



Expanding the Dental Team

Increasing Access to Care in Public Settings

The Pew Charitable Trusts

Susan K. Urahn, *executive vice president*

Alexis Schuler, *senior director*

The children's dental campaign

Shelly Gehshan

Laura K. Hale

Jane Koppelman

Rebecca Singer Cohen

External reviewers

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Pew's work on children's dental policy promotes cost-effective policies that will mean millions more children receive the routine care they need to grow, learn, and lead healthy lives.

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The analysis included in this report is that of The Pew Charitable Trusts and does not necessarily reflect the views of outside reviewers. This report is intended for educational and informative purposes. References to specific policymakers, individuals, schools, policies, associations, or companies have been included solely to advance these purposes and do not constitute an endorsement, sponsorship, or recommendation.

Contact: Mary McNamara, communications manager
Email: mmcnamara@pewtrusts.org
Project website: pewstates.org/dental

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Overview

For decades researchers have been documenting the disparities in oral health between low-income children and their higher-income peers. Two factors in the current dental care delivery system fuel these differences: Most dentists do not accept Medicaid,¹ and millions of people live in areas with dentist shortages.² In 2011, more than half of all children on Medicaid did not see a dentist,³ and nearly 860,000 patients visited U.S. emergency rooms for dental problems that could have been avoided with earlier care.⁴

Innovative ways of delivering dental care are emerging to reach traditionally underserved populations. One strategy practiced in more than 50 nations is to authorize midlevel dental providers—often called dental therapists—to provide routine preventive and restorative care, such as placing fillings. Compared to dentists, dental therapists perform fewer procedures, require less training, and command lower salaries. Research has confirmed that they provide high-quality, cost-effective routine care and improve access to treatment in parts of the country where dentists are scarce.⁵ Midlevel providers are currently practicing in Alaska and Minnesota, were recently authorized in Maine, and are being considered for licensing in 15 additional states.⁶

Another strategy to expand access to care involves placing existing providers—dental hygienists and dental assistants—in community settings such as public schools and nursing homes and using telehealth technology to communicate with dentists in a hub practice. This tactic allows providers to offer screening and preventive care overseen by a dentist from an off-site location, and to refer patients to dental offices when more advanced procedures are needed.

In this study, The Pew Charitable Trusts looked at three examples of dental providers working to expand care to underserved populations in nonprofit public settings. It builds on an earlier study that examined how two private practices⁷ used dental therapists, which found that the practices leveraged the dental therapists on staff to serve more low-income patients while continuing to generate profits.⁷

Unlike private dentistry, the organizations examined in this study are tasked to increase access to dental care for the underserved. The operating budgets of nonprofit clinics often rely on grants—federal, state, or private—to help cover the costs of uncompensated care and Medicaid reimbursements that are lower than commercial fees. They must address as much of the unmet need in their areas as possible with the dollars they have available. The core issue examined in these three examples is whether more people can be served in a cost-efficient way by using additional types of providers on the dental team.

To examine this issue, Pew researchers conducted site visits; interviewed the dental team—dentists, dental therapists, and dental hygienists working in community settings—clinic directors, and patients; and reviewed practice utilization and financial records. (See Appendixes 1 to 3: Methodologies.)

The specific questions addressed are:

- How are these providers integrated into practice settings?
- Are they expanding care to previously underserved populations?
- What is the economic value of their contribution, and does employing them make financial sense to these organizations?

In addition to the site visits and interviews, Pew researchers used input from health economists and dentists to craft a methodological framework for analyzing practice records that empirically assessed changes in productivity, patient access to care, revenue, and other variables in these practices. The findings were vetted

through a multistage evaluation by an expert advisory panel and peer reviewers. (See Acknowledgments and Appendixes 1 to 3: Methodologies.)

The sites

The three public practices represent an array of settings.

Federally qualified health center in Minnesota: People’s Center Health Services is located close to downtown Minneapolis. With low-income people as the center’s target population, a dental therapist was hired to increase the number of patients who could be served.

Clinic with multiple sites in Alaska: Norton Sound Health Corp., a tribally owned and operated nonprofit health care organization, deploys dental health aide therapists to distant rural locations. They work under the supervision of dentists at a central hub.

Telehealth project in California: The Virtual Dental Home is a demonstration project operated by the University of the Pacific School of Dentistry at sites throughout California. Dental hygienists conduct screenings and serve patients in community settings such as schools, Head Start programs, and nursing homes. They collect dental information that is sent electronically to a supervising dentist, who creates a treatment plan for the hygienist to implement.

Findings

There was much variation among these practices, but a review of the case studies yields the following findings:

- **Underserved populations had increased access to care.** All three of these approaches made it possible to care for more people in underserved populations.
- **Nonprofit practices were able to stretch their dollars to reach more underserved people.** In the Alaska and Minnesota case studies, cost efficiencies were achieved by using providers other than dentists to deliver routine restorative care.

Specifically, in the Alaska case in 2012, two dental therapists provided care to 1,352 patients, many of whom received regular access to dental care for the first time. When compared to the reimbursement value of the care they delivered, the therapists exceeded their costs of employment by a combined \$216,000.

In the Minnesota case, a dental therapist hired by a “safety net” clinic that serves a primarily low income and heavily immigrant population conducted 1,756 patient visits in the study year. The estimated Medicaid revenue she generated exceeded her employment costs by more than \$30,000, leading the clinic to hire a second dental therapist to address further unmet needs.

In California, the Virtual Dental Home was able to serve low-income children who did not have a regular source of dental care. The estimated revenue that could be generated by billing California’s Medicaid program—which has one of the lowest reimbursement rates in the country—would cover more than half of the program’s costs. The study found that Medicaid payments would more than cover program costs using national Medicaid reimbursement rate and salary averages.

Millions in the U.S. have no access to dental care. The case studies in this report can be useful to policymakers, public health officials, dentists, and other stakeholders as they examine options for delivering regular, high-quality dental care to people who have been living with unmet dental needs.

People’s Center Health Services, Minneapolis

Dental therapists extend the reach of a federally qualified health center

Table 1
Rules Governing Dental Therapists and Advanced Dental Therapists in Minnesota

	Dental therapists	Advanced dental therapists
Education	Bachelor’s degree (28-month post-high-school program requires 10 prerequisite courses); students work alongside dental and hygiene students in the School of Dentistry patient clinics.	Master’s degree (26-month program requiring a bachelor’s degree in dental hygiene or 28-month program requiring a bachelor’s degree and 10 prerequisite courses), plus 2,000 clinical practice hours.
Allowed procedures*	<ul style="list-style-type: none"> ▪ Take X-rays ▪ Administer local anesthesia ▪ Apply fluoride varnish and sealants ▪ Prepare and restore decayed primary and permanent teeth (fillings) ▪ Place temporary stainless steel crowns ▪ Perform primary tooth pulpotomies (partial pulp removal) ▪ Extract primary teeth 	<p>All procedures a dental therapist can perform plus:</p> <ul style="list-style-type: none"> ▪ Complete an oral evaluation ▪ Develop a treatment plan ▪ Extract permanent teeth (nonsurgically)
Supervision	Some procedures (preparing cavities and restoring and extracting teeth) require a dentist’s presence in the office, while others (taking X-rays and applying fluoride varnish and sealants) do not.	Advanced dental therapists can work without a dentist in the same location. Any procedures that may require the supervising dentist’s prior consent are noted in a Collaborative Management Agreement.
Other requirements	The underserved population must make up at least half of a dental therapist’s patients.	The underserved population must make up at least half of an advanced dental therapist’s patients.

* This is not a comprehensive list of authorized procedures.

Sources: State of Minnesota, Minnesota Administrative Rules, 150A.105, accessed Nov. 26, 2013, <https://www.revisor.mn.gov/statutes/?id=150a.105>; State of Minnesota, Minnesota Session Laws (2009), Regular Session, Chapter 95—S.F. No. 2083, accessed Nov. 26, 2013, <http://www.dentalboard.state.mn.us/Portals/3/Licensing/Dental%20Therapist/DTLEG.pdf>; and Minnesota Board of Dentistry, “Dental Therapist Scope of Practice,” accessed Nov. 26, 2013, <http://www.dentalboard.state.mn.us/Portals/3/Licensing/Dental%20Therapist/DTSOPE.pdf>.

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Case study abstract

In April 2012, People's Center Health Services became the first federally qualified health center (FQHC) to hire a dental therapist.* An analysis of clinic records tracking the first 12 months of the dental therapist's employment found that she conducted 1,756 patient visits. The estimated revenue she generated more than covered the costs of her employment. The center hired a second dental therapist in July 2013.

