THE PEW CENTER ON THE STATES

Falling Short

Most States Lag On Dental Sealants

The Pew Center on the States is a division of The Pew Charitable Trusts that identifies and advances effective solutions to critical issues facing states. Pew is a nonprofit organization that applies a rigorous, analytical approach to improve public policy, inform the public, and stimulate civic life.

The Pew Children's Dental Campaign works to promote policies that will help millions of children maintain healthy teeth, get the care they need, and come to school ready to learn.

PEW CENTER ON THE STATES

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Why Prevention Matters

Dental care remains the greatest unmet health need among U.S. children,[1] especially for low-income children, who are almost twice as likely to develop cavities as their middle-class and wealthy peers.[2] More than 15 million Medicaid-enrolled children did not see a dentist in 2010.[3]

Tooth decay can have far-reaching effects on a child's life. Untreated decay can cause pain and infection that may lead to difficulty eating, speaking, socializing, and sleeping and to poor overall health.[4] Dental problems also negatively affect school attendance and performance.[5] In California alone, an estimated 504,000 children missed at least one school day in 2007 due to a toothache or other dental ailment.[6] Children with dental problems are more likely to have oral health problems as adults, which can limit their job prospects.[7]

Dental disease also has serious consequences for state budgets. Between 2010 and 2020, annual Medicaid spending for dental services in the United States is expected to increase 170 percent,

from $8 billion to more than $21 billion.[8] Children account for approximately 60 percent of the program's total spending on dental services.[9]

Unnecessary dental-related trips to hospital emergency rooms (ERs) add to states' financial burdens. For example, between 2006 and 2009, visits to South Carolina's hospital ERs for preventable dental problems increased 37 percent, from 9,804 to 13,424. Nearly three of every four ER trips in 2009 were made by Medicaid recipients or the uninsured, meaning a large portion of the cost was covered by the state's taxpayers or other hospital consumers.[10]

In Florida, the cost of treating dental problems in emergency rooms exceeded $88 million in 2010.[11] ER treatment is not only expensive but is also typically incomplete, requiring patients to seek follow-up care from a dentist to address the underlying problem.[12]

States could reduce the pain and costs associated with dental problems by doing more to prevent cavities among low-income children—kids who are more at risk of tooth decay.

The good news is that states have a variety of cost-effective strategies they can use. In many states, policy makers are expanding proven approaches such as community water fluoridation and fluoride varnish.

Dental sealants—clear plastic coatings applied to the chewing surfaces of molars (see page 5 for more information)—are another key tool, which has been used in school-based programs since the 1980s.[13] The bad news is that most states simply are not doing enough, especially when it comes to dental sealants. Although it has been 45 years since the first research paper reported the successful use of sealants, the last comprehensive U.S. survey (2009–2010) revealed that only half of teens ages 13 to 15 had received sealants on permanent teeth.[14]

Despite strong evidence that sealants prevent decay, Dr. Barbara Gooch, a senior official at the Centers for Disease Control and Prevention (CDC), noted that "this preventive intervention is underused, especially in children from low-income families."[15] States are missing an opportunity that can save families and taxpayers money. The average cost of sealing one molar is less than one-third of the cost of filling a cavity.[16]

By expanding the number of children reached by sealant programs, states can spare kids the consequences of tooth decay while making a smarter investment of tax dollars.

Grading the States

In both 2010 and 2011, the Pew Children's Dental Campaign released reports grading all 50 states and the District of Columbia on children's dental health, relying on eight evidence-based policies that cover prevention, financing, and workforce issues. However, this year, Pew's 50-state report focuses on prevention, examining states' efforts to improve access to sealants for low-income kids.

Pew's grades are based on four indicators that should be a key part of any state's prevention strategy:

1. having sealant programs in high-need schools,
2. allowing hygienists to place sealants in school-based programs without requiring a dentist's exam,
3. collecting data regularly about the dental health of school-children and submitting it to a national oral health database, and
4. meeting a national health objective on sealants.

Pew's assessment reflects the states' policies that existed as of July 1, 2012.

Key Findings

Although a number of states are making progress, most of them have a great deal of work to do if they intend to make prevention a priority. Indeed, 40 percent of all states earned a grade of D or F on Pew's benchmarks:

- Thirty-five states and the District of Columbia do not have sealant programs in a majority of high-need schools—those with a high proportion of children most at risk of decay. Unfortunately, four states have no programs in these schools.
- Nineteen states and the District of Columbia still maintain a regulation that restricts hygienists' ability to provide sealants to more children. This outdated rule requires a dentist to examine a child before a hygienist can place a sealant, ignoring the evidence showing that this prerequisite is unnecessary. Even states that have passed laws to remove these barriers need to take additional steps. For example, Arkansas removed this restriction in 2011, but the state Board of Dentistry has not yet released regulations to implement this law.
- Forty states and the District of Columbia could not confirm that they had reached at least 50 percent of their children with sealants. This is the minimum threshold established by Healthy People 2010, a national set of disease-prevention objectives that were developed by federal health officials.
- Collecting recent data on tooth decay and other dental health measures is essential for states to make informed and strategic policy decisions. Yet 19 states and the District of Columbia did not submit data from within the past five years on school-age children to the National Oral Health Surveillance System (NOHSS), a database that enables policy makers to identify trends and assess progress.
- Only five states earned an A, and only two of them (Maine and New Hampshire) received the maximum points possible. Yet, even in these five states, there is room for improvement because thousands of children who are most at risk for decay are not receiving sealants.
- Eight states received a B. Of these states, five failed to meet the Healthy People 2010 objective, and half did not have sealant programs in a majority of high-need schools.
- Seventeen states earned C grades, and another 15 received D's. The D states have significant room for improvement.

- Five states—Hawaii, New Jersey, Montana, North Carolina, and Wyoming—and the District of Columbia earned an F. They are lagging far behind in prevention efforts.

Table A.1 on pages 21-22 shows all states' grades and how they performed on each of the four benchmarks that were used by Pew.

WHAT ARE SEALANTS?

Dental sealants are clear plastic coatings that take only a few minutes to apply to the chewing surfaces of permanent molars, the most cavity-prone teeth.[i] The coatings act as a barrier against decay-causing bacteria.[ii]

Sealants can be placed following a visual assessment of the teeth to make sure that sealants are not placed on any extensive decay.[iii] After the molars are cleaned and prepped, the sealant material is painted onto the enamel, where it bonds directly to the tooth and quickly hardens.[iv]

Usually, sealants are first placed on children's teeth while they are in the 2nd grade, shortly after their permanent molars appear.[v] In addition to protecting healthy teeth, sealants also can prevent cavities from forming when applied during the early stages of tooth decay.[vi]

The CDC and the American Dental Association's Council on Scientific Affairs have cited a number of studies that recognize sealants as one of the most effective preventive strategies.[vii] Schools are an ideal place to reach students at high risk for cavities. School-based sealant programs have been associated with reducing the incidence of tooth decay by an average of 60 percent.[viii]

School-based sealant programs save money by preventing the need for fillings and other expensive procedures among children at higher risk for cavities.[ix]

Despite the proven benefits of sealants for low-income children, the latest available data indicate that during 2009 and 2010, only about 26 percent of poor children had received sealants, compared with 34 percent of kids from families at higher income levels.[x] Race and ethnicity also shape this disparity. During this same span of years, the proportion of black children (27 percent) and Hispanic children (27 percent) having sealants was significantly below the 36 percent of white children who received them.[xi]

How the States Performed

Pew graded the states and the District of Columbia on four benchmarks related to access to sealants:

1. expanding school-based sealant programs,
2. updating hygienist supervision rules,
3. having adequate data collection systems, and
4. reaching Healthy People 2010 sealant objectives.

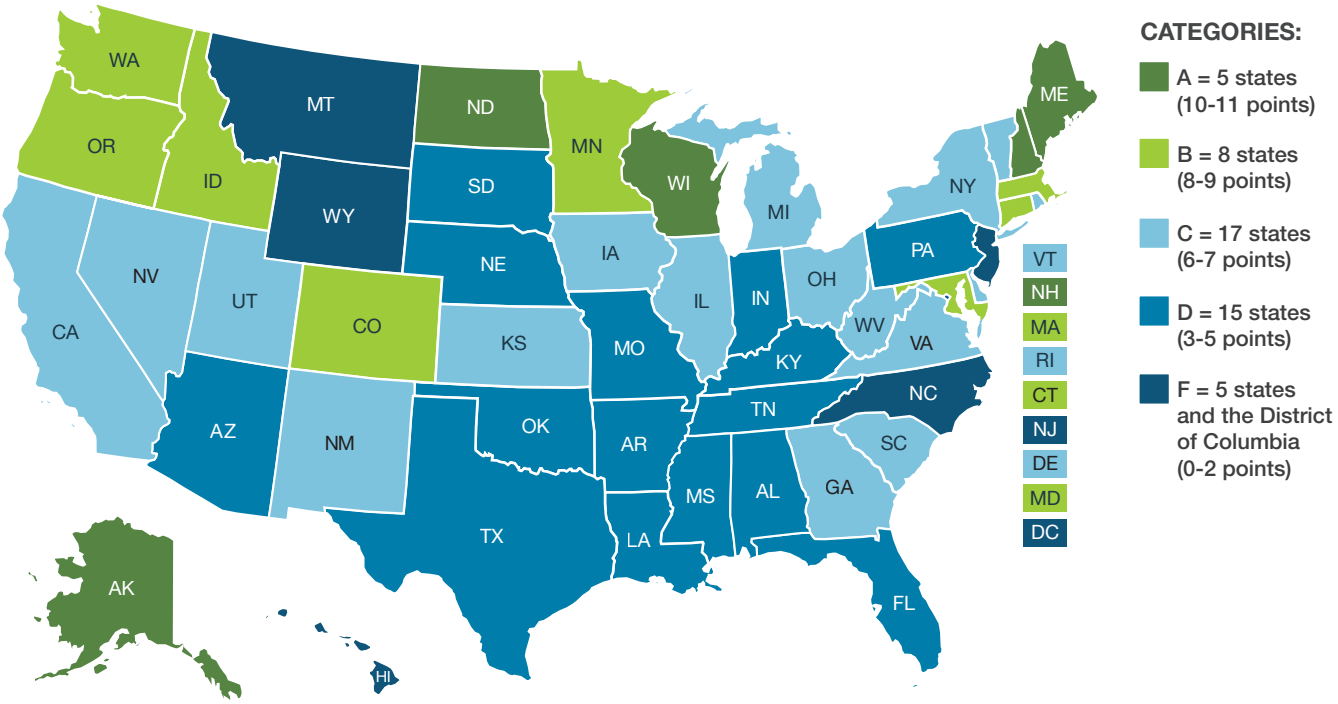
Overall State Grades

Pew's analysis shows that while some states have improved their sealant policies since 2010, most are not doing enough to use this cost-effective prevention tool. Only five states merited A grades, and Maine and New Hampshire were the only states to achieve the maximum of 11 possible points. Twenty states and the District of Columbia earned a D or an F, placing them far behind in promoting sealants.

