those with severe or profound hearing loss, and costs vary from one estimate at $297,000 per person (Mohr et al., 2000) to another at $417,000 per person (CDC, 2004). These cost estimates include both direct and indirect costs. The direct costs can be broken down into medical and nonmedical costs. The medical costs associated with AB 2004 are specified in the *Benefit Coverage, Utilization, and Cost Impacts* section of this report. Nonmedical direct costs for children with hearing loss primarily consist of special education costs. One estimate from the Centers for Disease Control and Prevention (CDC) indicates that 83% of direct costs and 30% of total lifetime costs associated with hearing loss for those younger than 18 years are attributed to non-medical direct costs (CDC, 2004).

It is unknown the degree to which the passage of AB 2004 might impact economic loss associated with pediatric hearing loss.

APPENDIX A TEXT OF BILL ANALYZED

On February 17, 2016, the California Assembly Committee on Health requested that CHBRP analyze AB 2004.

ASSEMBLY BILL **No. 2004**

Introduced by Assembly Member Bloom

February 16, 2016

An act to add Section 1367.72 to the Health and Safety Code, and to add Section 10123.72 to the Insurance Code, relating to health care coverage.

LEGISLATIVE COUNSEL'S DIGEST

AB 2004, as introduced, Bloom. Hearing aids: minors.

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

This bill would require a health care service plan contract or a health insurance policy issued, amended, or renewed on or after January 1, 2017, to include coverage for hearing aids for an enrollee or insured under 18 years of age, as specified. Because a willful violation of these requirements by a health care service plan would be a crime, this bill would impose a state-mandated local program.

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

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

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

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

SECTION 1. Section 1367.72 is added to the Health and Safety Code, to read:

1367.72. (a) (1) A health care service plan contract issued, amended, or renewed on or after January 1, 2017, shall include

coverage for hearing aids for all enrollees under 18 years of age when medically necessary.

(2) Coverage for hearing aids includes an initial assessment, new hearing aids at least every five years, *new ear molds*, new hearing aids if alterations to the existing hearing aids cannot meet the needs of the child, a new hearing aid if the existingone is no longer working, fittings, adjustments, auditory training, and maintenance of the hearing aids.

(b) For purposes of this section, "hearing aid" means ~~any nonexperimental, wearable instrument or device designed for the ear and offered for the purpose of aiding or compensating for impaired human hearing, but excluding batteries and cords~~ *an electronic device usually worn in or behind the ear of a deaf and hard of hearing person for the purpose of amplifying sound.*

(c) This section shall not apply to Medicare supplement, dental-only, or vision-only health care service plan contracts.

SEC. 2. Section 10123.72 is added to the Insurance Code, to read:

10123.72. (a) (1) A health insurance policy issued, amended, or renewed on or after January 1, 2017, shall include coverage for hearing aids for all insureds under 18 years of age when medically necessary.

(2) Coverage for hearing aids includes an initial assessment, new hearing aids at least every five years, *new ear molds*, new hearing aids if alterations to the existing hearing aids cannot meet the needs of the child, a new hearing aid if the existingone is no longer working, fittings, adjustments, auditory training, and maintenance of the hearing aids.

(b) For purposes of this section, "hearing aid" means ~~any nonexperimental, wearable instrument or device designed for the ear and offered for the purpose of aiding or compensating for impaired human hearing, but excluding batteries and cords~~ *an electronic device usually worn in or behind the ear of a deaf and hard of hearing person for the purpose of amplifying sound.*

(c) This section shall not apply to accident-only, specified

disease, hospital indemnity, Medicare supplement, dental-only, or vision-only health insurance policies.

SEC. 3. No reimbursement is required by this act pursuant to Section 6 of Article XIIIB of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.

APPENDIX B LITERATURE REVIEW METHODS

Appendix B describes methods used in the medical effectiveness literature review for AB 2004, a bill that would require plans/policies issued/amended/renewed on/after January 1, 2017, to include coverage for hearing aids for all enrollees under 18 when medically necessary. Coverage includes initial assessment, new hearing aids at least every 5 years, new hearing aid if it no longer meets the child's needs or if existing device is not working, fittings, adjustments, auditory training, and maintenance for hearing aid.

The CHBRP medical effectiveness review for AB 2004 focuses on traditional air conduction hearing aids. AB 2004 may also apply to bone conduction hearing aids (BCHAs) and vibrotactile aids, wearable devices that are used by persons who are not helped by air conduction hearing aids. The review does not assess the effects of surgically implanted BCHAs or cochlear implants because AB 2004 only addresses wearable devices designed for the ear. With the exception of the wearable BCHA, surgically implanted BCHAs and cochlear implants combine a surgical implant with an external microphone and sound processor.

CHBRP review for AB 2004 builds upon the review conducted by CHBRP for AB 368 (2007). Studies of the medical effectiveness of hearing aids were identified through searches of MEDLINE (PubMed), the Cochrane Database of Systematic Reviews, the Cochrane Register of Controlled Clinical Trials, Web of Science, PsycInfo, and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). The search was limited to abstracts of peer-reviewed studies of children with hearing loss, defined as subjects aged 0 to 18 years. The search was limited to studies of children with hearing loss because AB 2004 would require health plans to cover hearings aids only for children and because characteristics of hearing loss in children and adults differ (CHBRP, 2007). These differences suggest that findings from studies of adults with hearing loss should not be generalized to children with hearing loss.

The search was limited to studies published from 2006 to present. Of the 503 articles found in the literature review, 34 were reviewed for potential inclusion in this report on AB 2004, and 4 studies were included in the medical effectiveness review for this report.