Background

People's Center Health Services, which serves a low-income and heavily immigrant population in Minneapolis, has been an FQHC since 2003. In 2010, the center added dental care to its services by acquiring a local practice. According to Peggy Metzger, People's CEO at the time of this study:

- Nearly one-quarter of the clinic's dental patients are uninsured and receive care at a sliding, discounted rate.
- More than 60 percent of its patients are covered by Medicaid and other publicly subsidized insurance programs.
- An estimated 50 to 60 percent of patients are of East African descent, predominantly Somali. The clinic also serves large numbers of African-Americans, as well as Hmong patients.
- Nearly one-quarter of the patients need interpreters when they receive care.

Many immigrants who come to the clinic have never been to a dentist, according to the center's dental director. He also said oral health in the community is poor, with high levels of periodontal (gum) disease.

The dental clinic offers a full range of dental services, including prevention and restoration. The clinic is open weekdays, with extended hours several days a week.

Hiring a dental therapist

Minnesota began allowing dental therapists and advanced dental therapists[†] to practice in 2009. As of February 2014, there were 32 such midlevel providers practicing in the state.⁸ Staffing of the People's Center dental clinic includes three dentists, two dental therapists, three hygienists, and three dental assistants.

Metzger explained her reasons for hiring a dental therapist:

- Faced with a high demand for dental care, the clinic needed to serve more patients despite its limited financial resources.
- The clinic wanted to offer extended hours to meet the needs of the working poor, but it was difficult to find enough dentists to work those hours.
- Using dental therapists would help attract and retain dentists by allowing them to focus on high-skilled work and maintain a reasonable workload.

"It's becoming more and more difficult to recruit and retain dentists," said Metzger. "They don't want to spend all their time doing fillings, extractions, and periodontal work. But routine restorative services are high in demand. And dental therapists are trained to deal with low-income communities more than dentists are. They are trained to deal with people who are stressed."

* At the request of the practice, the names of the dental therapist and supervising dentist are being withheld from the report.

† As of publication, the dental therapist who is the focus of this case study has become an advanced dental therapist.

The role of the dental therapist

Minnesota law requires that at least half of a dental therapist's patients be underserved—that is, on public assistance, uninsured, or living in an area with a shortage of dentists.⁹ Because of the nature of the FQHC population, most of the patients seen by the center's dental therapist are on public insurance or are uninsured and pay on a sliding scale. She sees children and adults.

- **New patients and walk-ins.** She assesses new patients and sees walk-ins who are in pain. When the dentist enters the room, she presents the case and the dentist develops a treatment plan for her to implement if it falls within her scope of practice.
- **Patient volume.** She sees an average of seven patients a day.
- **Procedure mix.** She spends most of her time providing fillings and fluoride rinses, placing sealants, and doing scaling and root planing along with some extractions.
- **Oral health education.** Working with patients who often have little knowledge of oral health, she educates during every procedure she performs. "You educate basically from the time the patient sits down to the time the patient leaves," she said.

Supervision

The dental director at the time of this study noted that integrating the dental therapist occurred in stages. For the first two weeks, the dental therapist shadowed the dentist. For the next three or four months, he checked her work during each procedure. After that, he checked her work periodically.

Each day, the dentist and the dental therapist review her schedule and any cases about which she might have questions. They also meet informally a few times a month to discuss how the work is going, and formally to conduct quarterly evaluations.

Impact of the dental therapist

Patient records from June 2012 through May 2013 were analyzed for this report. Due to a changeover in data management systems, the data in this case were limited to a simple count of the number of patient visits to the dental therapist. Therefore, this analysis focused solely on the dental therapist's economic contribution to the practice, and how the estimated revenue she generated compared to the costs associated with her employment.

Economic contribution

Federally qualified health centers operate under a unique financing model that includes federal grants to help offset the costs of serving uninsured patients and a flat per-patient-visit reimbursement rate from Medicaid, no matter how many procedures are conducted during a single office visit. The center negotiated its per-visit rate with the state Medicaid agency using federal parameters.

In one year, the dental therapist conducted 1,756 patient visits. The costs of her employment—salary, benefits, taxes, dentist supervisory time, and supplies—came to \$136,070. (See Appendix 1.) The center estimates that 65 percent of its patients were on Medicaid. Factoring in a reported 25 percent collection failure rate on Medicaid billings, the center collected an estimated \$166,920 from Medicaid for the dental therapist's procedures based on its per-visit rate. Even before accounting for the other 35 percent of patients she served, the estimated Medicaid revenue that she generated exceeded the cost of her employment by more than \$30,000. (See Table 2.) This estimate does not factor in any revenue generated from the approximately 600 visits she handled that were not billed to Medicaid.

It should be noted that the dental therapist operated without a dental assistant. The net revenue generated by the dental therapist from Medicaid alone would cover most of the costs of adding a dental assistant (about \$47,000; see Appendix 1). The remaining costs would likely be covered by two additional revenue sources: the estimated 600 non-Medicaid patient visits she handled in 2012 and the increased productivity and capacity from the help of a dental assistant.

Table 2

Estimated Financial Contribution of the People’s Center Dental Therapist

Costs of employment	Estimated payments from Medicaid	Amount by which estimated revenue exceeded costs
\$136,070	\$166,920	more than \$30,000

Note: These figures do not include any revenue generated by the 35 percent of the dental therapist’s patients who were not enrolled in Medicaid.

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Providers’ experience

The dental director recalled that he was unsure about bringing a dental therapist into the practice. “I was a little hesitant about their training, and I wasn’t sure what kind of treatment dental therapists would be able to provide and what they’ll be able to do,” he said. “Basically I had no idea what their place [was] in a dental office until we had one. It turned out that it’s been a great help.”

The director said the therapist allows him to concentrate on more complex procedures. “If I can put all my filling patients on the side, then I have more freedom,” he said. “I can pick up more crown and bridge cases or root canal cases.” He also noted that patients’ waiting time for appointments has decreased. “If there was a month wait before somebody could get in, now it is probably 2½ to three weeks, because now we have more chairs open and more people are seen.”

The director and the therapist both reported that patients had no concerns about being treated by a dental therapist. “I was prepared for the possibility that every day there would be at least one patient who would come in and say, ‘I don’t want to be seen by a therapist. I need a dentist,’ ” he said. “So I was very, very much prepared for that, but it has never happened once.”

Said Metzger: “She fills a very, very important gap and allows [the dental director] to work much faster. Our experience has shown that they can do a lot more together than they can separately.”



If there was a month wait before somebody could get in, now it is probably 2½ to three weeks, because now we have more chairs open and more people are seen.”

Dental Director, People's Center Health Services

Summary

The 9,541 FQHC sites operating across the United States¹⁰ are the centerpiece of the nation’s health care safety net. With more states considering dental therapists as a way to expand dental care to underserved groups, FQHCs could use these midlevel providers to help them achieve their mission within their budgets.

Metzer said she chose to hire a dental therapist to maximize the clinic’s limited budget and expand access to dental care. In her first year of employment, the dental therapist conducted 1,756 patient visits and provided predominantly routine restorative care. Data reveal that given a 65 percent Medicaid patient rate, the estimated revenue she generated exceeded her employment costs by more than \$30,000—even before accounting for the other 35 percent of patients.

After the research for this study was almost complete, Metzer hired a second dental therapist to help address significant unmet needs for dental care in the community. Future data could indicate whether hiring a second dental therapist would yield similar results.

Norton Sound Health Corp., Nome, Alaska

Dental health aide therapists open access to the underserved

Table 3
Rules Governing Dental Health Aide Therapists in Alaska

Education	24-month program plus 400 hours of clinical practice in a tribal location under the direct supervision of a dentist.
Allowed procedures*	<ul style="list-style-type: none"> ▪ Perform exams ▪ Take X-rays ▪ Conduct cleanings ▪ Apply fluoride varnish and sealants ▪ Prepare and restore (fill) decayed primary and permanent teeth ▪ Place temporary stainless steel crowns ▪ Perform pulpotomies (partial pulp removal) ▪ Extract (nonsurgically) primary and permanent teeth
Supervision	Practice under the general supervision of a dentist, performing procedures according to standing orders issued by the supervising dentist.
Other requirements	They are a part of the Community Health Aide Program authorized under the federal Indian Health Care Improvement Act; must be employees of the Indian Health Service or of a tribe or tribal organization.

* This is not a comprehensive list of authorized procedures.

Sources: U.S. Public Health Service, Dental Category, "Alaska Dental Health Aide Therapist Program FAQs," <http://www.phs-dental.org/depac/akdentalhealthaide.html>; email from Mary Williard, D.D.S., director, Dental Health Aide Therapist Educational Program, Alaska Native Tribal Health Consortium, List of AK Medicaid Approved Procedure Codes for DHATs.