FIGURE 1:

OVERALL STATE GRADES

States were given specific points for each benchmark, and grades — on a scale of A to F — were based on the total points earned. (For an explanation of each benchmark and an overview of how points were assigned, see pages 23–25.)



Source: Pew Center on the States, 2012.

The grades in this report should be viewed in the larger context of oral health prevention. For example, New Hampshire's status as a top performer in this report should be tempered by the fact that only 43 percent of the state's residents whose homes are connected to public water systems receive fluoridated water.[17] By contrast, Kentucky does a better job than almost any state at providing fluoridated water to its residents but lacks most of the policies needed to expand dental sealants to more low-income children.[18]

School-based sealant programs remain an underutilized preventive strategy, despite their proven benefits.

Benchmark #1: Percentage of High-Need Schools with Sealant Programs

Sealant programs that target high-need schools[19] are effective because they directly reach low-income kids, who need sealants the most and are least likely to receive them.[20] These programs help deliver sealants to children through a variety of providers, such as dentists, hygienists, and dental assistants. These teams of practitioners bring care to schools in several ways, including portable equipment, a mobile clinic, or a fixed facility located in the school.[21]

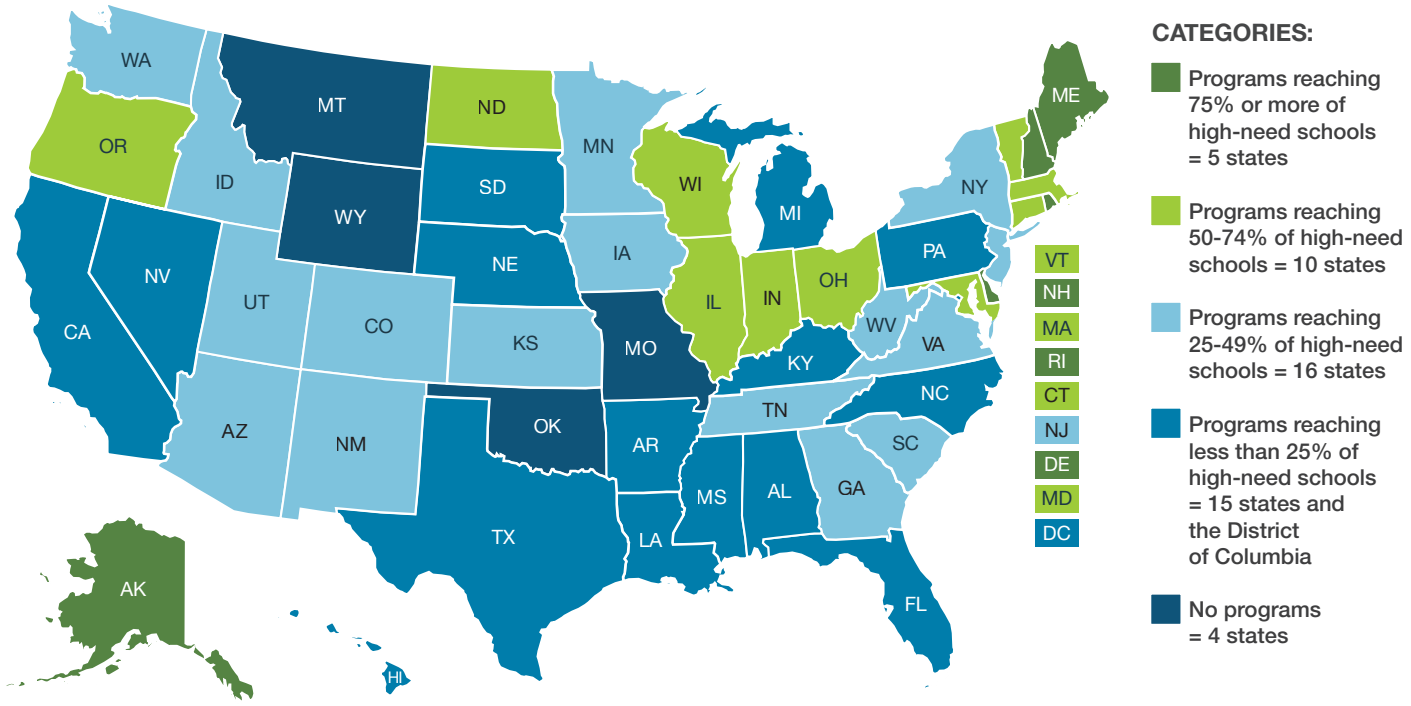
In 2002, the U.S. Task Force on Community Preventive Services, an expert panel convened by the CDC, strongly recommended that school-based sealant programs be part of a comprehensive strategy to prevent and control tooth decay.[22] The Task Force found that tooth decay of molars dropped by an average of 60 percent up to five years after sealant application in a school program.[23]

School-based sealant programs can also reduce the large disparities that exist in dental health. A national study found that, compared with their more affluent counterparts, low-income children ages

FIGURE 2:

BENCHMARK #1: PERCENTAGE OF HIGH-NEED SCHOOLS WITH SEALANT PROGRAMS

States were graded on the percentage of high-need schools—those where more than 50 percent of students participate in the federal free and reduced-price lunch program—that have sealant programs. School-based sealant programs that specifically target high-need schools have been shown to be effective in reaching the most at-risk children. Only 15 states have programs in at least half of these schools.



Source: Pew Center on the States, 2012.

6 to 11 are significantly more likely to develop cavities in their permanent teeth and 24 percent less likely to have dental sealants.[24]

Children who are most susceptible to decay benefit the most from receiving sealants.[25] This is primarily because they are more likely to have tooth decay and less likely to receive regular dental care to fill a cavity before it grows larger and deeper.[26] Low-income kids face multiple barriers to care, including lack of insurance, the limited availability of dental providers who accept Medicaid or reduced fees, and parents' oral health knowledge and behaviors.[27] These behaviors can include infrequent tooth-brushing, fear of oral health providers, and making unhealthy food choices.

Sealing the molars prevents cavities from becoming more serious problems, interfering with schoolwork, and negatively affecting a child's overall health. By not providing sealant programs to all high-need schools, states miss a key opportunity to close economic and racial gaps in oral health and to reduce treatment costs. [28]

Between 2011 and 2012, nine states increased the number of high-need schools with sealant programs. Yet progress is slow in most states. Only 15 states provide sealants to more than 50 percent of these schools (see Figure 2), and only five of them have school-based sealant programs in at least 75 percent of high-need schools: Alaska, Delaware, Maine, New Hampshire, and Rhode Island.

Some dental providers have viewed these school programs with unease, expressing concern that hygienists might seal children's teeth without referring these kids to a local dentist for ongoing care. Yet this concern was put to rest several years ago when CDC staff examined scientific literature and convened an expert panel to review new information about sealants.[29] This analysis led to a 2009 report in the *Journal of the American Dental Association*, advising that programs should "seal teeth of children even if follow-up [care] cannot be ensured" because "the potential risk associated with loss to follow-up… does not outweigh the potential benefit of dental sealants."[30] While children should have a source of high-quality follow-up care, sealants can be effective even when access to this care is limited. A lack of comprehensive care following a visit with a school-based sealant program is not a reason to deny preventive services to the most cavity-prone children.

Evidence supports the cost-effectiveness of school-based sealant programs. The Colorado Department of Public Health and Environment estimates that in that state, "for every dollar spent on school sealant programs, two dollars are saved."[31]

PROGRESS IN MASSACHUSETTS

In 2009, Massachusetts Governor Deval Patrick signed legislation to create public health hygienists, a new category of hygienists who may work in a variety of public health settings, including schools, nursing homes, and medical facilities or in local and state government agencies. In August 2010, the Massachusetts Board of Registration in Dentistry released rules to implement this law, allowing public health hygienists to provide preventive services, including sealant application, without requiring patients to see a dentist beforehand.[xii]

In addition, the 2010 regulation allows all dental hygienists to place sealants without a dentist's prior examination as long as they are doing so in a public health setting, they have a standing order (e.g., a dentist's authorization), and they are working under the general supervision of a dentist.

General supervision allows hygienists to offer preventive services in a different physical location from a dentist while still working under the dentist's supervision.[xiii] The Massachusetts story illustrates that there are many ways to provide adequate supervision for hygienists and to ensure the safety and health of the public.