Evidence Grading System

In making a "call" for each outcome measure, the medical effectiveness lead and the content expert consider the number of studies as well the strength of the evidence. Further information about the criteria CHBRP uses to evaluate evidence of medical effectiveness can be found in CHBRP's *Medical Effectiveness Analysis Research Approach.*[48] To grade the evidence for each outcome measured, the team uses a grading system that has the following categories:

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

The grading system also contains an overall conclusion that encompasses findings in these five domains. The conclusion is a statement that captures the strength and consistency of the evidence of an

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

intervention's effect on an outcome. The following terms are used to characterize the body of evidence regarding an outcome:

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

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

A grade of *preponderance of evidence* indicates that the majority of the studies reviewed are consistent in their findings that treatment is either effective or not effective. This can be further subdivided into preponderance of evidence from high-quality studies and preponderance of evidence from low-quality studies.

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

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

Search Terms

The search terms used to locate studies relevant to AB 2004 were as follows:

Major MeSH terms used to search PubMed

- Hearing Aids
- Infant or Child or Adolescent
- Cost-Benefit Analysis
- Cost of Illness
- Costs and Cost Analysis [EXP]
- Cross-Sectional Studies
- Educational Status
- Employer Health Costs
- Ethnic Groups [EXP]
- Insurance, Health
- Literacy
- Patient Satisfaction
- Poverty
- Prevalence
- Program Evaluation
- Quality of Life
- Race Relations [EXP]
- Sexism
- Sexuality
- Socioeconomic Factors [EXP]
- Social Class
- Social Skills
- Specific Learning Disorder
- Treatment Outcome

Keywords used to search PubMed, Business Search Complete, Cochrane Library, EconLit, PsycInfo. Web of Science, CINAHL, and relevant websites:

- Hearing Aid*
- Assessment
- Cost or Costs
- Economic Loss
- Employment
- Effectiveness
- Efficacy
- Ethnicity
- Gender
- Incidence
- Income
- Outcome*
- Prevalence
- Race
- Sexual Orientation
- Statistics

* *indicates truncation*

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

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

The cost analysis in this report was prepared by the members of the cost team, which consists of CHBRP task force members and contributors from the University of California, Los Angeles, and the University of California, Davis, as well as contracted actuarial firms, Milliman, Inc, and PricewaterhouseCoopers (PwC).[49]

Data Sources

This subsection discusses the variety of data sources CHBRP uses. Key sources and data items are listed below, in Table 6.

Table 6. Data for 2017 Projections

Data Source	Items
California Department of Health Care Services (DHCS) administrative data for the Medi-Cal program, data available as of end of December 2014	Distribution of enrollees by managed care or FFS distribution by age: 0–17; 18–64; 65+ Medi-Cal Managed Care premiums
California Department of Managed Health Care (DMHC) data from the interactive website "Health Plan Financial Summary Report," August–October, 2015	Distribution of DMHC-regulated plans by market segment*
California Department of Insurance (CDI) Statistical Analysis Division data; data as of December 31, 2015	Distribution of CDI-regulated policies by market segment

[49] CHBRP's authorizing statute, available at www.chbrp.org/docs/authorizing_statute.pdf, requires that CHBRP use a certified actuary or "other person with relevant knowledge and expertise" to determine financial impact.

Data Source	Items
California Health Benefits Review Program (CHBRP) Annual Enrollment and Premium Survey of California's largest (by enrollment) health care service plans and health insurers; data as of September 30, 2015; responders' data represent approximately 97% of persons not associated with CalPERS or Medi-Cal with health insurance subject to state mandates (full-service (nonspecialty) DMHC-regulated plan enrollees and of full-service (nonspecialty) CDI-regulated policy enrollees).	Enrollment by: • Size of firm (2–50 as small group and 51+ as large group) • DMHC vs. CDI regulated • Grandfathered vs. nongrandfathered Premiums for individual policies by: • DMHC vs. CDI regulated • Grandfathered vs. nongrandfathered
California Employer Health Benefits Survey, 2014 (conducted by NORC and funded by CHCF)	Enrollment by HMO/POS, PPO/indemnity self-insured, fully insured, Premiums (not self-insured) by: • Size of firm (3–25 as small group and 25+ as large group) • Family vs. single • HMO/POS vs. PPO/indemnity vs. HDHP employer vs. employer premium share
California Health Interview Survey (CHIS)	Uninsured, age: 65+ Medi-Cal (non-Medicare), age: 65+ Other public, age: 65+ Employer-sponsored insurance, age: 65+
California Public Employees' Retirement System (CalPERS) data, enrollment as of October 1, 2015	CalPERS HMO and PPO enrollment • Age: 0–17; 18–64; 65+ • HMO premiums
California Simulation of Insurance Markets (CalSIM) (projections for 2017)	Uninsured, age: 0–17; 18–64 Medi-Cal (non-Medicare) (a), age: 0–17; 18–64 Other public (b), age: 0–64 Individual market, age: 0–17; 18–64 Small group, age: 0–17; 18–64 Large group, age: 0–17; 18–64
Centers for Medicare and Medicaid (CMS) administrative data for the Medicare program, annually (if available) as of end of September	HMO vs. FFS distribution for those 65+ (noninstitutionalized)
PricewaterhouseCoopers (PwC) estimate	Medical trend influencing annual premium increases

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

Further discussion of external and internal data follows.