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Case study abstract

Norton Sound Health Corp., or NSHC, has employed dental health aide therapists in Alaska since 2007, four years after the Indian Health Service, or IHS,* authorized their use. These midlevel providers deliver preventive and routine restorative care to people living in western Alaska. According to Mark Kelso, D.D.S., the group's dental director, having dental therapists provide routine care has freed its dentists to address unmet needs for higher-level procedures.

In terms of economic value, an analysis of the records of two dental therapists shows that their estimated net revenue exceeded the cost of their employment. The dental therapist stationed in a rural village also helped save about \$95,000 in Medicaid outlays for travel by providing preventive care and treating dental problems early.

* The U.S. Department of Health and Human Services' Indian Health Service is responsible for providing medical and public health services to members of federally recognized tribes and Alaska Natives.

Background

Norton Sound Health Corp. is a tribally owned-and-operated nonprofit health care organization that contracts directly with the Indian Health Service. NSHC was founded in 1970 to create a network of community-based health care clinics serving the 10,000 people who live in the Bering Strait region of western Alaska. Most of the residents are Alaska Natives, predominantly low-income, and reside in distant villages.

NSHC's hub—a new, state-of-the-art facility in Nome (population nearly 3,800)—houses a hospital and a dental clinic, and offers a range of outpatient services. NSHC also has satellite clinics in 15 surrounding villages, ranging in size from 150 to 750 residents, that are home to the region's Iñupiaq, Siberian Yupik, and Yup'ik peoples. Dental therapists are stationed full time in three of the 15 clinics: Shishmaref (population nearly 600), Unalakleet, and Savoonga (population in the latter two roughly 700 each).

According to NSHC's dental providers—dentists, hygienists, and therapists—the oral health needs of residents in the region are extensive. For example, children have a high incidence of cavities. It is not uncommon for primary front teeth to be extracted and for young children to have a full set of stainless-steel crowns. Some adolescents are missing all of their teeth. Dentists and their teams, including dental health aide therapists, have been working to address such oral health needs in the region.



I could be doing a filling and telling them about prevention at the same time."

Rochelle Ferry

Hiring dental health aide therapists

NSHC works to make health care available to people in the rural areas it serves and to educate local people to provide some of that care. The first step in achieving these goals was to train residents as community health aides who could create a link between patients in the villages and the medical staff in Nome. Physician assistants and nurse practitioners were hired to staff satellite clinics. Following that model, dental health aide therapists were also placed in village clinics.

Before the health corporation hired dental health aide therapists, dentists would visit village clinics once or twice a year for two to six weeks each, depending on the size of the village. According to Kelso, dentists would work 12- to 14-hour days addressing the pent-up demand for dental care. Villagers had to fly to Nome for advanced dental needs and to Anchorage for care that required general anesthesia.

For example, before a dental health aide therapist lived in the village of Shishmaref, residents had access to a dentist just six weeks a year. With a full-time dental therapist in place, dentists now visit for two weeks annually with an additional two to three shorter, supervisory visits to check on program goals. Kelso reported that visiting dentists now spend more of their time providing advanced care, and significantly fewer villagers need to fly to hub cities for emergency treatment. He also said that recruiting dentists—a constant challenge in very rural settings—has become easier now that travel requirements have eased. Savoonga, Shishmaref, and Unalakleet have dental health aide therapists.

For this case study, researchers visited dental clinics to observe dental health aide therapists Rochelle Ferry in Nome and Robert Curtis in Shishmaref.

Education

Ferry and Curtis attended a two-year educational program in New Zealand, which has used dental therapists since 1921 and has an established training program.*

Ferry and Curtis said that it took three to six months to reach full productivity once they started practicing. For both, a large part of the learning curve was dealing more quickly and efficiently with large cavities, which they had not encountered in New Zealand.

How dental health therapists are used in the clinics

Rochelle Ferry in the Nome clinic

At the clinic, which has no hygienists, the dental assistants are trained and certified to perform cleanings but not deep scalings. Patients see a dentist or a dental therapist for a checkup and a dental assistant for a routine cleaning. Ferry or one of the clinic's four dentists sees patients with toothaches.

In Nome, Ferry works from 8 a.m. to 5 p.m. and sees about eight patients a day, adults and children. She travels to remote villages about 11 weeks a year, working 10- to 13-hour days and seeing 13 or 14 patients a day. Ferry talks about prevention and good oral health care during every appointment. "I could be doing a filling and telling them about prevention at the same time," she said.

Robert Curtis in the Shishmaref clinic

Since 2009, Robert Curtis has been a dental health aide therapist in the Inupiat village of Shishmaref, about 100 miles north of Nome. Fewer than 600 people live there. No roads connect Shishmaref to other villages; it is accessible only by airplane or snowmobile. There is no running water in the village, so preventing tooth decay by access to fluoridated water is difficult.

In the morning, Curtis provides preventive care and oral health education to children at the public school. In the afternoon, he treats children and adults at the community health clinic. Curtis provides sealants, fluoride varnish, and fluoride rinses to the school's 200 students. He also discusses the importance of a low-sugar diet and frequent brushing for good oral health. Curtis works with school administrators to schedule all students for annual exams and cleanings at the clinic, which is a short walk from the school.

In addition to the services he provides at the school, Curtis sees six to eight patients a day. He travels to other villages about seven weeks a year, working long hours to address unmet needs and seeing on average of 13 to 15 patients a day. The procedures he does most often are fillings and extractions, but Curtis says he also provides oral health education "in the chair, at the store, in the community."

"People here think if you have a cavity, your tooth has to come out," said Curtis, who works to change cultural attitudes about the importance of keeping teeth through prevention and treatment. He involves parents in the oral health education of young children, emphasizing the risks of putting soda in baby bottles and of allowing children to fall asleep with bottles of milk in their mouths.

* Since 2007, the two-year dental health aide training program has been based in Alaska and run by the Alaska Native Tribal Health Consortium, a nonprofit group funded by the federal Indian Health Service to address Alaska Native health issues. The training clinics are in Anchorage and Bethel. The consortium contracted with the University of Washington's MEDEX Northwest Physician Assistant Training Program to help with curriculum development and administration of the first year of the program.

Curtis is supervised by dentists in the Nome clinic, with whom he communicates regularly. Shishmaref residents either call the clinic for appointments or walk in. With the help of his assistant, Curtis can provide for most of the dental care residents need. He refers patients with impacted wisdom teeth to dentists in Nome. In addition, patients needing procedures that require general anesthesia are referred to dentists in Anchorage. A round-trip flight from Shishmaref to Nome costs about \$430, so minimizing such trips saves money for the state's Medicaid program, NSHC, and residents who pay for services themselves.

“ They have a limited scope of practice, meaning fillings and sealants and cleanings and that type of thing. By the time they're out of school, they've had time to focus just on this smaller aspect of dentistry, and they have proven to be as capable as the new dental students that I've worked with.”

Dr. Mark Kelso

Supervision

According to Kelso, initial supervision of new dental therapists is intense. “For the first month, I watch everything they do. ... We talk about communication skills, the quality and quantity of their work, as well as how they interact with others and with staff.”

After the first month, dental therapists go through another phase, in which they explain to Kelso the procedures they plan for patients and have their work checked by him afterward. “I worked with Dr. Kelso for a good six or seven months before he was comfortable with allowing me to work without him,” Ferry said.

Therapists who will serve distant villages are trained for four to six months by Kelso in the Nome clinic before they leave for their clinics.

In addition to formal annual reviews, there are many opportunities for the dentist to supervise his team. Kelso said dental health aide therapists working away from the Nome clinic often ask him and other staff dentists a variety of questions. “They call me about patients with acute infections. Should we manage them with some antibiotics or should we take the teeth out right away?” Questions about serial extractions and the need for orthodontia are also common.

Ferry is stationed at the Nome clinic. There, she receives feedback on a daily basis. “What I can improve on or what I'm doing excellent at ... it's a continuous sort of thing. I'm constantly learning,” Ferry said.

In addition to the contact Curtis has with dentists at the Nome clinic, he works alongside visiting dentists in Shishmaref. When Curtis travels to other villages, he works with a visiting dentist half of the time.

Kelso said he feels comfortable with the level of quality he sees in the work of the dental health aide therapists. “They have a limited scope of practice, meaning fillings and sealants and cleanings and that type of thing,” he noted. “By the time they're out of school, they've had time to focus just on this smaller aspect of dentistry, and they have proven to be as capable as the new dental students that I've worked with.”