"School is a place for learning," said Lynn Bethel, former director of the state's Office of Oral Health. "Allowing dental hygienists to place sealants in schools without first having a dentist's examination will improve the oral health of children without reducing their learning time."[xiv]

To better understand the obstacles to establishing such programs, Pew interviewed 35 experts in 2009, ranging from state dental directors to local sealant program managers, about barriers to expanding their school-based efforts.[32] These officials cited a number of obstacles, including a lack of leadership by policy makers, state health officials' limited capacity to expand sealant programs, the inability of hygienists to bill directly for their services, and cumbersome Medicaid reimbursement rules. However, Pew's research concluded that reducing restrictions on dental hygienists was "without question the most frequently noted [policy]" that would help to expand school-based sealant programs.[33]

Benchmark #2: Rules Restricting Hygienists

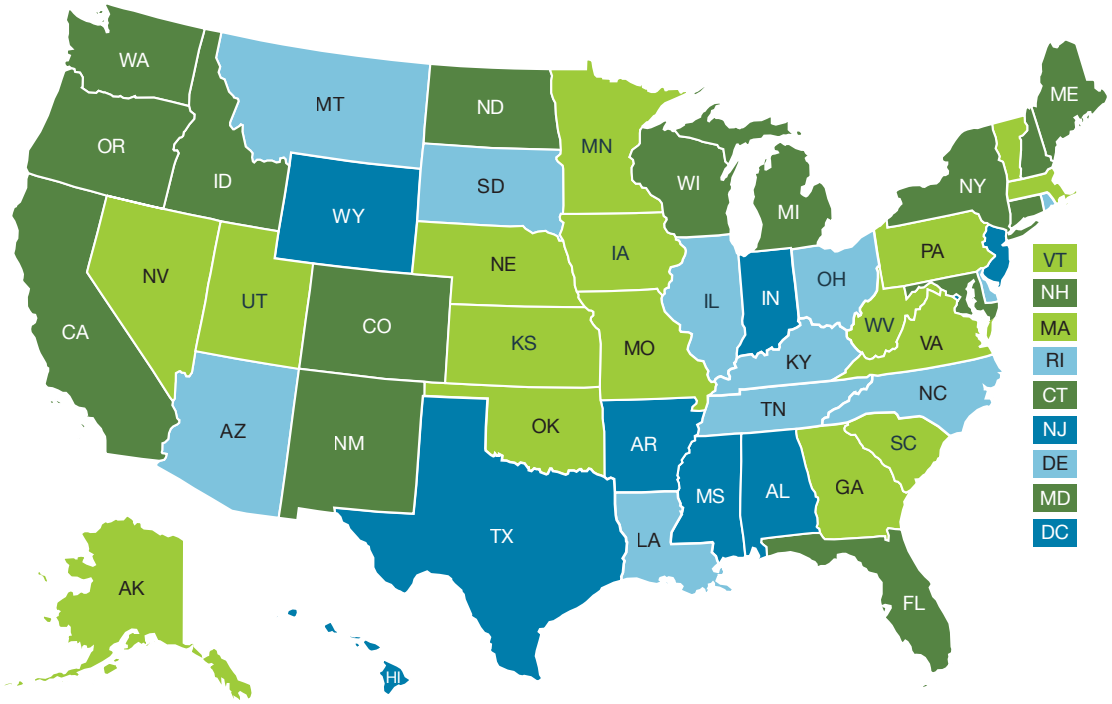
Hygienists are the primary practitioners who apply sealants in school-based programs. Before a tooth is sealed, the dental provider examines the molars to ensure that extensive decay does not exist on these teeth. An expert panel convened by the CDC concluded in 2009 that a comprehensive dental exam was not required to determine if a tooth should be sealed; a simple visual assessment is sufficient.[34] Training standards prepare hygienists to perform these tasks safely and effectively.[35]

In the past year, five states followed this evidence by eliminating these needless regulations. However, as of July 1, 2012, 19 states and the District of Columbia still required that children be examined by a dentist before a hygienist can apply sealants, creating expensive and unnecessary barriers to serving children in school-based sealant programs

FIGURE 3:

BENCHMARK #2: RULES RESTRICTING HYGIENISTS

States were graded on whether they require a dentist to examine children before a hygienist can apply sealants. These outdated requirements raise the costs and reduce the efficiency of school-based sealant programs. Nineteen states and the District of Columbia still have such restrictive rules in place. Of these, eight and DC go even further, requiring that the dentist be present during sealant application.



CATEGORIES:

- A dentist's exam is not required prior to a hygienist placing a sealant in a school. = 15 states
- A dentist's exam is sometimes required in a school (e.g., certain classifications of dental hygienist, such as public health hygienists, can place sealants without a dentist's prior exam). = 16 states
- A dentist's exam is always required in a school. = 11 states
- A dentist's exam and indirect or direct supervision are required in a school. = 8 states and the District of Columbia

Note: This report grades states on policies in place on July 1, 2012. Grades were not altered for changes that occurred after July 1, 2012, to maintain a research design that ensures consistency in grading across states.

Source: Pew Center on the States, 2012.

(see Figure 3). Eight of these states and the District of Columbia deviate even further from the evidence by requiring a dentist to be present when a sealant is applied in a school-based program.

Requiring a dentist to be on-site complicates scheduling the application of sealants and needlessly increases the cost of these programs.[36] For example, Virginia found that eliminating the prior exam rule saved 20 percent in costs per child for sealant application.[37] Moreover, if the outdated prior exam rule were removed, dentists working with school-based programs could instead use their time to care for students with more complex dental needs.

The prior exam regulation also may cause children to miss more class time, as an additional appointment must be made with a dentist. A single visit with a hygienist expedites the sealant placement, making it easier to provide this important preventive service to more kids in need. Given sealant programs' limited resources, the mandate to locate and make arrangements for a dentist to conduct exams can reduce the cost-effectiveness of these programs and limit the number of children served.

Unnecessarily restrictive regulations also limit hygienists' ability to practice to the full scope of their education and training, which is at odds with the conclusions reached by the Institute of Medicine (IOM). In a 2011 report, IOM recommended that "at minimum, state practice acts should allow allied dental professionals to practice to the full extent of their education and training."[38] IOM reports are recognized as the gold standard for health policy makers. By updating their laws, states can meet this recommendation and strengthen access to sealants for children who need them the most.

Other types of rules can restrict the ability of hygienists to provide preventive services in school settings. For example, Maine's Board of Dental Examiners adopted a rule change in 2012 prohibiting children who have seen a dentist in the past year from getting school-based preventive care unless that dentist approves.[39] The state's largest newspaper criticized the policy shift because "adding this bureaucratic hurdle will mean that some kids will never get treatment, or at least not in a timely way."[40] Although this change does not impose a prior exam requirement, it could create a similar barrier to sealant programs.

Benchmark #3: Collecting and Submitting Data to the National Oral Health Surveillance System

State health departments promote school sealant programs by playing several roles, including setting standards and facilitating private-public partnerships.[41] In order to make informed policy decisions about sealants, state officials must have a system for collecting and reviewing critical data about the public's dental health.

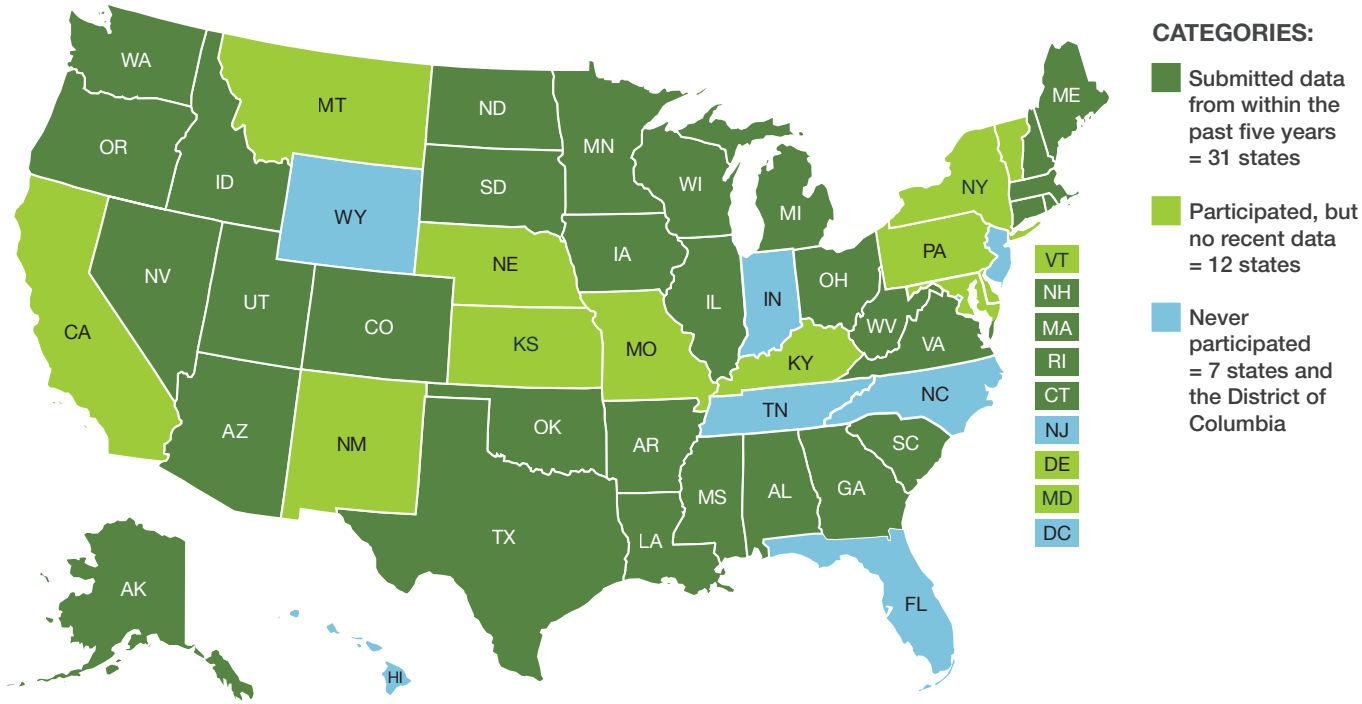
The National Oral Health Surveillance System (NOHSS) provides states with guidelines for adequate data collection. This national database is a collaborative effort of the Association of State and Territorial Dental Directors (ASTDD) and the CDC.