Internal data

- CHBRP's Annual Enrollment and Premium Survey collects data from the six largest providers of health insurance in California (including Aetna, Anthem Blue Cross of California, Blue Shield of California, CIGNA, Health Net, and Kaiser Foundation Health Plan,) to obtain estimates of enrollment not associated with CalPERS or Medi-Cal by purchaser (i.e., large and small group and individual), state regulator (DMHC or CDI), grandfathered and nongrandfathered status, and average premiums. CalSIM and market trends were applied to project 2017 health insurance enrollment in DMHC-regulated plans and CDI-regulated policies.
- CHBRP's other surveys of the largest plans/insurers collect information on benefit coverage relevant to proposed benefit mandates CHBRP has been asked to analyze. In each report, CHBRP indicates the proportion of enrollees — statewide and by market segment — represented by responses to CHBRP's bill-specific coverage surveys. The proportions are derived from data provided by CDI and DMHC.

External sources

- California Department of Health Care Services (DHCS) data are used to estimate enrollment in Medi-Cal Managed Care (beneficiaries enrolled in Two-Plan Model, Geographic Managed Care, and County Operated Health System plans), which may be subject to state benefit mandates, as well as enrollment in Medi-Cal Fee For Service (FFS), which is not. The data are available at: www.dhcs.ca.gov/dataandstats/statistics/Pages/Monthly_Trend_Report.aspx.
- California Employer Health Benefits Survey data are used to make a number of estimates, including: premiums for employment-based enrollment in DMHC-regulated health care service plans (primarily health maintenance organizations [HMOs] and point of service [POS] plans) and premiums for employment-based enrollment in CDI-regulated health insurance policies regulated by the (primarily preferred provider organizations [PPOs]). Premiums for fee-for-service (FFS) policies are no longer available due to scarcity of these policies in California. This annual survey is currently released by the California Health Care Foundation/National Opinion Research Center (CHCF/NORC) and is similar to the national employer survey released annually by the Kaiser Family Foundation and the Health Research and Educational Trust. More information on the CHCF/NORC data is available at: www.chcf.org/publications/2014/01/employer-health-benefits.
- California Health Interview Survey (CHIS) data are used to estimate the number of Californians aged 65 and older, and the number of Californians dually eligible for both Medi-Cal and Medicare coverage. CHIS data are also used to determine the number of Californians with incomes below 400% of the federal poverty level. CHIS is a continuous survey that provides detailed information on demographics, health insurance coverage, health status, and access to care. More information on CHIS is available at: www.chis.ucla.edu.
- California Public Employees Retirement System (CalPERS) data are used to estimate premiums and enrollment in DMHC-regulated plans, which may be subject to state benefit mandates, as well as enrollment in CalPERS' self-insured plans, which is not. CalPERS does not currently offer enrollment in CDI-regulated policies. Data are provided for DMHC-regulated plans enrolling non-Medicare beneficiaries. In addition, CHBRP obtains information on current scope of benefits from evidence of coverage (EOC) documents publicly available at: www.calpers.ca.gov. California Simulation of Insurance Markets (CalSIM) estimates are used to project health insurance status of Californians aged 64 and under. CalSIM is a microsimulation model that projects the effects of

the Affordable Care Act on firms and individuals. More information on CalSIM is available at: http://healthpolicy.ucla.edu/programs/health-economics/projects/CalSIM/Pages/default.aspx.

- To estimate the premium impact of certain mandates, PwC's projections may derive from its proprietary comprehensive pricing model, which provides benchmark data and pricing capabilities for commercial health plans. The pricing model factors in health plan features such as deductibles, copays, out-of-pocket maximums, covered services, and degree of healthcare management. The pricing model uses normative data and benefit details to arrive at estimates of allowed and net benefit costs. The normative benchmarking utilization metrics within the pricing model are developed from a database of commercial (under 65) health plan experience representing approximately 20 million annual lives.
- The MarketScan databases, which reflect the health care claims experience of employees and dependents covered by the health benefit programs of large employers, are used to estimate utilization and unit cost. These claims data are collected from insurance companies, Blue Cross Blue Shield plans, and third party administrators. These data represent the medical experience of insured employees and their dependents for active employees, early retirees, individuals with COBRA continuation coverage, and Medicare-eligible retirees with employer-provided Medicare Supplemental plans. No Medicaid or Workers Compensation data are included.
- Ingenix MDR Charge Payment System, which includes information about professional fees paid for health care services, based upon claims from commercial insurance companies, HMOs, and self-insured health plans.

Projecting 2017

This subsection discusses adjustments made to CHBRP's Cost and Coverage Model to project 2017, the period when mandates proposed in 2016 would, if enacted, generally take effect. It is important to emphasize that CHBRP's analysis of specific mandate bills typically addresses the incremental effects of a mandate — specifically, how the proposed mandate would impact benefit coverage, utilization, costs, and public health, *holding all other factors constant*. CHBRP's estimates of these incremental effects are presented in the *Benefit Coverage, Utilization, and Cost Impacts* section of this report.

Baseline premium rate development methodology

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

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

For each market segment, CHBRP first obtained an estimate of the insurance premium PMPM by taking the 2015 reported premium from the abovementioned data sources and trending that value to 2017. CHBRP uses trend rates published in the Milliman HCGs to estimate the health care costs for each market segment in 2017.

The large-group market segments for each regulator (CDI and DMHC) are split into grandfathered and nongrandfathered status. For the small-group and individual markets, further splits are made to indicate association with Covered California, the state's health insurance marketplace. Doing so allows CHBRP to

separately calculate the impact of ACA and of specific mandates, both of which may apply differently among these subgroups. The premium rate data received from the CHCF/NORC California Employer Health Benefits survey did not split the premiums based on grandfathered or exchange status. However, CHBRP's Annual Enrollment and Premium (AEP) survey asked California's largest health care service plans and health insurers to provide their average premium rates separately for grandfathered and nongrandfathered plans. The ratios from the CHBRP survey data were then applied to the CHCH/NORC aggregate premium rates for large and small group, to estimate premium rates for grandfathered and nongrandfathered plans that were consistent with the NORC results. For the individual market, the premium rates received from CHBRP's AEP survey were used directly.