Impact

Pew obtained NSHC's records on procedure volume and type, revenue billed and collected according to payor, and the number of Medicaid patients the dental operation served in 2011 and 2012. Because records from before the dental health aide therapist was employed were not available, Pew was unable to determine how revenue and productivity had changed. The analysis focused on three questions:

1. What was the level of productivity of dental health aide therapists?
2. What was their mix of procedures?
3. What was the economic contribution of dental health aide therapists to NSHC?

Provider productivity

Practice records show that Ferry and Curtis were busy, and their productivity in 2012 was similar to that of their supervising dentist. Ferry saw 715 patients, conducted 1,426 visits, and performed 4,734 procedures. Curtis saw 637 patients, conducted 1,026 visits, and performed 2,622 procedures. Ferry's productivity is in line with that of other dental health aide therapists across the state. A 2011 survey of tribal system dental directors found that, on average, a dental therapist sees about 830 patients a year.¹¹ "The patients in our region typically have more advanced dental disease ... resulting in the dental provider spending more restorative time per patient," Kelso said.

Curtis' recorded productivity was lower than Ferry's for two reasons. First, much of the preventive work he does for children in schools, such as fluoride rinses, is not recorded. Second, the village where he is based has fewer than 600 residents (compared to Nome's population of nearly 3,800).

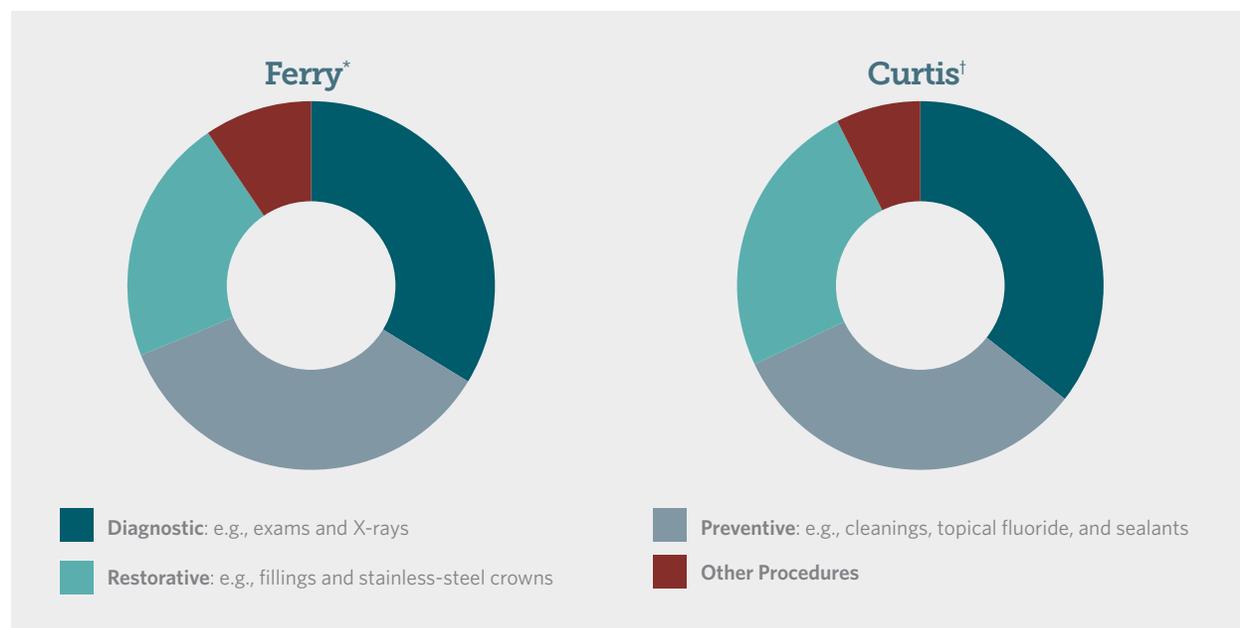
Table 4
NSHC Productivity Levels, 2011 and 2012

Provider	Visits	Patients served
2011		
Kelso	1,879	769
Ferry	1,217	640
Curtis	887	555
2012		
Kelso	1,637	701
Ferry	1,426	715
Curtis	1,026	637

Procedure mix

About 36 percent of the care Curtis provided was diagnostic, 32 percent was preventive, and 25 percent was restorative (predominantly fillings and stainless-steel crowns). About 34 percent of the care Ferry provided was diagnostic, 35 percent was preventive, and 22 percent was restorative. Most of the remaining procedures for both were extractions. (See Figure 1.)

Figure 1
Procedure Mix for Ferry and Curtis, 2012



* Ferry performed 1,596 diagnostic procedures, 1,662 preventive procedures, 1,027 restorative procedures, and 449 other procedures in 2012. The procedure codes included in each category are as follows: diagnostic (D0120, D0140, D0145, D0150, D0170, D0210, D0220, D0230, D0270, D0272, D0274, D0330), preventive (D1110, D1120, D1203, D1204, D1351, D4342), restorative (D2140, D2150, D2160, D2161, D2330, D2331, D2332, D2335, D2391, D2392, D2393, D2394, D2930, D2931, D2940, D3110, D3120, D3220, D3221, D3240), and other (D7140, D7210, D8670, D9110, D9310).

†Curtis performed 932 diagnostic procedures, 850 preventive procedures, 644 restorative procedures, and 196 other procedures in 2012. The procedure codes included in each category are as follows: diagnostic (D0120, D0140, D0145, D0150, D0220, D0230, D0270, D0272), preventive (D1110, D1120, D1203, D1204, D1330, D1351), restorative (D2140, D2150, D2160, D2161, D2330, D2331, D2332, D2335, D2391, D2392, D2393, D2394, D2930, D2931, D2940, D2970, D3110, D3120, D3220, D3221), and other (D7140, D7210, D8670, D9110).

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Economic contribution

Norton Sound Health Corp.'s dental operation is funded by a number of sources. Over one-third of its operating revenue comes from the Indian Health Service, which pays for the care of the Alaska Native community. NSHC does not bill this population for routine and emergency dental care; instead, the IHS apportions funding to each of the 12 Native health corporations in Alaska using a formula that accounts for population and level of need. It does not cover all of the costs of providing care to each corporation's service population.

Medicaid is another significant funding source, accounting for nearly 41 percent of the dental patients whom NSHC serves and 29 percent of overall revenue. Private insurance and self-pay are a small portion of revenue. (See Table 5.)

Table 5
Breakdown of Payors to NSHC

Estimated 2012 dental budget*	IHS funding as a percent of budget	Medicaid as a percent of budget	Private insurance as a percent of budget	Self-pay as a percent of budget
\$3,053,724	36%	29%	16%	3%

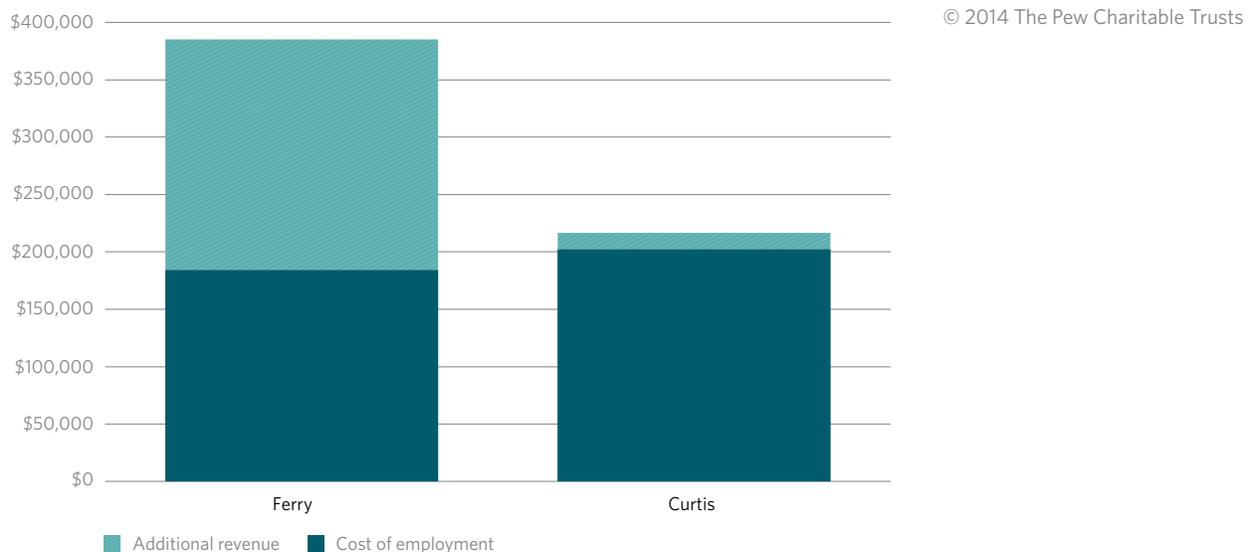
* 2012 billings were matched against payments and write-offs for uncompensated care; 16 percent of the 2012 operations budget is unaccounted for because some billings were processed in 2013.