Using surveys and data sources that meet ASTDD and CDC guidelines, states report on a variety of oral health measures, including the percentage of 3rd graders who received sealants. Collecting accurate

FIGURE 4:

BENCHMARK #3: COLLECTING AND SUBMITTING DATA TO THE NATIONAL ORAL HEALTH SURVEILLANCE SYSTEM

States were graded on whether they participated in the national system of data collection regarding children's oral health and, if so, on whether their data were sufficiently current – within the past five years – to provide the most policy-relevant information. Most states performed well on this benchmark, with 84 percent participating and more than half providing recent data.



Source: National Oral Health Surveillance System. (2012). Dental Sealants: Percentage of 3rd grade students with dental sealants on at least one permanent molar tooth. http://apps.nccd.cdc.gov/nohss/IndicatorV.asp?Indicator=1. Maine and Utah had submitted data for the 2010-2011 school year, but data had yet to be posted on the CDC website. Kathy Phipps, consultant to the CDC, confirmed their submission and data via email to Pew Center on the States. Guidelines from ASTDD and CDC state that data should be no older than five years, so recent data are considered to be data submitted for the 2005-2006 school year or later.

and timely data is crucial to crafting state policy solutions and measuring progress against state and federal goals. Guidance from ASTDD and CDC recommends that data be no more than five years old to make them useful for public health policy decision making.[42]

A large majority of states fully participated in the NOHSS. Yet 19 states and the District of Columbia did not provide data on school-age children at all or submitted data that were older than five years, failing to meet the standards set by ASTDD and CDC (see Figure 4).[43]

ARKANSAS AND ARIZONA: UNFINISHED BUSINESS

Even when state laws do not unnecessarily restrict the ability of hygienists to provide sealants, other aspects of the dental care system can maintain or erect barriers. Arkansas and Arizona offer two examples.

In 2011, Arkansas State Senator David Johnson spearheaded an initiative to improve children's oral health throughout his state through three key policy changes, providing for dental sealants, community water fluoridation, and fluoride varnish. As part of this initiative, he introduced legislation to create "collaborative care permits," which would authorize hygienists to apply sealants in schools without a prior exam. This bill was passed by the legislature and signed into law by Governor Mike Beebe.[xv]

However, one hurdle remains before this law will have the intended impact. As of January 2, 2013, the Arkansas State Board of Dental Examiners had not issued regulations to implement the sealant law.[xvi] Until then, hygienists cannot apply sealants to the tens of thousands of at-risk children in Arkansas who would benefit from them.

Arizona faces a different hurdle. Although its law allows certain hygienists to place sealants without a dentist's prior exam, the health plans that administer the state Medicaid program do not reimburse these hygienists unless an on-site dentist has performed an exam. Multiple counties cannot implement school-based sealant programs due to the lack of such dentists.

By reimbursing only sealant programs that follow this restrictive practice, Medicaid administrators inhibit Arizona's ability to provide sealants to children in need.

Benchmark #4: Meeting Healthy People 2010 Sealant Goal

A good barometer for measuring states' progress is whether they are meeting the sealant goal established in Healthy People 2010, a set of objectives developed by federal officials based on the input of national experts and state agencies.

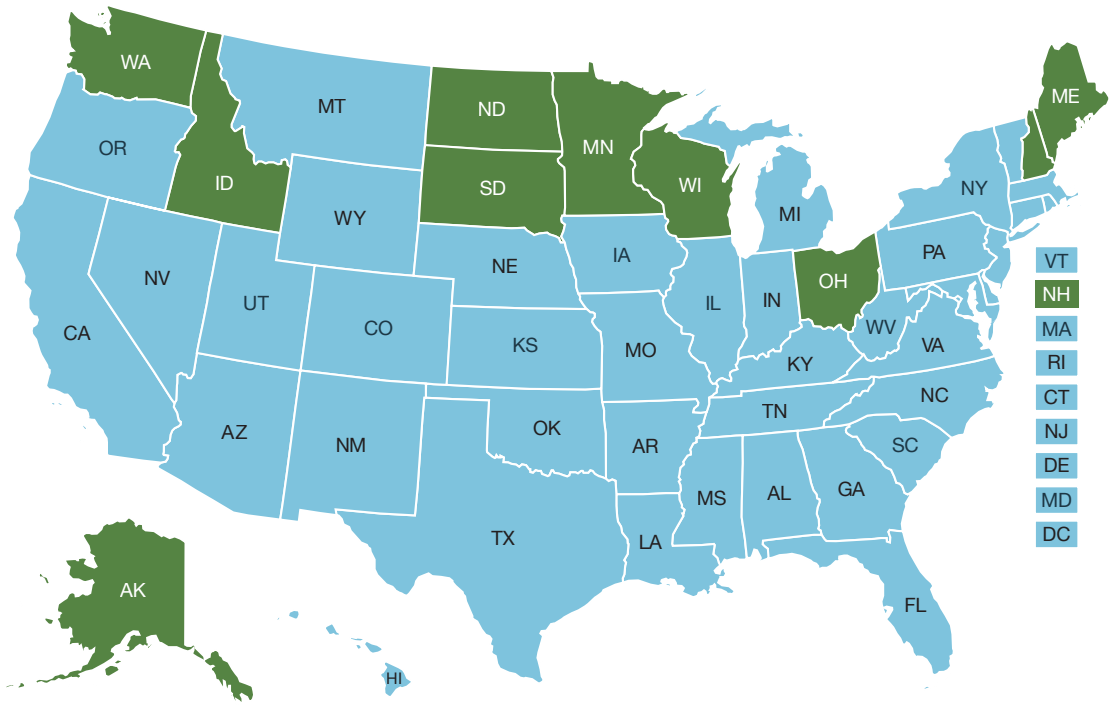
This goal calls for sealants to be applied to the molars of 50 percent of children, and it also says there should be no disparities among kids based on income and other factors. Only 10 states have recent data indicating they achieved this 50 percent objective (see Figure 5). Because data standards for NOHSS do not require states to report health indicators by income groups, Pew is unable to determine if disparities by income also were eliminated in these 10 states.

A new source of data to gauge state performance will be available to policy makers soon. In the 2010 fiscal year, the Centers for Medicare & Medicaid Services (CMS) began requiring that states report the number of children enrolled in Medicaid and the Children's Health Insurance Program (CHIP) who received sealants.[44] Though CMS is still assessing the quality of the state-level data, the agency hopes to set benchmarks by 2013 for states to improve sealant access for low-income children.[45]

FIGURE 5:

BENCHMARK #4: MEETING HEALTHY PEOPLE 2010 SEALANT GOAL

Federal officials established a set of objectives for public health, known as Healthy People 2010. These goals included application of sealants to the molars of at least 50 percent of children. Our study found that only 10 states currently meet this goal.



CATEGORIES:

- **Met the sealant goal = 10 states**
- **Did not meet the sealant goal = 40 states and the District of Columbia**

Source: National Oral Health Surveillance System. (2012). Dental Sealants: Percentage of 3rd grade students with dental sealants on at least one permanent molar tooth. http://apps.nccd.cdc.gov/nohss/IndicatorV.asp?Indicator=1. Maine and Utah had submitted data for the 2010-2011 school year, but data had yet to be posted on the CDC website. Kathy Phipps, consultant to the CDC, confirmed their submission and data via email to Pew Center on the States. Only data submitted for 2005-2006 or later were considered.

VIRGINIA: COALITION SPURS LEGISLATIVE SUCCESS

In 2009, the Virginia General Assembly passed legislation permitting a small group of dental hygienists to apply sealants in schools in three counties without a prior examination by a dentist. An evaluation of this pilot program found that during the 2010-2011 school year, 85 percent of the targeted schools participated in the sealant initiative. The average per-child cost of this program was 20 percent less than applying sealants under the prior exam restriction.[xvii]

A report by the Virginia Department of Health stated that "with an aging public health workforce and difficulties in recruiting dentists into safety net positions, [this] model could offer an alternative… Preventive services could be provided to more individuals at a lower personnel cost, with referrals to public health dentists primarily for treatment services from greater geographic areas."[xviii] The report also declared that eliminating the prior exam regulation improved the financial sustainability of sealant programs.[xix]

Based on this success, the Virginia Dental Association and State Senator Phillip Puckett introduced legislation that made the pilot program a permanent statewide statute. The General Assembly then passed legislation in February 2012 that eliminated the prior exam restriction for hygienists employed by the Virginia Department of Health.[xx]

A key to the policy's success was the wide network of stakeholders who supported this change, including the Department of Health, the Old Dominion Dental Society, the state dental hygienists' association, the Virginia Health Care Foundation, and the Virginia Oral Health Coalition.

As Virginia Dental Association President Roger Wood stated, "Once we saw the initial results of the [pilot], we knew this was the right thing to do."[xxi]

Safe Use of Sealants

Sealants have been used in school-based programs since the 1980s, and Pew has found no reported health effects or clinical research documenting problems. After sealants are applied to teeth, residual trace amounts of Bisphenol A (BPA) may be present in the mouth. A 2010 study in *Pediatrics* found no evidence that the one-time placement of sealants provides the kind of chronic BPA exposure that has been linked to food packaging.[46]

Further research from the dental field has established that trace amounts of BPA in sealants are greatly reduced when proper application techniques are used (using a mild abrasive to wipe a sealant once it has set and having children rinse their mouths with water).[47] Leading oral health organizations recommend these techniques to sealant program directors.[48] The co-authors of the 2010 study cited sealants' "proven benefits" and "the brevity of BPA exposure" in recommending their continued use with strict adherence to proper application techniques.