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

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

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

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

General Caveats and Assumptions

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

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

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

- Cost impacts are shown only for plans and policies subject to state benefit mandate laws.
- Cost impacts are only for the first year after enactment of the proposed mandate.

- Employers and employees will share proportionately (on a percentage basis) in premium rate increases resulting from the mandate. In other words, the distribution of the premium paid by the subscriber (or employee) and the employer will be unaffected by the mandate.
- For state-sponsored programs for the uninsured, the state share will continue to be equal to the absolute dollar amount of funds dedicated to the program.
- When cost savings are estimated, they reflect savings realized for 1 year. Potential long-term cost savings or impacts are estimated if existing data and literature sources are available and provide adequate detail for estimating long-term impacts. For more information on CHBRP's criteria for estimating long-term impacts, please see: www.chbrp.org/analysis_methodology/docs/longterm_impacts08.pdf.

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

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

Analysis-Specific Caveats and Assumptions

This subsection discusses the caveats and assumptions relevant to specifically to an analysis of AB 2004.

- The population subject to the mandated offering includes children covered by DMHC-regulated commercial insurance plans and CDI-regulated policies and publicly funded plans (including CalPERS and Medi-Cal) subject to the requirements of the Knox-Keene Health Care Service Plan Act. Health plans and insurers could currently comply with this mandate in one of two ways: (1) as a written agreement, or rider, that attaches to a policy to modify insurance coverage; or (2) as part of their basic benefit package. CHBRP assumes that carriers would provide coverage to comply with AB 2004 post-mandate in the base plan to avoid adverse selection (attracting members who anticipated using this benefit). CalPERS and Medi-Cal currently offer coverage for hearing aids and are thus already compliant with AB 2004.

- AB 2004 exceeds Essential Health Benefits (EHBs) because hearing aids for children are not a part of California's EHBs/benchmark plan.

- Healthcare Common Procedure Coding System (HCPCS) and Current Procedural Terminology (CPT) codes related to hearing aids, including codes related to screening and diagnostics, hearing aid fittings, ear molds, maintenance and repairs, and replacements, were identified with CHBRP's content expert.

    - The following hearing aid codes were excluded as they identify services not covered by AB 2004: Codes relating to implants (including cochlear), Codes relating to battery and cord replacements, Under consultation with CHBRP's content expert, codes associated with screening and thus covered under California's EHB's were also excluded from the analysis.

    - As AB 2004 applies only to minors, the final claims database used was limited to 0- to 17-year-olds. CHBRP summarized four categories of hearing aid services within the claims data and thus reports utilization by these categories in **Table 1**: Hearing aids; Hearing aid maintenance & repair; Replacement; Ear mold; Diagnostic tests, hearing aid checks, fittings and adjustments.

    - The identified HCPCS and CPT codes were used to extract data from the MarketScan® Commercial Claims and Encounters Database. These data from MarketScan® were used to develop baseline cost and utilization information for hearing aids. Baseline cost and utilization rates per 1,000 members were calculated and used to estimate enrollee counts for each service type and cost per user.

    - Cost of hearing aids and services does not include any additional costs from warranties or other add-on costs to protect hearing aids that might be purchased by families obtaining hearing aids for children.

- Baseline cost was trended at a 2.1% annual rate of increase from 2014 to 2017 based on 2015 medical CPI rate, for a total increase in cost of 6.1% over the time period.

- Carrier surveys were administered to estimate the percentage of enrollees who have hearing aid coverage pre-mandate along with typical cost-sharing for those who do have coverage.

- To estimate the total number of services provided, CHBRP estimated the percentage of children with coverage for hearing aids in the MarketScan® database, based on responses to the carrier surveys.

- The surveys revealed that 9% of commercially insured enrollees have this coverage. CHBRP then calculated the utilization rate as a percentage of enrollees; the analysis showed that 0.21% of children received at least one of the relevant hearing aid services. For each of the service types, CHBRP calculated a similar value. CHBRP then applied the utilization rates to each of the population cohorts that currently have coverage. All Medi-Cal children, who do have coverage for hearing aids and services were assumed to have utilization rates at the same levels as commercially insured children.

- For commercially insured, cost-sharing covers approximately 15% of costs; cost sharing is not required for children enrolled in Medi-Cal. Post-mandate cost sharing is assumed to be the same for the newly covered children.

- Because there are no data sources that show by how much hearing aid utilization increases when coverage for hearing aids is mandated (i.e., there are no longitudinal studies examining changes utilization before and after legislation has been implemented in other states), CHBRP used content expert input and information in the peer-reviewed literature to estimate the most likely utilization change that would occur if AB 2004 were to be enacted. The following describes the sources of information that were gathered to make an assessment of utilization change:

  - Cost has been cited as a barrier to the acquisition of hearing aids in a study of 352 U.S. parents with young children diagnosed with hearing loss (Muñoz et al. (2013). This study found approximately 1% of the study population did not get hearing aids due to cost (4 out of 352) and is consistent with the price elasticity of demand literature described below that points to hearing aids and pediatric services being largely inelastic.