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The starting salary at NSHC for dental therapists was \$60,000, with an additional \$3,000 a year for continuing education and professional development. Curtis received an additional \$18,000 a year for housing expenses, because he was permanently stationed away from Nome.

In 2012, the cost of employing Ferry—salary, continuing education stipend, a full-time dental assistant, supplies, employer taxes, and benefits—was \$184,009. The cost for Curtis was \$202,009, including the housing allowance. (See Figure 2.)

Figure 2
Estimated Financial Cost Contribution by Curtis and Ferry, 2012



Methodology for estimating economic contributions

The estimated economic contributions made to NSHC by Robert Curtis and Rochelle Ferry were calculated by first applying practicewide percentages of Medicaid, Indian Health Service, private insurance, and self-pay payments to their total billings from procedures.

Then, because routine and emergency care for IHS beneficiaries is provided without out-of-pocket expenses for the beneficiary, Alaska's Medicaid reimbursement rate—71 percent of NSHC's fees—was assigned to charges for dental care. (See Appendix 2.) Finally, the providers' costs of employment were subtracted from these combined values.

After accounting for employment costs, Ferry generated \$201,329 in estimated net revenue, and Curtis generated \$14,709. (See Table 6.) The revenue difference is due to higher patient volume in the Nome clinic, where Ferry works; the amount of time spent by Curtis performing non-billed preventive procedures at the school; and his housing allowance.

Table 6
Estimated Financial Contributions of Ferry and Curtis, 2012

Provider	Billings	Estimated total revenue*	Costs of employment	Estimated net revenue
Ferry	\$526,783	\$385,338	\$184,009	\$201,329
Curtis	\$296,268	\$216,718	\$202,009	\$14,709

* The value of care provided for free to Alaska Native patients was calculated as if it was paid at Alaska's Medicaid reimbursement rate.

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The patients in our region typically have more advanced dental disease ... resulting in the dental provider spending more restorative time per patient."

Dr. Mark Kelso

Averted travel costs

NSHC reported that Curtis generated savings in averted patient trips to Nome and Anchorage for care. According to the Shishmaref clinic administrative coordinator, Medicaid paid annually for an average of 250 patient trips to receive advanced care before Curtis was placed in the village. In 2012, the number of trips had declined to 59. At an estimated cost of at least \$500 per trip (airfare plus lodging), this represents a Medicaid savings of \$95,500 annually.

Providers' experience

Based on nearly 10 years of experience with dental therapists, Mark Kelso, D.D.S., said Ferry and Curtis have made notable contributions to NSHC's dental operation, including the opportunity for dentists to spend more time addressing advanced care needs. "Since I've started working with dental therapists, I've observed that I'm busier than ever with referrals for patients requiring higher-level care," he said. "In the past, a lot of adults were unable to have all their routine work completed. Now they want that crown that they've been forgoing for years because [before] they just got the decay taken care of."

Curtis said residents are not concerned about seeing a dental therapist instead of a dentist. "People don't ask to see a dentist instead of me," he said. "In fact, they were excited that I came to the village," Ferry agreed. "When I go out to the villages, the kids are very at ease with me because they see me on a regular basis. So I come in and get hugs, and parents bring me food."

After six years of working as a dental therapist, Ferry said, "I have seen a decrease in the amount of decay and the severity of decay. ... So I know I have made a difference."

“ Since I've started working with dental therapists, I've observed that I'm busier than ever with referrals for patients requiring higher-level care.”

Dr. Mark Kelso

Summary

In 2012, Curtis and Ferry together provided diagnostic, preventive, and restorative care to 1,352 patients and performed 7,356 procedures. Curtis provided the 585 residents of Shishmaref with regular access to dental care for the first time, treating children in the elementary school with preventive care and serving all ages in the community clinic. Ferry traveled about 11 weeks of the year from her base in Nome to other rural villages to provide residents with greater access to regular care.

This analysis finds that the revenue generated by the dental health aide therapists exceeded their costs of employment when compared with the reimbursement value of patient care they provided. Ferry exceeded her employment costs by more than \$200,000; Curtis exceeded his by nearly \$15,000. He also yielded an additional savings of over \$95,000 to Medicaid in averted trips by his patients from Shishmaref to hub cities for dental care.

“ I have seen a decrease in the amount of decay and the severity of decay. ... So I know I have made a difference.”

Rochelle Ferry

Virtual Dental Home, California

Telehealth supervision extends dental home into schools

Table 7
Virtual Dental Home Demonstration Project

Purpose	Designed to provide dental care to populations that would otherwise not receive it or would have difficulty getting to a dentist’s office or clinic.
Site locations	Elementary schools in low-income neighborhoods, Head Start centers, residential facilities for people with disabilities, subacute hospitals,* nursing homes, rural communities.
Dental hygienist and assistant capabilities	Cleanings, sealants, fluoride, X-rays, digital photos, charting, oral hygiene instruction, nutritional counseling, placing interim therapeutic restorations (temporary fillings).
Supervision	Dental hygienists and dental assistants are supervised remotely by a consulting dentist. The care team can collect diagnostic records; provide preventive services, education, and counseling; prepare charts; and place temporary fillings per the supervising dentist’s authorization.
Demonstration topics	Providers can perform two duties without a dentist present: deciding which X-rays to take, if any, to facilitate a dentist’s evaluation, and placing interim therapeutic restorations.

* Subacute hospitals provide care to patients who have been discharged from a hospital’s acute care services but still need specialized treatment therapies before returning home.

Source: Virtual Dental Home Demonstration Project, Pacific Center for Special Care

More information: [http://www.dental.pacific.edu/Community_Involvement/Pacific_Center_for_Special_Care_\(PCSC\)/Innovations_Center/Virtual_Dental_Home_Demonstration_Project.html](http://www.dental.pacific.edu/Community_Involvement/Pacific_Center_for_Special_Care_(PCSC)/Innovations_Center/Virtual_Dental_Home_Demonstration_Project.html); California Office of Statewide Health Planning and Development, “OSHDP Health Workforce Pilot Project #172, Report and Evaluation,” accessed April 22, 2014, http://dental.pacific.edu/Documents/community/special_care/acrobat/VirtualDentalHome_HWPP_Evaluation_2013_04_051213.pdf.

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Case study abstract

The Virtual Dental Home, or VDH, is a demonstration project in California testing whether telehealth—the delivery of health-related services and information via telecommunications technologies—can be used to provide dental care to populations that would otherwise not receive it. Dental hygienists and dental assistants are sent to community sites such as schools, Head Start programs, day care centers, and nursing homes to conduct exams and collect diagnostic information. They make the data available electronically through a cloud-based record system to a supervising dentist at a clinic or dental office. The dentist then advises the local provider on what preventive and routine restorative care (temporary fillings, for example) should be delivered. When necessary, patients are referred to dental offices for more complex needs.

VDH achieves cost efficiencies by deploying dental hygienists to collect diagnostic information and deliver preventive and early intervention care. These lower-cost providers meet many of their patients' oral health needs. For cases in which a patient requires advanced care, the dentist can review the records before the office visit, saving preparation time. In addition to the cost savings from preventive and routine care provided by hygienists, the program also spares patients and their families the time and money of traveling to an office, unless further care is needed.

VDH operates at 40 sites. Researchers examined data from three elementary schools for this case study: Harmon Johnson in Sacramento, and El Toyon and Lincoln Acres in San Diego.* The researchers also visited Harmon Johnson, where dental hygienists served 93 students, providing exams, dental cleanings, X-rays, sealants, fluoride treatments, and temporary fillings. The school has a largely Hispanic enrollment, and many of the students come from low-income homes.

VDH is funded predominantly by grants. However, the researchers determined that the estimated revenue that could be generated by billing California's Medicaid program would cover more than half of the program's costs. At the national level, where average salaries are lower and the average Medicaid reimbursement rate is higher than in California, Medicaid payments could exceed program costs.

Background

The program, run by the Arthur A. Dugoni School of Dentistry's Pacific Center for Special Care, University of the Pacific, features nine teams delivering care to over 40 rural, inner city, and suburban sites across California. Four staff members manage operations, communications, and data analysis and help with technical assistance for field sites. VDH was established in 2010 by Paul Glassman,† D.D.S., director of the Pacific Center for Special Care.