Citing a lack of evidence demonstrating adverse health effects from the low level of BPA exposure due to sealants, the Association of State and Territorial Dental Directors adopted a 2011 policy statement supporting the continued use of dental sealants.[49]

BPA is used in thousands of consumer products. The federal government found that 93 percent of Americans have it in their urine, with children having higher levels.[50] Experts are trying to determine whether these levels are safe because BPA mimics estrogen. Studies on laboratory animals, as well as epidemiology studies, have raised concerns. In 2009, Congress funded research to resolve these questions. In the next couple of years, the answers should become more clear.

Conclusion

It has been 45 years since the first research reported the successful application of sealants, and this effective, preventive tool has been used in school-based programs since the 1980s.[51] Yet the most recent comprehensive U.S. health survey (2009-2010) revealed that only half of teens ages 13 to 15 had received sealants on one or more of their permanent teeth.[52] This finding suggests that many states are falling short on this critical opportunity to improve children's health.

Sealants provide children with an impressive level of dental disease prevention and can be applied without discomfort—and in less time than it takes to have a cavity filled.[53] In 2009, U.S. children made more than 49,000 visits to hospital ERs for preventable dental problems.[54] It is reasonable to conclude that at least some—perhaps many—of these ER visits could have been avoided if states had done a better job of providing high-need kids with sealants.

Any state that takes dental health, including preventive care, seriously should make sealants for high-risk children a priority. By collecting critical data on decay and other measures, states can clearly see the scope of their oral health challenges and better target scarce resources to sealant programs and other prevention strategies. But gathering data is not enough. State policy makers also need to remove regulations that create unnecessary and costly barriers for dental hygienists, the primary practitioners who apply sealants in school-based programs.

The average cost of sealing one molar is less than one-third of the expense of filling a cavity.[55] By reaching more high-risk children with sealants, states can reduce the amount of money they pay through Medicaid and other programs for fillings and more costly dental treatments.

TABLE A.1:
COMPLETE STATE BENCHMARK DATA AND GRADES

		BENCHMARKS			
	GRADE	Percentage of High-Need Schools with Sealant Programs	Rules Restricting Hygienists	Collecting and Submitting Data to the National Oral Health Surveillance System	Meeting Healthy People 2010 Sealant Goal
ALABAMA	D	<25%	Most severe restrictions	Yes – and submitted recent data	Did not meet goal
ALASKA	A	>75%	Some restrictions	Yes – and submitted recent data	Met goal
ARIZONA	D	25-49%	Severe restrictions	Yes – and submitted recent data	Did not meet goal
ARKANSAS	D	<25%	Most severe restrictions	Yes – and submitted recent data	Did not meet goal
CALIFORNIA	C	<25%	No restrictions	Yes – but no recent data	Did not meet goal
COLORADO	B	25-49%	No restrictions	Yes – and submitted recent data	Did not meet goal
CONNECTICUT	B	50-74%	No restrictions	Yes – and submitted recent data	Did not meet goal
DELAWARE	C	>75%	Severe restrictions	Yes – but no recent data	Did not meet goal
DISTRICT OF COLUMBIA	F	<25%	Most severe restrictions	No data submitted	Did not meet goal
FLORIDA	D	<25%	No restrictions	No data submitted	Did not meet goal
GEORGIA	C	25-49%	Some restrictions	Yes – and submitted recent data	Did not meet goal
HAWAII	F	<25%	Most severe restrictions	No data submitted	Did not meet goal
IDAHO	B	25-49%	No restrictions	Yes – and submitted recent data	Met goal
ILLINOIS	C	50-74%	Severe restrictions	Yes – and submitted recent data	Did not meet goal
INDIANA	D	50-74%	Most severe restrictions	No data submitted	Did not meet goal
IOWA	C	25-49%	Some restrictions	Yes – and submitted recent data	Did not meet goal
KANSAS	C	25-49%	Some restrictions	Yes – but no recent data	Did not meet goal
KENTUCKY	D	<25%	Severe restrictions	Yes – but no recent data	Did not meet goal
LOUISIANA	D	<25%	Severe restrictions	Yes – and submitted recent data	Did not meet goal
MAINE	A	>75%	No restrictions	Yes – and submitted recent data	Met goal
MARYLAND	B	50-74%	No restrictions	Yes – but no recent data	Did not meet goal
MASSACHUSETTS	B	50-74%	Some restrictions	Yes – and submitted recent data	Did not meet goal
MICHIGAN	C	<25%	No restrictions	Yes – and submitted recent data	Did not meet goal
MINNESOTA	B	25-49%	Some restrictions	Yes – and submitted recent data	Met goal
MISSISSIPPI	D	<25%	Most severe restrictions	Yes – and submitted recent data	Did not meet goal
MISSOURI	D	None	Some restrictions	Yes – but no recent data	Did not meet goal

NOTE: Pew surveyed states to learn whether regulations require a dentist to examine a child before a hygienist can place a sealant at a school – which research shows is an unnecessary restriction. State policies were categorized as follows: a dentist's exam is not required – no restrictions; a dentist's exam is sometimes required (e.g., certain classifications of dental hygienists can place sealants without a dentist's prior exam) – some restrictions; a dentist's exam is always required – severe restrictions; and a dentist's exam is always required and the dentist must remain on-site while the hygienist places the sealant – most severe restrictions.

SOURCE: Pew Center on the States, 2012. See Appendix B: Methodology for details on data sources for individual indicators.

TABLE A.1:
COMPLETE STATE BENCHMARK DATA AND GRADES

		BENCHMARKS			
	GRADE	Percentage of High-Need Schools with Sealant Programs	Rules Restricting Hygienists	Collecting and Submitting Data to the National Oral Health Surveillance System	Meeting Healthy People 2010 Sealant Goal
MONTANA	F	None	Severe restrictions	Yes – but no recent data	Did not meet goal
NEBRASKA	D	<25%	Some restrictions	Yes – but no recent data	Did not meet goal
NEVADA	C	<25%	Some restrictions	Yes – and submitted recent data	Did not meet goal
NEW HAMPSHIRE	A	>75%	No restrictions	Yes – and submitted recent data	Met goal
NEW JERSEY	F	25-49%	Most severe restrictions	No data submitted	Did not meet goal
NEW MEXICO	C	25-49%	No restrictions	Yes – but no recent data	Did not meet goal
NEW YORK	C	25-49%	No restrictions	Yes – but no recent data	Did not meet goal
NORTH CAROLINA	F	<25%	Severe restrictions	No data submitted	Did not meet goal
NORTH DAKOTA	A	50-74%	No restrictions	Yes – and submitted recent data	Met goal
OHIO	C	50-74%	Severe restrictions	Yes – and submitted recent data	Met goal
OKLAHOMA	D	None	Some restrictions	Yes – and submitted recent data	Did not meet goal
OREGON	B	50-74%	No restrictions	Yes – and submitted recent data	Did not meet goal
PENNSYLVANIA	D	<25%	Some restrictions	Yes – but no recent data	Did not meet goal
RHODE ISLAND	C	>75%	Severe restrictions	Yes – and submitted recent data	Did not meet goal
SOUTH CAROLINA	C	25-49%	Some restrictions	Yes – and submitted recent data	Did not meet goal
SOUTH DAKOTA	D	<25%	Severe restrictions	Yes – and submitted recent data	Met goal
TENNESSEE	D	25-49%	Severe restrictions	No data submitted	Did not meet goal
TEXAS	D	<25%	Most severe restrictions	Yes – and submitted recent data	Did not meet goal
UTAH	C	25-49%	Some restrictions	Yes – and submitted recent data	Did not meet goal
VERMONT	C	50-74%	Some restrictions	Yes – but no recent data	Did not meet goal
VIRGINIA	C	25-49%	Some restrictions	Yes – and submitted recent data	Did not meet goal
WASHINGTON	B	25-49%	No restrictions	Yes – and submitted recent data	Met goal
WEST VIRGINIA	C	25-49%	Some restrictions	Yes – and submitted recent data	Did not meet goal
WISCONSIN	A	50-74%	No restrictions	Yes – and submitted recent data	Met goal
WYOMING	F	None	Most severe restrictions	No data submitted	Did not meet goal

NOTE: Pew surveyed states to learn whether regulations require a dentist to examine a child before a hygienist can place a sealant at a school – which research shows is an unnecessary restriction. State policies were categorized as follows: a dentist's exam is not required – no restrictions; a dentist's exam is sometimes required (e.g., certain classifications of dental hygienists can place sealants without a dentist's prior exam) – some restrictions; a dentist's exam is always required – severe restrictions; and a dentist's exam is always required and the dentist must remain on-site while the hygienist places the sealant – most severe restrictions.

SOURCE: Pew Center on the States, 2012. See Appendix B: Methodology for details on data sources for individual indicators.

Methodology

In 2011 and 2012, Pew conducted surveys of both state dental directors and state dental boards. Additional data were gathered from the National Oral Health Surveillance System (NOHSS). States were given points for each benchmark, and grades were based on the sum of points earned for the four benchmarks. Though data for 2011 were collected, points and grades were awarded only for 2012 data. We graded states on an A to F scale:

TABLE B.1:
SCALE FOR POINTS EARNED AND GRADES

Points Earned	Grade
10-11	A
8-9	B
6-7	C
3-5	D
0-2	F

Source: Pew Center on the States, 2012.