  - Price elasticity of demand —- the measure of the relationship between a change in the quantity demanded of a good (in this case, hearing aids for children) and a change in its price — is a key input to estimating utilization change when cost to the consumer changes when coverage is given. There are estimates of the price elasticity of demand for hearing aids, suggesting hearing aids are largely inelastic, which means the demand or use of the good is largely unaffected by price change (price elasticity of demand ranges between -0.31 and -0.54 according to Amlani, 2010; Amlani and De Silva, 2005). These price elasticity of demand estimates for hearing aids, however, are not specific to pediatric hearing aids. Thus, going to the broader body of literature on pediatric services, there is evidence that the price elasticity of demand for pediatric clinical visits is also low: Goldman and Grossman (1978) find the price elasticity of demand for pediatric visits to be −0.03 to -0.06. Similarly, Wolfson et al. (1982) found no relationship between user fees/cost sharing and the use of services among disabled children, suggesting the presence of a disability makes it less likely to reduce the use of medical services and parents are likely less inclined to risk the child's health by foregoing medical services. Despite the evidence pointing to the price inelasticity of demand for child hearing aids, CHBRP recognizes it is still possible that the introduction of coverage for a previously uncovered service would result in some increase in demand (Eichner, 1998). The removal of cost as a barrier when coverage is introduced for hearing aids thus is assumed to result in utilization uptake. Assuming a family has no coverage for hearing aids, the family pays 100% of the cost. If their insurance plan were to cover hearing aids such that the enrollee pays 20% out-of-pocket, the family experiences an 80% reduction in cost. Applying a price elasticity of -0.03 (low point estimate from Goldman and

Grossman (1978) of price elasticity of demand for pediatric visits; the low point is chosen to better reflect the more inelastic nature of a medical service for a disability in children per Wolfson and colleagues (1982)) to the assumed 80% reduction in cost, there would be a 2.4% (-.03*80%) increase in demand/utilization of hearing aids. CHBRP thus assumed pre-mandate baseline utilization is lower among noncovered enrollees compared to covered enrollees such that postmandate, AB 2004 would result in an increase in utilization of 2.4% among noncovered enrollees, bringing utilization among noncovered enrollees up to par with utilization among covered enrollees. This assumption is consistent with the assumption applied in the cost analysis of hearing aids bill AB 368 by CHBRP in 2007 in which CHBRP estimated a baseline premandate utilization rate 2% less for those who lack coverage, which was based on a survey conducted in 2003 by the Listen Up organization that found approximately 1% of respondents cited cost as a barrier to obtaining a hearing aid for their child with hearing loss (CHBRP, 2007).

  - CHBRP's content expert pointed out that there exist a number of ways families might receive help for obtaining hearing aids if cost poses a barrier. For currently noncovered enrollees who meet certain financial qualifications, they can receive financial aid and full coverage for hearing aids. California Children's Services (CCS) is available for hearing aid services for children who are commercially insured but do not have a hearing aid benefit or have high out-of-pocket costs for hearing aids depending on their financial status. There are other charitable organizations that provide hearing aids for free or at a drastic discount, based on specified financial qualifications. For example, the Miracle-Ear Children's Foundation provides hearing aids to children 16 years or younger whose families are low income but do not qualify for public support (Miracle-Ear Children's Foundation, 2016). Utilization rates and cost data for enrollees obtaining hearing aids through CCS, charitable organizations, or for those purchasing units fully out of pocket, are not available and thus not included in this analysis.

- Health plans and insurers often provide discounts to members or subscribers. Even if health plans and insurers do not cover hearing aids, it is common for many to have relationships with vendors to provide a discount to their members or subscribers. These relationships may change postmandate; however, due to the uncertainty in how the mandate would shift provider-vendor relationships, CHBRP is unable to estimate impacts of these changes.

Determining Public Demand for the Proposed Mandate

This subsection discusses public demand for the benefits (AB) 2004 would mandate. Considering the criteria specified by CHBRP's authorizing statute, CHBRP reviews public demand for benefits relevant to a proposed mandate in two ways. CHBRP:

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

On the basis of conversations with the largest collective bargaining agents in California, CHBRP concluded that unions currently do not include hearing aids for children aged 0 to 17 in their health

insurance negotiations. In general, unions negotiate for broader contract provisions such as coverage for dependents, premiums, deductibles, and broad coinsurance levels.

Among publicly funded self-insured health insurance policies, the preferred provider organization (PPO) plans offered by CalPERS currently have the largest number of enrollees. The CalPERS PPOs currently provide benefit coverage that is more comprehensive for pediatric hearing aids and related services compared to what is available through group health insurance plans and policies that would be subject to the mandate.

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

REFERENCES

American Hearing Research Foundation. Hearing and Balance Disorders. *Hearing Aids.* 2015.Available at: http://american-hearing.org/disorders/hearing-aids/. . Accessed March 4, 2016.

American Speech-Language-Hearing Association (ASHA). Degree of Hearing Loss. Available at http://www.asha.org/public/hearing/Degree-of-Hearing-Loss/. Accessed March 1, 2016a.

American Speech-Language-Hearing Association (ASHA). State Information. California Hearing Screening Requirements for Newborns and School-Aged Children Available at: http://www.asha.org/Advocacy/state/info/CA/California-Hearing-Screening-Requirements.htm. Accessed March 1, 2016b.

American Speech-Language-Hearing Association (ASHA). Information for the Public, Hearing and Balance, Different Styles of Hearing Aids. Available at http://www.asha.org/public/hearing/Different-Styles-of-Hearing-Aids/. Accessed March 2, 2016c.

American Speech-Language-Hearing Association (ASHA). State Insurance Mandates for Hearing Aids. Available at: http://www.asha.org/advocacy/state/issues/ha_reimbursement/. Accessed March 1, 2016d.