VDH includes a state-authorized demonstration program that is testing a small scope-of-practice expansion for dental hygienists and dental assistants.‡ Under the pilot program, these providers can take X-rays without first consulting a dentist. They may also place interim therapeutic restorations with approval by a supervising dentist. A supervising dentist is not required to be on site when these procedures are performed.

State, federal, and private grants fund VDH. California law does not include Medicaid reimbursement for dental services using telehealth technology. However, state legislation pending as of June 2014, Assembly Bill 1174, would make permanent this expanded scope of practice for dental assistants and hygienists and allow Medicaid billing.¹²

How VDH works

Each care team includes at least one dental hygienist or assistant. These providers are always supported by at least one supervising dentist via telehealth technology. At present, only hygienists are used in schools. Dental care is provided at the community site, and patient data and visits are entered into an online dental records system. Within 48 hours, the supervising dentist logs in to the system, reviews records, and authorizes procedures. If patients need care that cannot be performed at the community site, they are referred to a dentist.

* Only dental hygienists were used at these sites.

† Glassman is a consultant on Pew's work on children's dental policy.

‡ VDH is authorized under the authority of a Health Workforce Pilot Project approved by the state's Office of Statewide Health Planning and Development. Under this process, a demonstration project can study a workforce change that is not allowable under current law, such as the creation of another category of provider or expansion of the scope of practice of an existing type of provider. The two procedures performed in the pilot program are not authorized by California law and fall under this exception. (Source: <http://www.oshpd.ca.gov/hwdd/HWPP.html>).

VDH in practice

The Virtual Dental Home system at Harmon Johnson Elementary serves a high percentage of low-income students.¹³ The program serves children in grades three through six. Of the school's 580 children, 68 percent are Hispanic, 10 percent have Southeast Asian ancestry, 10 percent are multiracial or other, 8 percent are African-American, and 5 percent are Caucasian.* The neighborhood has high rates of poverty.

Staffing

Hygienists Lisa Greenshields and Deborah Blanchard each work at Harmon Johnson one day a week. A private-practice pediatric dentist, whose office is five miles away, is the supervising dentist. All of the staff, including the supervising dentist, are paid hourly as contract workers. The dental hygienists are paid for a combined total of about 12 hours a week, seven of which are devoted to clinical care. The remaining five hours are spent on travel, equipment setup and breakdown, processing forms, and other non-clinical tasks.

Program participation

From December 2012 to November 2013, 111 of the school's 580 students were enrolled in the Virtual Dental Home program; 93 received care. Enrollment and care were limited because of the pilot program's capacity. Outreach has been narrowly targeted to incoming third-graders since the program started. Students first seen in third grade continue to receive care after moving on to higher grades.

Clinic setup

The dental program uses a small multipurpose room at Harmon Johnson. On scheduled dental care days, the VDH staff sets up portable equipment—a dental chair, X-ray machine, water container, and intraoral video camera—and a computer. No water source is needed in the room. Setup takes 30 to 40 minutes. An additional portable case contains other dental tools. All of the equipment fits into a car.

Service delivery

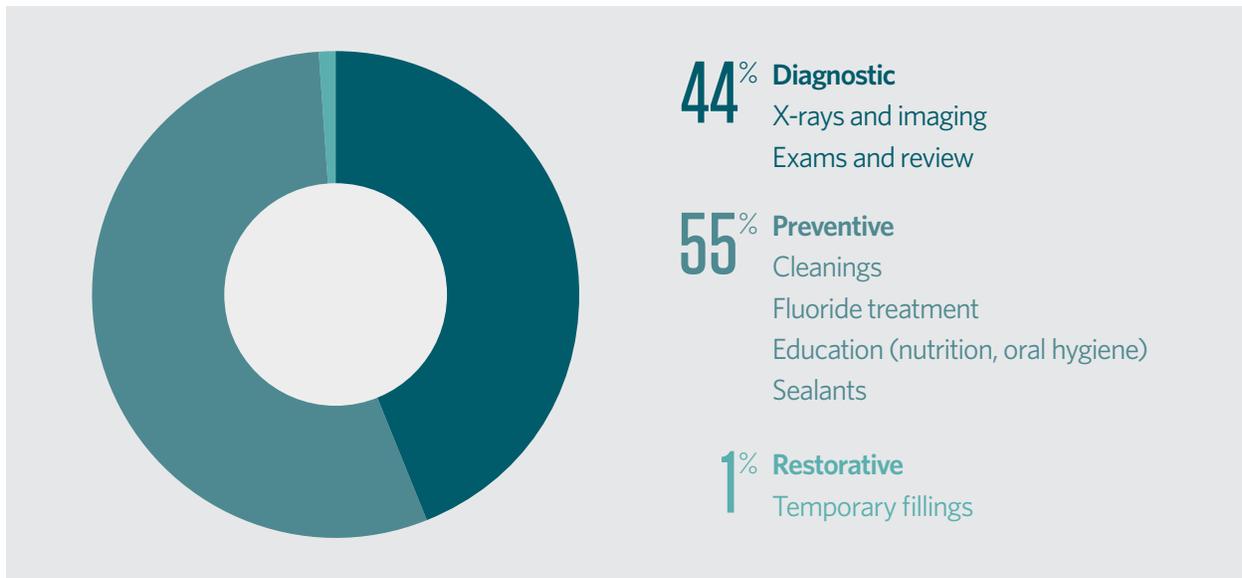
After setting up, the dental providers call classrooms to send patients. These are students who need a follow-up visit or a checkup, or have submitted a consent form to become new patients. Each provider sees four to five children a day when seeing new patients or conducting checkups, and as many as six or seven when conducting follow-up visits. New appointments take nearly an hour; follow-ups are shorter.

At Harmon Johnson, Greenshields and Blanchard provide exams, cleanings, sealants, fluoride, X-rays, digital photos, charting, oral hygiene instruction, interim therapeutic restorations, and nutritional counseling. Following each day of care, the on-site providers send the dentist a list of patients whose charts have been entered into the electronic database and require review. The supervising dentist reviews all patient records within 48 hours of the visit. When a temporary filling might be necessary, the hygienist charts the area of concern, takes X-rays and photographs, and flags the file for the dentist to review.

* At the request of the practice, the name of the dentist is not used in the report.

Figure 3

Total Procedures in 3 Elementary Schools,* December 2012–November 2013



*Harmon Johnson Elementary School in Sacramento and El Toyon and Lincoln Acres elementary schools in San Diego.

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Students' dental health

The dental providers report that many students have moderate to high rates of tooth decay and significant levels of plaque. Oral hygiene habits tend to be poor, and students have little nutritional education or knowledge about dental health. For many students, VDH is their first experience with a dental provider or their first non-emergency visit. "Probably the most profound feeling is when you ask one of the students, 'Do your teeth hurt?' and they say, 'Only when the air is cold,' or 'Only when I drink water,' or 'Only when I breathe in deep,' or 'Only when I chew.' And I think to myself, that's all day long, all through class, at night, all day, and for who knows how long," Greenshields said.

The two providers make oral health education an integral part of each patient visit. "We're teaching somebody how to take care of their mouth for the rest of their life," Greenshields said. "And they become the educator with their parents. I've had students tell me, 'Oh, we're not drinking soda anymore,' after we showed them the effect of soda on teeth."

“Probably the most profound feeling is when you ask one of the students, 'Do your teeth hurt?' and they say, 'Only when the air is cold,' or 'Only when I drink water,' or 'Only when I breathe in deep,' or 'Only when I chew.' And I think to myself, that's all day long, all through class, at night, all day, and for who knows how long.”

Lisa Greenshields

Referrals

Greenshields estimates that she can address all of the dental care needs of about 60 percent of the children she serves. During the year examined in this case study, 35 of the 93 students served (38 percent) were referred for follow-up dental care.

“As time goes by, it’s becoming clear that this approach is actually a way that dentists can expand their practices,” Glassman said. “We’re taking people who have not had dental care before and were not likely to get it, and we’re detecting advanced disease that people might not have realized was there. We’re making referrals and trying to get people into dental offices.”

“ We’re taking people who have not had dental care before and were not likely to get it, and we’re detecting advanced disease that people might not have realized was there. We’re making referrals and trying to get people into dental offices.”

Dr. Paul Glassman

Cost impact

Because the Virtual Dental Home demonstration is grant-funded, patients in elementary schools are not billed for care. The central question for this economic analysis was: Could the program cover its costs if Medicaid was billed for the services provided?