Benchmark #1: Percentage of High-Need Schools with Sealant Programs

State dental directors were asked for the percentage of high-need schools with sealant programs. States used a variety of sources to estimate the percentage of these schools with school-based sealant programs, including regularly updated databases and staff estimates. In general, states defined high-need schools as those in which more than 50 percent of students participate in the federal free and reduced-price lunch program; a few states had slightly different definitions. Low-income children have been shown to have a greater risk of tooth decay.[56] School-based sealant programs that specifically target high-need schools have been shown to be effective in reaching these children.[57] Respondents were asked which of the following categories accurately described their state's status:

- programs reaching 75 percent or more of high-need schools,
- programs reaching 50 to 74 percent of high-need schools,

- programs reaching 25 to 49 percent of high-need schools,
- programs reaching less than 25 percent of high-need schools, or
- no programs.

States were given 4 points for 75 percent or higher, 3 points for 50 to 74 percent, 2 points for 25 to 49 percent, 1 point for less than 25 percent, and 0 points for no programs.

States used a variety of data sources to estimate these percentages, ranging from high-quality surveys to staff estimates; going forward, health officials need support in developing an adequate system for collecting critical dental health data.[58]

Benchmark #2: Rules Restricting Hygienists

State dental directors and dental regulatory boards were surveyed regarding the ability of hygienists to apply sealants without a dentist's prior exam in schools as of July 1, 2011, and then were re-surveyed to determine regulations as of July 1, 2012. Pew staff resolved discordant responses through a review of hygienist rules and discussions with both dental directors and dental boards. If changes were made to regulations since the 2011 Pew survey, respondents were asked to place their states into one of the following four categories:

- A dentist's exam is not required prior to a hygienist applying a sealant (EN).
- A dentist's exam is sometimes required (e.g., certain classifications of dental hygienists, such as public health hygienists, can place sealants without a dentist's prior exam) (ES).
- A dentist's exam is always required (EA).
- A dentist's exam and indirect or direct supervision are required (DS).

States were given 4 points for EN, 3 points for ES, 1 point for EA, and no points for DS. Under direct supervision, a dentist is on-site while the hygienist is practicing; the dentist both authorizes sealant placements before the hygienist performs them and checks all patients afterward. Under indirect supervision, an on-site dentist is required to authorize the hygienist's application of sealants but does not check all patients after sealants are placed.[59]

It is worth noting that in some states without a prior-exam restriction, other rules may exist that can complicate the logistics of operating school-based sealant programs.

Benchmark #3: Collecting and Submitting Data to the NOHSS

States' submission of sealant data to the NOHSS was assessed using publicly available data from the Centers for Disease Control and Prevention (CDC).[60] If states submitted those data, Pew assessed whether CDC reported data that were too outdated (older than the 2006–2007 school year) to use for planning programs and strategies. Both the CDC and the Association of State and Territorial Dental Directors (ASTDD) advise states to provide data that are not older than five years.[61]

States were given no points for never participating in NOHSS, 1 point for monitoring sealants but only having data prior to the 2006–2007 school year, and 2 points for monitoring sealants and having recent data.

Benchmark #4: Meeting Healthy People 2010 Sealant Goal

One measure reported in NOHSS is the percentage of 3rd grade children with sealants. The federal Healthy People 2010 objective for sealants is that 50 percent of children in this age range should have sealants. This objective also seeks to close any disparities in sealant rates among kids, including disparities that occur by income levels.[62]

States were given 1 point if they had recent data (2006–2007 school year or newer) that showed them having over 50 percent of 3rd graders with sealants. Pew was unable to ascertain from the data reported to NOHSS the prevalence of sealants among low-income children, so is unable to give additional credit to states that may have reached this very important goal. States received 0 points if they had no recent data or no data indicating they met the Healthy People 2010 objective.

Endnotes

1 Newacheck, P. W., Hughes, D. C., Hung, Y. Y., Wong, S., & Stoddard, J. J. (2000). The unmet health needs of America's children. *Pediatrics, 105*(4 Pt 2), 989–997.

2 Here "middle-class and wealthy" is defined as a family income of at least two times the federal poverty line, and "low income" is defined as a family income below the federal poverty line. Dye, B. A., Tan, S., Smith, V., Lewis, B. G., Barker, L. K., Thornton-Evans, G., et al. (2007). Trends in oral health status: United States, 1988–1994 and 1999–2004. *Vital and Health Statistics. Series 11, Data from the National Health Survey* (248), 1–92. Table 10, p. 23. Hyattsville, MD: National Center for Health Statistics.

3 This figure counts children ages one to 18 eligible for the Early and Periodic Screening, Diagnosis & Treatment benefit. U.S. Department of Health and Human Services & Centers for Medicare and Medicaid Services. (2012). *Annual EPSDT participation report, form CMS-416 (national) fiscal year: 2010*. Retrieved June 11, 2012, from http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Benefits/Downloads/EPSDT2010National.zip

4 Centers for Disease Control and Prevention. (January 7, 2011). *Children's oral health overview*. Retrieved May 12, 2012, from http://www.cdc.gov/oralhealth/topics/child.htm; U.S. Department of Health and Human Services & National Institute of Dental and Craniofacial Research. (2000). *Oral health in America: A report of the Surgeon General*, p. 135. Rockville, MD: U.S. Public Health Service, Department of Health and Human Services.

5 Blumenshine, S. L., Vann, W. F. Jr., Gizlice, Z., & Lee, J. Y. (2008). Children's school performance: Impact of general and oral health. *Journal of Public Health Dentistry, 68*(2), 82–87; Jackson, S. L., Vann, W. F. Jr., Kotch, J. B., Pahel, B. T., & Lee, J. Y. (2011). Impact of poor oral health on children's school attendance and performance. *American Journal of Public Health, 101*(10), 1900–1906; U.S. Department of Health and Human Services & National Institute of Dental and Craniofacial Research. (2000). *Oral health in America : A report of the Surgeon General*, p. 2. Rockville, MD.: U.S. Public Health Service, Department of Health and Human Services.

6 Pourat, N., & Nicholson, G. (2009). Unaffordable dental care is linked to frequent school absences. *Policy Brief* (PB2009-10). UCLA Center for Health Policy, p. 1–6.

7 Willis, M. S., Esqueda, C. W., & Schacht, R. N. (2008). Social perceptions of individuals missing upper front teeth. *Perceptual and Motor Skills, 106*(2), 423–435; U.S. Department of Health and Human Services & National Institute of Dental and Craniofacial Research. (2000). *Oral health in America : A report of the Surgeon General*. Rockville, MD: U.S. Public Health Service, Department of Health and Human Services.

8 U.S. Department of Health and Human Services & Centers for Medicare and Medicaid Services. (2011). *National health expenditure projections 2010–2020*, Table 8. Retrieved March 6, 2012, from http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/proj2010.pdf

9 U.S. Department of Health and Human Services & Centers for Medicare and Medicaid Services. (2004). *Dental services spending by gender, age group and source of payment, calendar year 2004*. Retrieved March 6, 2012, from http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/2004GenderandAgeTables.pdf

10 The Pew Children's Dental Campaign identified preventable dental conditions using the International Classification of Diseases (ICD-9) codes of 521 and 522. One of these codes (521 or 522) was listed as a primary code for the patient's medical problem. Agency for Healthcare and Quality (AHRQ), *Healthcare Cost and Utilization Project (HCUP)—South Carolina emergency department sample for the years 2009 and 2006*. Rockville, MD: Author. Retrieved from http://hcupnet.ahrq.gov/

11 Florida Public Health Institute. (2011). *Oral health emergency room spending in Florida*. Retrieved October 3, 2012, from http://cdn.trustedpartner.com/docs/library/FloridaOralHealth2011/ORAL_HEALTH_ER_SPENDING_FINAL.pdf

12 Casamassimo, P. S., Thikkurissy, S., Edelstein, B. L., & Maiorini, E. (2009). Beyond the DMFT: The human and economic cost of early childhood caries. *Journal of the American Dental Association*, 140(6), 650–657.

13 NIH Consensus Development Conference Consensus Statement. (1983). Dental Sealants in the Prevention of Tooth Decay. December 5-7; 4(11).

14 National Maternal and Child Oral Health Resource Center. *Leadership and legacy: Oral health milestones in maternal and child health*. Retrieved April 26, 2012, from http://www.mchoralhealth.org/milestones/1967.html; Dye, B. A., Li, X., & Thorton-Evans, G. (2012). Oral health disparities as determined by selected Healthy People 2020 oral health objectives for the United States, 2009–2010. *NCHS Data Brief (104)*.

15 Email from Linda Orgain, Centers for Disease Control and Prevention, to Pew Center on the States, May 4, 2012.

16 The national median charge among general practice dentists for procedure D1351 (dental sealant) is $45, and the national mean charge for procedure D2150 (two-surface amalgam filling) is $144. American Dental Association Survey Center. (2011). *2011 survey of dental fees*, p. 17. Chicago, IL: American Dental Association.

17 This percentage identifies the portion of New Hampshire residents whose homes are on public water systems that receive optimally fluoridated water. Centers for Disease Control and Prevention. (2012). *2010 water fluoridation statistics*. Retrieved May 15, 2012, from http://www.cdc.gov/fluoridation/statistics/2010stats.htm

18 Ibid.

19 Pew defines "high-need" schools as those with 50 percent or more of their students participating in the National School Lunch Program. According to the Association of State and Territorial Dental Directors' *Best Practice Approach Report School-based Sealant Program*, this is a proportion commonly used by state health programs to target limited resources to schools with children at higher risk of decay.