Amlani AM, De Silva DG. Effects of business cycles and FDA intervention on the hearing aid industry. *American Journal of Audiology*. 2005;14(1):71-79.

Amlani AM. Will government subsidies increase the US hearing aid market penetration rate? *Audiology Today*. 2010;22(2):40-46.

Apuzzo ML, Yoshinaga-Itano C. Early identification of infants with significant hearing loss and the Minnesota child development inventory. *Seminars in Hearing*. 1995;16:124-139.

Boyle CA, Boulet S, Schieve LA, Cohen RA, Blumberg SJ, Yeargin-Allsopp M, Visser S, Kogan MD. Trends in the prevalence of developmental disabilities in US children, 1997-2008. *Pediatrics*. 2011;127(6):1034-42

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

Calderon R, Naidu S. Further support for the benefits of early identification and intervention for children with hearing loss. *Volta Review*. 2000;100:53-84.

California Department of Developmental Services (DDS). Quarterly Client Characteristics Report. December 2015. Available at: http://www.dds.ca.gov/FactsStats/docs/QR/Dec2015_Quarterly.pdf. Accessed March 20, 2016.

California Department of Education (CDE). DataQuest. Special Education Enrollment by Age and Disability Staetwide Report. Reporting Cycle December 1, 2014. Available at: http://data1.cde.ca.gov/dataquest/SpecEd/SpecEd1.asp?cChoice=SpecEd1&cYear=2014-15&cLevel=State&cTopic=SpecEd&myTimeFrame=S&submit1=Submit&ReptCycle=December . Accessed February 24, 2016.

California Department of Health Care Services (DHCS). Available at: http://www.dhcs.ca.gov/services/nhsp/Pages/FreqAskedQ.aspx. Accessed March 2, 2016.

California Department of Public Health (CDPH). California Newborn Hearing Screening Program. Calendar Year 2013 Data. Updated March 3, 2015. Available at http://www.dhcs.ca.gov/services/nhsp/Documents/NHSPData2013.pdf. Accessed March 2, 2016.

California Health Benefits Review Program (CHBRP). Analysis of Assembly Bill 368: Mandate to Offer Coverage of Hearing Aids for Children. A report to the 2007-2008 California State Legislature. Oakland, CA: CHBRP; 2007.

Carney AE, Moeller MP. Treatment efficacy: Hearing loss in children. *Journal of Speech, Language, and Hearing Research*. 1998;41:S61-S84.

Centers for Disease Control and Prevention (CDC). National Center on Birth Defects and Developmental Disabilties: Hearing Loss in Children: Types of Hearing Loss. Page last reviewed: February 18, 2015a. Available at: http://www.cdc.gov/ncbddd/hearingloss/types.html. Accessed March 2, 2016.

Centers for Disease Control and Prevention (CDC). National Center on Birth Defects and Developmental Disabilties: Hearing Loss in Children: Facts. Page last reviewed October 23, 2015b. Available at http://www.cdc.gov/ncbddd/hearingloss/facts.html. Accessed March 2, 2016.

Centers for Disease Control and Prevention (CDC). Hearing Loss in Children. Research and Tracking. Page last reviewed August 2015c. Available at: http://www.cdc.gov/ncbddd/hearingloss/research.html. Accessed March 6, 2016.

Centers for Disease Control and Prevention (CDC). NCHHSTP Social Determinants of Health. Frequently Asked Questions. Page last reviewed: March 10, 2014. Available at: http://www.cdc.gov/nchhstp/socialdeterminants/faq.html. Accessed August 27, 2015.

Ching TY, Hill M, Brew J, et al., The effect of auditory experience on speech perception, localization, and functional performance of children who use a cochlear implant and a hearing aid in opposite ears. *International Journal of Audiology.* 2005;44:677-690.

Ching TY, Psarros C, Hill M, Dillon H, Incerti P. Should children who use cochlear implants wear hearing aids in the opposite ear? *Ear and Hearing*. 2001;22:365-380.

Convertino CM, Marschark M, Sapere P, Sarchet T, Zupan M. Predicting academic success among deaf college students. *Journal of Deaf Studies and Deaf Education*. 2009;14:324–343.

Cuculick JA, Kelly RR. Relating deaf students' reading and language scores at college entry to their degree completion rates. *American Annals of the Deaf* 2003;148:279–286.

Eichner MJ. The demand for medical care: What people pay does matter. *American Economic Review.* 1998;88(2):117-121.

Fan Y, Zhang Y, Wang P, et al. The efficacy of unilateral bone-anchored hearing devices in Chinese mandarin-speaking patients with bilateral aural atresia*. JAMA Otolaryngology—Head & Neck Surgery*. 2014;140(4):357-362 356p.

Gabbard SA, Schryer J. Early amplification options. Mental Retardation and Developmental Disabilities *Research Review*. 2003;9:236-242.

Gallaudet Research Institute. State Summary Report of Data from the 2009-10 Annual Survey of Deaf and Hard of Hearing Children and Youth. April 2011. Washington, D.C.: GRI, Gallaudet University.

Gandel, Cathie. Hearing Aid Styles: Pros and Cons. AARP Bulletin. October 2014. Available at: http://www.aarp.org/health/conditions-treatments/info-05-2011/hearing-aid-styles.html. Accessed March 15, 2016.

Gatehouse S. Electronic aids to hearing. *British Medical Bulletin*. 2002;63:147-156.

Goldman F, Grossman, M. The demand for pediatric care: an hedonic approach. *Journal of Political Economy.* 1978;86:259- 80.

