Resource Guide: Determining Children's Oral Health Costs at an Alternative Care Delivery Site—New Hampshire Women, Infants, and Children Preventive Dental Care Program

The Centers for Medicare & Medicaid Services (CMS) Medicaid Innovation Accelerator Program (IAP) is a collaboration between the Center for Medicaid and Children's Health Insurance Program (CHIP) Services and the Center for Medicare & Medicaid Innovation that is designed to build state capacity and support ongoing innovation in Medicaid. From March 2017 to June 2019, the IAP Children's Oral Health Initiative (OHI) Value-Based Payment (VBP) technical assistance opportunity supported Medicaid agencies in the District of Columbia, Michigan, and New Hampshire with selecting, designing, and testing VBP approaches to sustain care delivery models that demonstrate improvement in children's oral health outcomes. This technical assistance complements the broader Children's OHI, in which CMS works with states to explore program and policy opportunities to improve children's oral health by increasing the proportion of children receiving preventive dental services in Medicaid and CHIP.

Introduction

An important aspect of designing a VBP model is understanding the materials and staffing resources needed to provide services that the model will incentivize. Medicaid agencies can then use this information to compute the underlying costs to a clinician of providing a specific service. This resource guide outlines one approach to consider in determining the costs to deliver oral health services at a site other than a dentist's office or hospital. Although the methodology would be similar in a conventional clinical setting, a primary difference between the types of sites is that real estate costs (i.e., rent, property tax) should be considered when determining costs of oral health care provided in private dentist offices and other clinical sites. Providing oral health services at nontraditional care delivery sites, such as a school or Women, Infants, and Children (WIC) program site as outlined in this resource guide, can allow providers to reach patients who may not visit dental clinics frequently. *This resource is not considered official guidance from CMS and should be viewed as one of many resources for Medicaid agencies to use.*

This resource guide is organized into the following sections:

1. **New Hampshire's Costing Method:** Information on how one state—New Hampshire—used time-driven activity-based costing (TDABC) as the foundation for its costing approach. In this section, we detail the clinical components of New Hampshire's care delivery model (as of 2019), the selected VBP approach, and the process for implementing it.
2. **Cost Worksheet Instructions:** Instructions for how to use the cost worksheet developed for New Hampshire, as part of the IAP OHI VBP technical assistance opportunity. This provides a step-by-step approach to completing the blank cost worksheet. These instructions also include New Hampshire's tables and considerations as examples.
3. **Cost Worksheet Template:** A blank cost worksheet in a corresponding Microsoft® Excel® workbook, a separate file, to assist states wishing to take a similar approach to costing individual or bundled oral health services in a care setting other than a clinical office or hospital. This resource guide

reviews the step-by-step approach to completing the blank cost worksheet. The tables and examples in the instructions included in the resource guide reflect those in the workbook.

Together, these resources can offer insight into (1) how New Hampshire incorporated the TDABC method, (2) how other states could incorporate that method, (3) the adaptations that New Hampshire made to ensure that the costing approach aligned with the specific circumstances of its pilot program, and (4) the adaptations that other states should make to implement a similar approach.

New Hampshire's Costing Method

BACKGROUND ON NEW HAMPSHIRE'S PAYMENT MODEL REFORM AND VALUE

In 2019, the State of New Hampshire began implementing a pilot program (hereinafter the New Hampshire dental pilot) to provide preventive dental care to Medicaid-eligible children at care sites nested within WIC program clinics. Two WIC sites located in Keene and Concord, New Hampshire, already are delivering services through the New Hampshire dental pilot.

Dental hygienists at the pilot WIC sites deliver up to seven preventive services, depending on the dental needs of the presenting child. The following services are available at the pilot sites:

- Dental screening
- Toothbrush dental prophylaxis
- Fluoride varnish
- Sealant
- Interim therapeutic restoration
- Silver diamine fluoride
- Oral health education and anticipatory guidance

Under its fee schedule, New Hampshire Medicaid covers only two of these seven services: fluoride varnish and sealants. Medicaid reimbursements for these services are paid directly to the WIC sites, which rely on grant funding for reimbursement of remaining uncompensated labor and supply costs. Clinical and administrative staff at both sites are reimbursed on an hourly basis regardless of the services delivered or Medicaid reimbursement received.

VALUE-BASED PAYMENT APPROACH

A central goal of New Hampshire's participation in the IAP OHI VBP technical assistance opportunity was to develop a sustainable reimbursement methodology for the suite of available preventive services to Medicaid-eligible children. With IAP, the state developed a bundled encounter rate to be used for the New Hampshire dental pilot that intends to provide a single flat-rate payment to providers for performance of all necessary services—as many as all seven defined above—during a clinical visit. Under this model, providers have an incentive to treat patients before they require more complex restorative and disease management services because providers receive no additional compensation for visits requiring sealants or interim therapeutic restorations, compared with visits when these services are not required. This combined care delivery and reimbursement model aims to promote value by improving dental outcomes and reducing dental expenditures. Specifically, the model aims to increase the rate of delivery of preventive services and decrease the occurrence of cavities requiring treatment.