20 Centers for Disease Control and Prevention. (2001). Impact of targeted, school-based dental sealant programs in reducing racial and economic disparities in sealant prevalence among schoolchildren—Ohio, 1998–1999. *Morbidity and Mortality Weekly Report, 50*(34), 736–738. Retrieved May 29,2012, from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5034a2.htm; Gooch, B. F., Griffin, S. O., Gray, S. K., Kohn, W. G., Rozier, R. G., Siegal, M., et al. (2009). Preventing dental caries through school-based sealant programs: Updated recommendations and reviews of evidence. *Journal of the American Dental Association, 140*(11), 1356–1365.

21 Carter, N., American Association for Community Dental Programs, & National Maternal and Child Oral Health Resource Center. (2011). *Seal America: The prevention invention*, Second Edition, Revised. Retrieved March 15, 2012, from http://www.mchoralhealth.org/seal/step1.html; National Maternal and Child Oral

Health Resource Center. *Leadership and legacy: Oral health milestones in maternal and child health*. Retrieved April 26, 2012, from http://www.mchoralhealth.org/milestones/1967.html

22 Truman, B. I., Gooch, B. F., Sulemana, I., Gift, H. C., Horowitz, A. M., Evans, C. A., et al. (2002). Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. *American journal of Preventive Medicine, 23*(1 Suppl.), 21–54.

23 Ibid.

24 In this instance, "more affluent" is defined as a family income above the federal poverty line. "Low-income" is defined as those with family income below the federal poverty line. Dye, B. A., Tan, S., Smith, V., Lewis, B. G., Barker, L. K., Thornton-Evans, G., et al. (2007). Trends in oral health status: United States, 1988–1994 and 1999–2004. *Vital and Health Statistics. Series 11, Data from the National Health Survey* (248), 1–92, Table 10, p. 23. "Children" refers to children ages 6 to 9. Dye, B. A., Li, X., & Thorton-Evans, G. (2012). Oral health disparities as determined by selected Healthy People 2020 Oral Health Objectives for the United States, 2009–2010. *NCHS Data Brief (104)*.

25 Bhuridej, P., Damiano, P. C., Kuthy, R. A., Flach, S. D., Kanellis, M. J., Heller, K. E., et al. (2005). Natural history of treatment outcomes of permanent first molars: a study of sealant effectiveness. *Journal of the American Dental Association, 136*(9), 1265–1272.

26 Truman, B. I., Gooch, B. F., Sulemana, I., Gift, H. C., Horowitz, A. M., Evans, C. A., et al. (2002). Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. *American Journal of Preventive Medicine, 23*(1 Suppl.), 21–54; Gooch, B. F., Griffin, S. O., Gray, S. K., Kohn, W. G., Rozier, R. G., Siegal, M., et al. (2009). Preventing dental caries through school-based sealant programs: Updated recommendations and reviews of evidence. *Journal of the American Dental Association, 140*(11), 1356–1365.

27 Newacheck, P. W., Hughes, D. C., Hung, Y. Y., Wong, S., & Stoddard, J. J. (2000). The unmet health needs of America's children. *Pediatrics, 105*(4 Pt 2), 989–997; Lewis, C., Mouradian, W., Slayton, R., & Williams, A. (2007). Dental insurance and its impact on preventive dental care visits for U.S. children. *Journal of the American Dental Association, 138*(3), 369–380; U.S. General Accounting Office. (2010). *Efforts under way to improve children's access to dental services, but sustained attention needed to address ongoing concerns, Pub. no. GAO-11-96*. Washington, DC: GAO; Behrens, D., & Lear, J. G. (2011). Strengthening children's oral health: views from the field. *Health Affairs, 30*(11), 2208–2213.

28 Gooch, B. F., Griffin, S. O., Gray, S. K., Kohn, W. G., Rozier, R. G., Siegal, M., et al. (2009). Preventing dental caries through school-based sealant programs: Updated recommendations and reviews of evidence. *Journal of the American Dental Association, 140*(11), 1356–1365.

29 This review was done at the request of the Association of State and Territorial Dental Directors (ASTDD).

30 Ibid.

31 Colorado Department of Public Health and Environment. (2005). Impact of oral disease on the health of Coloradans, p. 22. Retrieved March 6, 2012, from http://www.cdphe.state.co.us/pp/oralhealth/impact.pdf

32 Frosh, W. (2010). *A report to the Pew Charitable Trusts: Advancing children's dental health initiative on advancing public policy to support sealant programs in the United States.*

33 Ibid.

34 The term "cavities" refers to decay that has penetrated the surface. Gooch, B. F., Griffin, S. O., Gray, S. K., Kohn, W. G., Rozier, R. G., Siegal, M., et al. (2009). Preventing dental caries through school-based sealant programs: updated recommendations and reviews of evidence. *Journal of the American Dental Association, 140*(11), 1356–1365; Fontana, M., Zero, D. T., Beltrán-Aguilar, E. D., & Gray, S. K. (2010). Techniques for assessing tooth surfaces in school-based sealant programs. *Journal of the American Dental Association, 141*(7), 854–860. .

35 Accreditation standards for dental hygiene training programs include standard 2-11, relating to education of dental hygiene students on dental-specific anatomy and pathology, with the intent of providing "the student with knowledge of oral health and disease as a basis for assuming responsibility for assessing, planning and implementing preventive and therapeutic services." Commission on Dental Accreditation. (2011). *Accreditation standards for dental hygiene education programs*, p. 19. Retrieved May 26, 2012, from http://www.ada.org/sections/educationAndCareers/pdfs/dh.pdf

36 Scherrer, C. R., Griffin, P. M., & Swann, J. L. (2007). Public health sealant delivery programs: Optimal delivery and the cost of practice acts. *Medical Decision Making: An International Journal of the Society for Medical Decision Making, 27*(6), 762–771.

37 Virginia Department of Health. (2011). *Final report on services provided by Virginia Department of Health (VDH) dental hygienists pursuant to a practice protocol in Lenowisco, Cumberland Plateau, and Southside Health Districts*, pp. 7–8. Retrieved March 16, 2012, from http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/RD2992011/$file/RD299.pdf

38 Committee on Oral Health Access to Services (U.S.), National Research Council (U.S.). Board on Children, Youth and Families, & Institute of Medicine (U.S.) Board on Health Care Services. (2011). *Improving access to oral health care for vulnerable and underserved populations*. Washington, DC: National Academies Press.

39 Donna Domino, *Rule change could curtail Maine kids' dental care*, DrBicuspid.com, October 1, 2012, http://www.drbicuspid.com/index.aspx?sec=sup&sub=pmt&pag=dis&ItemID=311592

40 Our view: New rule would help dentists, but not kids, *The Portland Press Herald*, September 22, 2012, http://www.pressherald.com/opinion/new-rule-would-help-dentists-but-not-kids_2012-09-22.html?pageType=mobile&id=5&start=21

41 Association of State and Territorial Dental Directors. (2003). *Best practice approach reports: School-based dental sealant programs*. Retrieved March 26, 2012, from http://www.astdd.org/school-based-dental-sealant-programs/#two

42 Centers for Disease Control and Prevention, Division of Oral Health. (2010). *Infrastructure development tools activity 2: Data collection and surveillance.* Retrieved March 6, 2012, from http://www.cdc.gov/oralhealth/state_programs/infrastructure/activity2.htm

43 Guidelines from ASTDD and CDC state that data should be no older than five years, so recent data are considered data submitted for the 2005–2006 school year or later. Centers for Disease Control and Prevention, Division of Oral Health. (2010). *Infrastructure development tools activity 2: Data collection and surveillance*. Retrieved March 6, 2012, from http://www.cdc.gov/oralhealth/state_programs/infrastructure/activity2.htm

44 Conversation with Laurie Norris, senior policy advisor and coordinator, CMS Oral Health Initiative, December 9, 2011. Sealant data are required for children ages 6 to 14. Data on children enrolled in Medicaid and Medicaid-expansion programs are available on CMS Form-416. U.S. Department of Health and Human Services & Centers for Medicare and Medicaid Services. (2012). Annual EPSDT participation report, form CMS-416 (national) fiscal year: 2010. Retrieved from http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Benefits/Downloads/EPSDT2010National.zip. Data on children enrolled in separate CHIP programs are collected in the CHIP Annual Reporting Template System (CARTS).

45 Conversation with Laurie Norris, senior policy advisor and coordinator, CMS Oral Health Initiative, December 9, 2011.

46 Fleisch, A.F., Sheffield, P.E., Chinn, C., Edelstein, B.L., and Landrigan, P.J. (2010). Bisphenol A and related compounds in dental materials. *Pediatrics, 126* (4), 760-768.

47 Azarpazhooh, A., Main, P.A. (2008). Is there a risk of harm or toxicity in the placement of pit and fissure sealant materials? A systematic review. *Journal of the Canadian Dental Association, 74*(2), 179-183; Ohio Department of Health. (2012). School-based Dental Sealant Program Manual: Bureau of Community Health Services and Patient-Centered Primary Care 2012, p. 20. Retrieved December 10, 2012, from http://www.odh.ohio.gov/~/media/ODH/ASSETS/Files/ohs/oral%20health/Dental%20Sealant%20Manual%202012.ashx.

48 National Maternal and Child Oral Health Resource Center and Ohio Department of Health. (2009). School-based dental sealant programs: Module 4.2. Retrieved December 5, 2012, from http://www.ohiodentalclinics.com/curricula/sealant/index.html; Association of State and Territorial Dental Directors. (February 3, 2011). Dental sealants and Bisphenol A (BPA) policy statement. Retrieved December 11, 2012 from http://www.astdd.org/docs/Dental_Sealants_and_BPA_Policy_Statement_February_3_2011.pdf.

49 Association of State and Territorial Dental Directors. (February 3, 2011). Dental sealants and Bisphenol A (BPA) policy statement. Retrieved December 10, 2012, from http://www.astdd.org/docs/Dental_Sealants_and_BPA_Policy_Statement_February_3_2011.pdf.