VDH is intended to function as an extension of an existing operation—a nonprofit clinic, federally qualified health center, or dental practice. This analysis considers only the services provided directly at the Virtual Dental Home sites and does not include revenue and costs for services performed due to referrals to dental offices or clinics. Findings are presented through two analytical lenses: per-visit costs and total program costs.

During the school year examined in this case study—Dec. 1, 2012, to Nov. 30, 2013, excluding winter, spring, and summer breaks—a total of 201 students at Harmon Johnson, El Toyon, and Lincoln Acres elementary schools were served, with an average of 2.2 visits per student. Hygienists performed an average of 6.4 procedures per child per visit.*

Estimated costs and reimbursement: California

The costs of care were calculated using data provided by VDH for time spent by the dental hygienists at the schools (clinical care and administrative tasks), consultative time by the off-site dentist, and equipment and supply costs. Estimates for administrative costs, employee fringe benefits, and employer taxes were included to model potential costs to a public clinic for implementing VDH.† The per-visit cost was \$111 to \$115. (See Table 8.)

* The procedure count is consistent with the California Medicaid fee schedule, which reimburses services such as sealants and images as separate billable services.

† Administrative costs will differ depending on the existing administrative capacity of the host organization. If VDH were operated in a practice with underutilized general office staff, costs would probably be lower than the 15 to 20 percent estimate used here.

Table 8

VDH Estimated Per-Visit Cost and Potential Revenue in 2 Scenarios Comparing California and national costs if the program billed Medicaid

	California	National
Total estimated cost per visit*	\$115	\$99
Total estimated potential revenue per visit	\$61	\$112
Total estimated net revenue per visit	(\$54)	\$13

*Assumes 20 percent administrative costs.

Note: See the methodology appendixes for further details.

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The average reimbursement per visit was estimated to be the total payments Medicaid would offer for all covered procedures delivered at the elementary schools divided by the total number of patient visits. The California Medicaid program pays 33 percent of average commercial dental fees,¹⁴ which would yield an average per-visit payment of \$61. Thus, in California, Medicaid would cover 53 to 55 percent of the VDH program costs for the dental care of 201 elementary school children.

Estimated costs and reimbursement: National

A cost analysis using national salary estimates and Medicaid reimbursement rates was conducted for two reasons: California has some of the highest average salary rates in the nation, but also one of the lowest Medicaid reimbursement rates in the country at roughly half the national average (33 percent in California, compared to 61 percent nationally).¹⁵ A cost analysis at the national level provides perspective on how this program might fare if implemented elsewhere.

The average per-visit cost using national salary estimates for dental hygienists and dentists comes to \$95 to \$99. Using an average national Medicaid reimbursement rate of 61 percent of commercial dental fees,¹⁶ the average reimbursement rate per visit is estimated at \$112,^{*} which would more than cover program costs. In both the California and national scenarios, the more than 1,000 nutritional counseling and oral health education services VDH provided to children in the study year figure into the per-visit program costs but are not covered by Medicaid—an extra benefit to the children.

Total program costs

Another perspective can be found by examining the extent to which Medicaid payments would cover annual program costs rather than per-visit costs. In California, for example, for the VDH program to serve 201 children, it would need to find \$27,000 to \$29,000 in additional funds to cover annual program costs. Using national estimates, Medicaid billing revenue would exceed program costs by \$2,000 to \$4,000. (See Table 9.)

* Based on reimbursement fees for all covered services provided to VDH students divided by the total number of visits.

Table 9

VDH Estimated Total Provider Cost and Potential Revenue per Year*

Case scenario	Estimated total costs [†]	Potential total revenue	Net program potential revenue
VDH California	\$54,000-\$56,000	\$27,000	(\$27,000-\$29,000)
VDH national	\$45,000-\$47,000	\$49,000	\$2,000-\$4,000

*Assumes a 40-week school year that does not include winter, spring, and summer vacations.

† Does not include a Medicaid billing collection rate.

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Summary

At the time of this study, the Virtual Dental Home program was providing dental care in 40 California community-based locations. Pew examined three elementary school sites at which 201 children received care. Dental hygienists operating under a dentist's supervision provided routine cleanings, sealants, temporary fillings, case management, and oral health education. They also examined patients to collect diagnostic information for the supervising dentist. VDH allowed patients to receive dental care while avoiding the logistical and cost burdens to families of taking students out of school and traveling to a clinic or office for care. For 60 percent of the cases at Harmon Johnson Elementary in Sacramento, all dental care needed by the children was provided at school.

Although VDH is mostly grant-funded, this case study examined whether the program costs would be covered if the services were billed to Medicaid. Using California-based salary costs and reimbursement rates, Medicaid would cover 53 to 55 percent of the average per-visit cost. In terms of total program costs, a VDH program serving 201 elementary school students at the three sites examined would need to find an additional \$27,000 to \$29,000 to run the program. However, using national estimates, Medicaid payments would exceed per-visit program costs; reimbursement rates for a program serving 201 children would surpass its annual costs by \$2,000 to \$4,000.

It is important to emphasize that the Virtual Dental Home is a demonstration program that has not been implemented to scale. Cost efficiencies not reflected in this case study could develop as the program serves more children and providers see more patients. And, as previously noted, administrative costs could be lower than estimated, given excess staff capacity of host operations.

Conclusion

More states are looking to midlevel dental providers—such as dental therapists or dental hygienists who can provide routine preventive and limited restorative care—to help address critical problems accessing dental care. Pew undertook a series of case studies to enrich the understanding of how such providers perform in practice settings and how they affect practice economics. This report focused on midlevel dental providers employed in three public health programs with the mission of increasing access by the underserved, and examined the extent to which these dental providers are helping these programs maximize the number of patients reached in a cost-effective way.

At People’s Center Health Services in Minnesota, there was enough need—assessments, restorations, and preventive care—to employ a dental therapist full time. In addition, the estimated revenue she generated easily covered her employment costs. People’s Center hired a second dental therapist to further expand care.

At Norton Sound Health Corp. in Alaska, dental health aide therapists are reaching thousands of residents in rural villages that had no regular access to dental care. These providers go into schools to reach children early with detection, education, prevention, and treatment, reducing the need for costly trips to larger cities for more serious preventable problems. The value of the services the dental health aide therapists provide exceeds their costs of employment, and they generate additional savings to NSHC, Medicaid, and private-pay patients in averted travel for advanced care.

In the Virtual Dental Home demonstration program in California, 201 elementary school students who previously had no regular sources of dental care received routine treatment without missing school or their parents missing work. A cost analysis found that if VDH billed California Medicaid for services, payments would cover 53 to 55 percent of average per-visit costs and come within \$27,000 to \$29,000 of covering the total annual program costs. However, using average national Medicaid reimbursement rates and national salary estimates, Medicaid payments would more than cover total program costs.

Three case studies cannot predict how such providers, working under the supervision of dentists in innovative ways, would be implemented across the country. This report, however, adds to the literature about how midlevel dental providers are expanding care to more low-income people. The findings show promise that midlevel providers are an effective and cost-efficient means for addressing the significant unmet need for care.

Appendix 1: Methodology for People’s Center Health Services

The economic question related to People’s Center, a federally qualified health center, was whether the dental therapist would generate sufficient revenue to support the costs of adding her to the clinical team.

Federal rules preclude the posting of actual salaries paid to employees of FQHCs, so we estimated the cost of hiring the dental therapist using the starting salary (\$35 an hour) at Children’s Dental Services, a nearby publicly funded dental clinic. People’s Center noted that the dental therapist is a full-time employee, so we estimated that she earned \$35 an hour in direct salary for 40 hours a week, or 2,080 hours a year. To this direct compensation we added 5.65 percent mandatory federal withholding for Medicare and FICA, 0.5 percent Minnesota state unemployment tax on the first \$28,000 of salary, and 0.9 percent federal unemployment tax on the first \$7,000 of salary. The practice also provided a benefit package equal to 25 percent of salary. Combined, these costs brought her hourly rate including benefits to \$45.80, equaling annual compensation of \$95,316.

To calculate the costs associated with a dentist’s supervision, we estimated that the dental director spent 2.5 hours a week on this function. Using the Bureau of Labor Statistics report of mean dentist salaries in Minneapolis, we estimated the cost to the practice of an hour of a supervising dentist’s time at \$95.71.^{*} This figure includes withholding and benefits. Thus, the costs of oversight amounted to \$11,964 a year, assuming 50 weeks of supervision a year.

We also estimated that the additional capacity created by the dental therapist resulted in an additional \$500 a week in supply costs to support patient care. Combined, total costs of using a dental therapist amounted to \$136,070.