Hearing Loss Association of America (HLAC). Basic Facts about Hearing Loss, 2016. Available at: http://www.hearingloss.org/content/basic-facts-about-hearing-loss. Accessed March 4, 2016.

Holt RF, Kirk KI, Eisenberg LS, Martinez AS, Campbell W. Spoken word recognition development in children with residual hearing using cochlear implants and hearing aids in opposite ears. *Ear and Hearing.* 2005;26:82S-91S.

Kent B, Smith S. They only see it when the sun shines in my ears: exploring perceptions of adolescent hearing aid users. *Journal of Deaf Studies and Deaf Education*. May 12, 2006.

Limb SJ, McManus MA, Fox HB, White KR, Forsman I. Ensuring financial access to hearing AIDS for infants and young children. Pediatrics. 2010 Aug;126 Suppl 1:S43-51.

Litovsky RY, Johnstone PM, Godar SP, et al. Bilateral cochlear implants in children: Localization acuity measured with minimum audible angle. *Ear and Hearing*. 2006b;27:43-59.

Mehra S, Eavey RD, Keamy DG Jr. The epidemiology of hearing impairment in the United States: newborns, children, and adolescents. *Archives of Otolaryngology—Head & Neck Surgery.* 2009;140(4):461-72.

Mohr PE, Feldman JJ, Dunbar JL, McConkey-Robbins A, Niparko JK, Rittenhouse RK, Skinner MW. The societal costs of severe to profound hearing loss in the United States. *International Journal of Technology Assessments in Health Care*. 2000;16(4):1120-35.

Muñoz K1, Blaiser K, Barwick K. Parent hearing aid experiences in the United States. *Journal of the American Academy of Audiologists*. 2013;24(1):5-16.

Musselman CR, Wilson AK, Lindsay PH. Effects of early intervention on hearing impaired children. *Exceptional Child.* 1988;55:222-228.

National Conference of State Legislatures (NCSL). *Newborn Hearing Screening Laws*. May 2011. Available at: http://www.ncsl.org/research/health/newborn-hearing-screening-state-laws.aspx#c. Accessed March 20, 2016.

National Institute on Deafness and Other Communication Disorders (NIDCD). *Cochlear Implants*. 2006. Available at: http://www.nidcd.nih.gov/health/hearing/coch.htm. Accessed March 13, 2007.

National Institute on Deafness and Other Communication Disorders (NIDCD*). Hearing Aids*. Last Updated December 14, 2015. Available at http://www.nidcd.nih.gov/health/hearing/pages/hearingaid.aspx Accessed March 8, 2016.

National Institute on Deafness and Other Communication Disorders (NIDCD). *Health Info, Hearing, Ear Infections and Deafness: Hearing Aids.* Last Updated March 22, 2016. Available at: https://www.nidcd.nih.gov/health/hearing-aids#hearingaid_05. Accessed March 22, 2016.

Niskar AS, Kieszak SM, Holmes A, Esteban E, Rubin C, Brody DJ. Prevalence of hearing loss among children 6 to 19 years of age: the Third National Health and Nutrition Examination Survey. *JAMA*. 1998;279(14):1071-5.

Office of Disease Prevention and Health Promotion. Healthy People 2020: Social Determinants of Health. Available at: Available at: www.healthypeople.gov/2020/topics-objectives/topic/socialdeterminantshealth/addressing-determinants. Accessed February 16, 2016.

Palmer CV, Ortmann A. Hearing loss and hearing aids*. Neurologic Clinics*. 2005;23:901-918

Paludetti G, Conti G, DI Nardo W, DE Corso E, Rolesi R, Picciotti PM, Fetoni AR. Infant hearing loss: from diagnosis to therapy Official Report of XXI Conference of Italian Society of Pediatric Otorhinolaryngology. *Acta Otorhinolaryngologica Italica*. 2012;32(6):347-70.

Pittman AL, Stelmachowicz PG. Hearing loss in children and adults: Audiometric configuration, asymmetry, and progression. *Ear and Hearing*. 2003;24:198-205.

Shargorodsky J, Curhan S, Curhan G, Eavey R. Change in Prevalence of Hearing Loss in US Adolesecents. *JAMA*. 2010: 304(7);772-778.

Stelmachowicz PG, Pittman AL, Hoover BM, Lewis DE, Moeller MP. The importance of high frequency audibility in the speech and language development of children with hearing loss. *Archives of Otolaryngology—Head & Neck Surgery*. 2004;130:556-562.

Tomblin JB, Oleson JJ, Ambrose SE, Walker E, Moeller MP. The Influence of Hearing Aids on the Speech and Language Development of Children With Hearing Loss. *JAMA Otolaryngology—Head & Neck Surgery*. 2014;140(5):403-409.

Tomblin JB, Harrison M, Ambrose SE, Walker EA, Oleson JJ, Moeller MP. Language Outcomes in Young Children with Mild to Severe Hearing Loss*. Ear and Hearing*. 2015;36 Suppl 1:76s-91s.

U.S Department of Labor. Department of Labor Force Statistics. Labor Force Statistics from the Current Population Survey, 2015. Available at: http://www.bls.gov/web/empsit/cpseea10.htm. Accessed March 17, 2016.

U.S. Department Of Health and Human Services. Office of Disease Prevention and Health Promotion. *Healthy People 2020: Social Determinants of Health*. Available at: www.healthypeople.gov/2020/topics-objectives/topic/social-determinantshealth/addressing-determinants. Accessed February 16, 2016.