50 The National Institute of Environmental Health Sciences. (2010). Bisphenol A (BPA). Retrieved December 11, 2012, from http://www.niehs.nih.gov/health/assets/docs_a_e/bisphenol_a_bpa_508.pdf.

51 National Maternal and Child Oral Health Resource Center. *Leadership and legacy: Oral health milestones in maternal and child health*. Retrieved April 26, 2012, from http://www.mchoralhealth.org/milestones/1967.html; NIH Consensus Development Conference Consensus Statement. (1983). Dental Sealants in the Prevention of Tooth Decay. December 5-7; 4(11).

52 Dye, B. A., Li, X., & Thorton-Evans, G. (2012). Oral health disparities as determined by selected Healthy People 2020 oral health objectives for the United States, 2009-2010. NCHS Data Brief (104).

53 Delta Dental. *Sealants prevent cavities in kids*. Retrieved April 26, 2012, from http://www.deltadentalid.com/files/DeltaDental0809_Sealants_Prevent_Cavities.pdf

54 Agency for Healthcare Research and Quality (AHRQ). *Healthcare cost and utilization project (HCUP)—The nationwide emergency department sample for the year 2009*. Rockville, MD: AHRQ. Retrieved April 23, 2012, from http://hcupnet.ahrq.gov/. The Pew Children's Dental Campaign identified preventable dental conditions using the International Classification of Diseases (ICD-9) codes of 521 and 522. A total of 49,258 children were admitted to hospital ERs in the United States during 2009. One of these two codes (521 and 522) was listed as a primary code for the patient's medical problem.

55 The national median charge among general practice dentists for procedure D1351 (dental sealant) is $45, and the national mean charge for procedure D2150 (two-surface amalgam filling) is $144. American Dental Association Survey Center. (2011). *2011 survey of dental fees*, p. 17. Chicago, IL: American Dental Association.

56 Here "affluent" is defined as a family income of two times the federal poverty line. Low-income is defined as those below the poverty line. Dye, B. A., Tan, S., Smith, V., Lewis, B. G., Barker, L. K., Thornton-Evans, G., et al. (2007). Trends in oral health status: United States, 1988-1994 and 1999-2004. *Vital and Health Statistics. Series 11, Data from the National Health Survey* (248), 1–92, Table 10, p. 23.

57 Siegal, M. D., & Detty, A. M. R. (2010). Do school-based dental sealant programs reach higher risk children? *Journal of Public Health Dentistry, 70*(3), 181–187; Siegal, M. D., & Detty, A. M. (2010). Targeting school-based dental sealant programs: Who is at "higher risk"? *Journal of Public Health Dentistry, 70*(2), 140–147.

58 Malvitz, D. M., Barker, L. K., & Phipps, K. R. (2009). Development and status of the National Oral Health Surveillance System. *Preventing Chronic Disease, 6*(2), A66; Tomar, S. L., & Reeves, A. F. (2009). Changes in the oral health of U.S. children and adolescents and dental public health infrastructure since the release of the Healthy People 2010 Objectives. *Academic Pediatrics*, 9(6), 388–395.

59 American Dental Association. (2012). *Current policies adopted 1954–2010*. Chicago, IL: American Dental Association.

60 National Oral Health Surveillance System. (2011). *Dental sealants: Percentage of 3rd grade students with dental sealants on at least one permanent molar tooth*. Retrieved from http://apps.nccd.cdc.gov/nohss/IndicatorV.asp?Indicator=1. Note that Maine and Utah had submitted data for the 2010-2011 school year, but data had yet to be posted on the CDC website. Kathy Phipps, consultant to the CDC, confirmed their submission and data via email to Pew Center on the States.

61 Centers for Disease Control and Prevention, Division of Oral Health. (2010). *Infrastructure development tools activity 2: Data collection and surveillance*. Retrieved March 6, 2012, from http://www.cdc.gov/oralhealth/state_programs/infrastructure/activity2.htm

62 U.S. Department of Health and Human Services. *Healthy People 2010: 21 oral health*. Retrieved March 6, 2012, from http://www.nidcr.nih.gov/NR/rdonlyres/00D8104D-0A87-46D4-90F0-51ECFB150D04/0/HP2010OralHealthTkit.pdf

Sidebar Notes

i Centers for Disease Control and Prevention. (2009). Dental sealants. Retrieved March 6, 2012, from http://www.cdc.gov/oralHealth/publications/factsheets/sealants_faq.htm; American Dental Association. Oral health topics: Dental sealants. Retrieved April 16, 2012, from http://www.ada.org/3026.aspx

ii Centers for Disease Control and Prevention. (2009). Dental sealants. Retrieved March 6, 2012, from http://www.cdc.gov/oralHealth/publications/factsheets/sealants_faq.htm

iii Gooch, B. F., Griffin, S. O., Gray, S. K., Kohn, W. G., Rozier, R. G., Siegal, M., et al. (2009). Preventing dental caries through school-based sealant programs: Updated recommendations and reviews of evidence. Journal of the American Dental Association, 140(11), 1356–1365; Fontana, M., Zero, D. T., Beltrán-Aguilar, E. D., & Gray, S. K. (2010). Techniques for assessing tooth surfaces in school-based sealant programs. Journal of the American Dental Association, 141(7), 854–860.

iv American Dental Association. Oral health topics: Dental sealants. Retrieved April 16, 2012, from http://www.ada.org/3026.aspx

v N. Carter, American Association for Community Dental Programs, & National Maternal and Child Oral Health Resource Center. (2011). Seal America: The prevention invention, Table 1, Second Edition, Revised. Retrieved March 15, 2012, from http://www.mchoralhealth.org/seal/step1.html; Association of State and Territorial Dental Directors. (2003). Best practice approach reports: School-based dental sealant programs. Retrieved March 26, 2012, from http://www.astdd.org/school-based-dental-sealant-programs/#two

vi Beauchamp, J., Caufield, P. W., Crall, J. J., Donly, K., Feigal, R., Gooch, B., et al. (2008). Evidence-based clinical recommendations for the use of pit-and-fissure sealants: A report of the American Dental Association Council on Scientific Affairs. Journal of the American Dental Association, 139(3), 257–268; Tellez, M., Gray, S. L., Gray, S., Lim, S., & Ismail, A. I. (2011). Sealants and dental caries: Dentists' perspectives on evidence-based recommendations. Journal of the American Dental Association, 142(9), 1033–1040.

vii Truman, B. I., Gooch, B. F., Sulemana, I., Gift, H. C., Horowitz, A. M., Evans, C. A., et al. (2002). Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. American Journal of Preventive Medicine, 23(1 Suppl.), 21–54; Beauchamp, J., Caufield, P. W., Crall, J. J., Donly, K., Feigal, R., Gooch, B., et al. (2008). Evidence-based clinical recommendations for the use of pit-and-fissure sealants: A report of the American Dental Association Council on Scientific Affairs. Journal of the American Dental Association, 139(3), 257–268.

viii Truman, B. I., Gooch, B. F., Sulemana, I., Gift, H. C., Horowitz, A. M., Evans, C. A., et al. (2002). Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. American Journal of Preventive Medicine, 23(1 Suppl.), 21–54.

ix Griffin, S. O., Griffin, P. M., Gooch, B. F., & Barker, L. K. (2002). Comparing the costs of three sealant delivery strategies. Journal of Dental Research, 81(9), 641–645.

x In this reference, "higher income" is defined as a family income above the federal poverty line and "low income" is defined as family income below the federal poverty line. "Children" refers to children ages 6 to 9. Dye, B. A., Li, X., & Thorton-Evans, G. (2012). Oral health disparities as determined by selected Healthy People 2020 Oral Health objectives for the United States, 2009–2010. NCHS Data Brief (104).

xi Ibid.

xii Massachusetts Board of Registration in Dentistry. (2010). Requirements for the practice of dentistry and dental hygiene. Retrieved March 6, 2012, from http://www.mass.gov/eohhs/docs/dph/regs/234cmr005-20100820.pdf

xiii Conversation with Lynn Bethel, former director, Massachusetts Office of Oral Health, to Pew Center on the States, October 19, 2011.

xiv Email from Lynn Bethel to Pew Center on the States, May 23, 2012.

xv Arkansas State Legislature. Act 89: An act to authorize dental hygienists to perform dental hygiene procedures for persons in public settings without the supervision of a dentist. Retrieved February 7, 2012, from http://www.arkleg.state.ar.us/assembly/2011/2011R/Pages/BillInformation.aspx?measureno=SB42

xvi Arkansas State Board of Dental Examiners. Dental Practice Act Dental Corporation Act Rules and Regulations, pg 46. Accessed January 2, 2013, from http://www.dentalboard.arkansas.gov/Documents/December%202012%20Dental%20Practice%20Act.pdf; Email from Dr. S. Bryan Whitaker to Pew Center on the States, January 2, 2013.

xvii Virginia Department of Health. (2011). Final report on services provided by Virginia Department of Health (VDH) dental hygienists pursuant to a practice protocol in Lenowisco, Cumberland Plateau, and Southside Health Districts. Accessed February 20, 2012, from http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/RD2992011/$file/RD299.pdf

xviii Ibid.

xix Ibid.

xx Virginia Legislative Information System. 2012 session: SB 146 dental hygienists; remote supervision by a public health dentist. Retrieved February 22, 2012, from http://lis.virginia.gov/cgi-bin/legp604.exe?ses=121&typ=bil&val=sb146

xxi Email from Terry Dickinson to Pew Center on the States, February 23, 2012.

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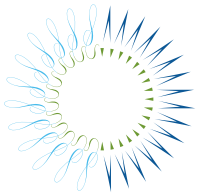

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