A salary estimate of \$47,000 for a full-time dental assistant was used in the case study. This is based on the Bureau of Labor Statistics average hourly rate for a dental assistant in Minneapolis of \$21.21.[†] When combined with taxes and fringe benefits, the dental assistant’s annual compensation came to \$46,812.

Estimates of the dental therapist’s collections were based on an analysis of line-item claims generated by People’s Center for services she performed, along with consultations with administrative and financial leadership and staff at the practice. The following data points and assumptions were used to estimate income attributable to the dental therapist:

- At least 65 percent of her patients were on Medicaid.
- The remainder of patients used third-party payments or self-paid.
- A per-visit Medicaid rate was reported by the People’s Center but was kept confidential at the center’s request.
- A maximum of 25 percent of capitated Medicaid claims were rejected by the state due to errors in billing or patient ineligibility for public assistance.

* Based on the average annual mean wage of dentists by area. (Source: U.S. Department of Labor, Bureau of Labor Statistics, Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates [May 2012], Minneapolis-St. Paul-Bloomington, MN-WI, BLS Occupation code 29-1021, Median and Mean Hourly Wage)

† Based on the average annual mean wage of dental assistants by area. (Source: U.S. Department of Labor, Bureau of Labor Statistics, Occupational Employment and Wages [May 2013], <http://www.bls.gov/oes/current/oes319091.htm>)

Appendix 2: Methodology for Norton Sound Health Corp.

NSHC provided Pew with three annual files (production, deposits, and adjustments) for 2011 and 2012. The production files included records of all procedures performed in a calendar year and contained unique transaction identification numbers, dates of service, services provided, providers of record, service sites, and amounts billed. The deposits files included records of all payments NSHC recorded during a calendar year and contained unique transaction IDs, transaction dates, patient IDs, payment amounts, and a description of the payor. The adjustment files contained records of write-offs, primarily due to the difference between billing amounts and Medicaid payments, as well as care provided to Alaska Natives without Medicaid or private insurance. These files contained transaction types, patient IDs, adjustment amounts, unique transaction numbers, and descriptions of the adjustments.

The practice provided the salaries paid to dental therapists and dental assistants as well as fringe benefits, which included support for continuing dental education and, in the case of the village-based therapists, housing allowances. Information on other employer costs, including federal and state withholding taxes, was obtained from public sources, either the U.S. Social Security Administration or the Alaska Department of Employment Security.

Due to a lack of patient ID numbers on the production files and the fact that the performing providers are not identified on the deposit report, we could not track collections to specific providers. NSHC logs whether each visit is a patient's first visit in that calendar year, and from those records the number of unique patients and total visits per calendar year were calculated.

To estimate the value of the care provided by the dental health aide therapists, we applied proportions from the total practice to their production totals. First, we added the total deposits received and total adjustments (write-offs) made in each calendar year for NSHC, which we used as a proxy for its overall dental operations budget. This amount was close to the total billings calculated from the production report (due to the lag time for a claim to be paid or processed, deposits or adjustments may be made in the following calendar year for procedures performed toward the end of the year). We then calculated the percentage of deposits plus adjustments broken down by source—Medicaid payments, private insurance payments, self-pay payments, and care charged to IHS. Those percentages were then applied to the dental therapists' total production billings to estimate amounts received from Medicaid, private insurance, and self-pay. To estimate the value of the IHS adjustments, we discounted to Alaska Medicaid rates the proportion of the dental therapists' billings written off to IHS.

To calculate Medicaid reimbursement rates on billings, we compared Medicaid payments for 15 common procedures to NSHC billings for those same procedures for 2011 and 2012.^{*} Because Alaska Medicaid reimbursement rates increased in July 2011, the two reimbursement rates in effect for 2011 were averaged. We calculated that Medicaid reimbursed at 74.54 percent of NSHC's fees in 2011 and 70.55 percent of its fees in 2012 (NSHC increased its fees an average of 6.58 percent from 2011 to 2012).

Travel costs were not included in the total cost estimates for the direct provision of care by dental therapists. Estimates of Medicaid savings due to averted travel costs for patients in Shishmaref to seek care in hub cities were based on numbers of trips as reported by the Shishmaref clinic administrative coordinator in an interview with Pew researchers.

* D0120, D0150, D0210, D0272, D0330, D1120, D1203, D1351, D2150, D2331, D2752 (in lieu of D2751), D2930, D3220, D3310, and D7140 (in lieu of D7110). Codes the American Dental Association selected for its March 2004 publication Medicaid Reimbursement for New England Region: Using Marketplace Principles to Increase Access to Dental Services were used in this report. Similar codes were substituted for two procedures that did not appear on NSHC's production report.

Appendix 3: Methodology for Virtual Dental Home

This case study focused on an economic analysis to determine whether the VDH could cover its costs with Medicaid reimbursement for services provided. Using VDH patient records, we analyzed the mix and frequency of procedures (including nutritional counseling and oral hygiene exams, which are not reimbursed under Medicaid). Because the program serves students only when school is in session, this analysis presumes a 40-week school year that does not include winter, spring, and summer vacations.

Procedures were grouped according to Current Dental Terminology and program codes into the following categories for analysis: X-rays/imaging, cleanings, fluoride varnish, nutritional and oral hygiene education, sealants, exams and review, and temporary fillings.

Procedure counts from the program include some for which Medicaid does not reimburse, such as nutritional counseling and patient education. Estimates of Medicaid reimbursement were credited toward only those procedures for which there was a fee assigned by the California Medicaid Schedule of Maximum Allowances 2012, pages 5-115 to 5-134.¹⁷

Table 10
VDH Estimated Per-Visit Cost*

	California	National
Hygienist	\$45 [†]	\$31 [‡]
Dentist supervisory time [§]	\$8 [†]	\$10 [‡]
Supplies	\$3	\$3
Equipment	\$14	\$14
Employer taxes and benefits	\$21	\$21
Staff training	\$6	\$4
Indirect costs (at 20%)	\$18	\$16
Total estimated cost per visit	\$115	\$99

* Values reflect rounded estimates.

† May 2012 California Occupational Employment and Wage Estimates United States, Bureau of Labor Statistics (Occupation code 29-2021 Median and Mean Hourly Wage). The time noted here accounts for clinical as well as administrative time.

‡ May 2012 National Occupational Employment and Wage Estimates United States, Bureau of Labor Statistics (Occupation code 29-2021, Median and Mean Hourly Wage). The time noted here accounts for clinical as well as administrative time.

§ Approximately 75 percent of visits require 10 minutes of close review with a diagnosis and follow-up care recommendation by the dentist.

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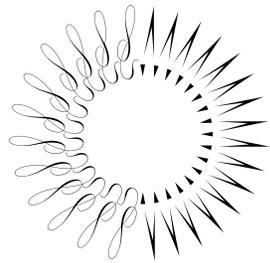
Also using VDH patient records, we estimated the average potential Medicaid reimbursement per child per visit as the total potential payment for covered services provided divided by the total number of VDH elementary school visits. The total number of participating children, visits, and procedures per visit were provided by the VDH program. To estimate the potential reimbursement per child per visit we used a 33 percent reimbursement rate estimate of commercial dental fees in California and a 60.5 percent reimbursement rate estimate of commercial dental fees nationally.¹⁸

To determine the provider cost of care, researchers obtained data from VDH staff on time spent by dental hygienists at the school and consultative time by the off-site dentist. Average hourly wage estimates from the U.S. Bureau of Labor Statistics were used to estimate dental staff salaries in California and nationwide. However, we included the VDH program hygienists' actual hourly wage of \$50 because it both accurately reflected the costs of the current program and informed the cost analysis in a market where wages are higher than the national average. The estimated total provider costs over the year assumed a 40-week school year that did not include winter, spring, and summer vacations; dentists worked 55 hours, and hygienists worked 480 hours.

Equipment (\$30,000 for technology and dental suite equipment, amortized over five years) and supply costs (\$3 per visit) were provided by Virtual Dental Home program staff. Because the VDH program is currently grant funded and housed at a university, a precise administrative cost for the program could not be provided. To develop a proxy for the administrative costs of a public health clinic providing dental services and billing Medicaid, we estimated that 15 to 20 percent of overall operations and staff costs were indirect after consultations with several dentists who direct or consult on school-based dental programs and other public health dental clinics. Fringe benefits were estimated based on these consultations and the National Network for Oral Health Access' 2010 Survey of Health Center Oral Health Providers (at 25 percent).¹⁹ Estimates for training staff to participate in the program included three days of training for dental hygienists (24 hours) and a half-day of training (four hours) for the supervising dentist. VDH staff provided the data on time spent by dental hygienists and the supervising dentist in training to participate in the demonstration project.

Endnotes

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