Van Naarden Braun K, Christensen D, Doernberg N, et al. Trends in the Prevalence of Autism Spectrum Disorder, Cerebral Palsy, Hearing Loss, Intellectual Disability, and Vision Impairment, Metropolitan Atlanta, 1991–2010. *PLoS One.* 2015;10(4):e0124120.

Vasconcellos AP, Colello S, Kyle ME, Shin JJ..Societal-level Risk Factors Associated with Pediatric Hearing Loss: A Systematic Review. *JAMA Otolaryngology—Head & Neck Surgery*. 2014;151(1):29-41.

Verhagen CV, Hol MK, Coppens-Schellekens W, Snik AF, Cremers CW. The Baha Softband. A new treatment for young children with bilateral congenital aural atresia*. International Journal of Pediatric Otorhinolaryngology.* 2008;72(10):1455-1459.

Wolfson J, Kapadia AS, Decker M, Sear AM, Roht LH, Effects of cost-sharing on users of a state's health service program. *Medical Care*. 1982;20(12):1178-1187.

Wyoming Early Hearing Detection and Intervention Program. Available at: http://www.wyomingehdi.org/types-of-hearing-loss/. Accessed March 3, 2016.

Yoshinaga-Itano C, Apuzzo ML. The development of deaf and hard of hearing children identified early through the high-risk registry. *American Annals of the Deaf*. 1998a;143:416-424.

Yoshinaga-Itano C, Apuzzo ML. Identification of hearing loss after age 18 months is not early enough. *American Annals of the Deaf.* 1998b;143:380-387.

Yoshinaga-Itano C. From Screening to Early Identification and Intervention: Discovering Predictors to Successful Outcomes for Children With Significant Hearing Loss. *Journal of Deaf Studies and Deaf Education*. 2003;Winter;8(1):11-30.

CALIFORNIA HEALTH BENEFITS REVIEW PROGRAM COMMITTEES AND STAFF

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

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

Faculty Task Force

Janet Coffman, MA, MPP, PhD, *Vice Chair for Medical Effectiveness*, University of California, San Francisco
Sara McMenamin, PhD, *Vice Chair for Medical Effectiveness and Public Health*, University of California, San Diego
Joy Melnikow, MD, MPH, *Vice Chair for Public Health*, University of California, Davis
Ninez Ponce, PhD, Co-*Vice Chair for Cost*, University of California, Los Angeles
Nadereh Pourat, PhD, Co-*Vice Chair for Cost*, University of California, Los Angeles
Susan L. Ettner, PhD, University of California, Los Angeles
Sheldon Greenfield, MD, University of California, Irvine
Sylvia Guendelman, PhD, LCSW, University of California, Berkeley
Marilyn Stebbins, PharmD, University of California, San Francisco

Task Force Contributors

Wade Aubry, MD, University of California, San Francisco
Diana Cassady, DrPH, University of California, Davis
Shana Charles, PhD, MPP, University of California, Los Angeles, and California State University, Fullerton
Shauna Durbin, MPH, University of California, Davis
Margaret Fix, MPH, University of California, San Francisco
Ronald Fong, MD, MPH, University of California, Davis
Brent Fulton, PhD, University of California, Berkeley
Erik Groessl, PhD, University of California, San Diego
Sarah Hiller, MA, University of California, San Diego
Jeffrey Hoch, PhD, University of California, Davis
Michelle Ko, MD, PhD, University of California, Los Angeles
Gerald Kominski, PhD, University of California, Los Angeles
Alicia LaFrance, MPH, MSW, University of California, San Francisco
Meghan Maiya, MA, University of California, San Diego

CHBRP Staff

Garen Corbett, MS, Director
John Lewis, MPA, Associate Director
Erin Shigekawa, MPH, Principal Policy Analyst
AJ Scheitler, EdD, Principal Policy Analyst
Karla Wood, Program Specialist

California Health Benefits Review Program
University of California
Office of the President
1111 Broadway, Suite 1400
Oakland, CA 94607
Tel: 510-287-3876 Fax: 510-763-4253
chbrpinfo@chbrp.org www.chbrp.org

The California Health Benefits Review Program is administered by UC Health at the University of California, Office of the President. UC Health is led by John D. Stobo, MD, Executive Vice President.

ACKNOWLEDGEMENTS

Alicia LaFrance, MPH, MSW, and Neil Sehgal, MPH, PhD, both of the University of California, San Francisco, prepared the medical effectiveness analysis. Penny Coppernoll-Blach, MLIS, of the University of California, San Diego, conducted the literature search. Diana Cassady, DrPH, and Dominique Ritley, MPH, both of the University of California, Davis, prepared the public health impact analysis. Riti Shimkhada, PhD, of the University of California, Los Angeles, prepared the cost impact analysis. Sandra Hunt, MPA, of PricewaterhouseCoopers, provided actuarial analysis. Margaret Winter, MS, CCC-A, of the University of Southern California, provided technical assistance with the literature review and expert input on the analytic approach. Erin Shigekawa, MPH, of CHBRP staff prepared the Policy Context and synthesized the individual sections into a single report. A subcommittee of CHBRP's National Advisory Council (see final pages of this report) and a member of the CHBRP Faculty Task Force, Brent Fulton, PhD, of the University of California, Berkeley, reviewed the analysis for its accuracy, completeness, clarity, and responsiveness to the Legislature's request.

Please direct any questions concerning this document to:

California Health Benefits Review Program
University of California, Office of the President
UC Health
1111 Broadway, Suite 1400
Oakland, CA 94607
Tel: 510-287-3876
Fax: 510-763-4253
www.chbrp.org

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

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

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

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

Garen Corbett, MS
Director