Accurately defining and measuring all direct and indirect costs associated with providing services through the New Hampshire dental pilot is fundamental to developing a reimbursement rate for each dental visit that is sustainable for pilot sites and the state. If calculated accurately, the reimbursement rate could allow

clinics to focus on ensuring that patients receive all necessary services without fear of financial insolvency and without incentivizing clinics to provide excess services to any individual patient.

NEW HAMPSHIRE'S TIME-DRIVEN ACTIVITY-BASED COSTING APPROACH

The bundled encounter payment methodology described above seeks to improve the ratio of health outcomes achieved to costs expended, but this ratio cannot be measured reliably without accurately determining service costs.[1] Determining service costs can be particularly challenging in an alternative care delivery setting, such as New Hampshire's WIC clinics, where a baseline understanding of program costs is lacking. This limited knowledge inhibits the potential effectiveness of traditional costing methods. Cost-to-charge ratios and relative value units rely on a known link between costs and corresponding charges or standardized measures of service complexity that are not known for this clinical site and context. Instead, New Hampshire has used TDABC as the foundation for its costing approach.

Developed in 2004[2] and posited as a method to enhance value in health care in 2011,[3] TDABC focuses on answering two questions: (1) how much time does it take to perform a service or activity? and (2) how much does that time cost? TDABC answers these questions by deriving two parameters or input variables for each of the seven services that constitute the care delivery bundle:

1. **Estimated Unit Times of Activities**: New Hampshire estimated the number of minutes that the dental hygienist, dental assistant, and WIC administrative staff spent on each of the seven dental services offered at the clinic.
2. **Cost per Time Unit of Capacity**: New Hampshire used staff salaries and hourly reimbursement rates to calculate the per minute cost of providers and WIC administrative staff.

These two variables can be used to estimate the cost of care delivery, regardless of setting, service, or provider type. Because of this flexibility, the TDABC approach has gained traction in recent years as a method for identifying the costs to providers of delivering care in accordance with value-based care models. The approach also has the advantage of easily quantifying savings achievable through time-saving process improvement.[4] New Hampshire also uses a third variable—the probability that a patient will receive each of the services at a given visit—to calculate the average cost to deliver this care delivery bundle to a patient.

Using TDABC as the basis, New Hampshire developed a costing instrument (*cost worksheet*) in Excel with support from the IAP OHI VBP technical assistance team. A simplified version of this cost worksheet, with hypothetical data in place of actuals, accompanies this resource guide and is a useful resource for checking formulas and furthering one's understanding of the TDABC approach. The cost worksheet offers a systematic framework for breaking down the costs and services of the New Hampshire pilot into procedure times and labor costs per unit of time. Additionally, New Hampshire supplemented a traditional TDABC approach with supply costs and other factors to project anticipated costs of dental encounters at the WIC clinics. These cost projections then can be used to calculate a sustainable bundled encounter rate because the calculation shows the breakeven rate for the provider. When setting the encounter rate, state Medicaid agencies should

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[1] Porter ME, Teisberg EO. *Redefining Health Care: Creating Value-Based Competition on Results*. Boston, MA: Harvard Business School Press; 2006.

[2] Kaplan RS, Anderson SR. Time-driven activity-based costing. *Harvard Business Review*. 2004;82(11):131–138, 150.

[3] Kaplan RS, Porter ME. The big idea: how to solve the cost crisis in health care. *Harvard Business Review*. 2011;89(9):46–52.

[4] Keel G, Savage C, Rafiq M, Mazzocato P. Time-driven activity-based costing in health care: a systematic review of the literature. *Health Policy*. 2017;121(7):755–763.

determine whether they want to pay providers the exact breakeven cost; an incentive above this amount as a reward for providing all necessary care, if additional services (such as care coordination or enhanced data reporting) are required; or a slightly smaller amount, if the state is seeking to incentivize providers to reduce their own costs by delivering care more efficiently. Instructions for using the cost worksheet are outlined below.

New Hampshire applied the TDABC approach to a bundled payment model. However, the flexibility of the approach makes the costing method useful to implementing many potential models across the Health Care Payment Learning & Action Network Alternative Payment Model Framework, such as pay-for-performance models that pay incentives to providers who meet quality and outcome goals, or "clinical episode payment models in which providers are accountable for patients over a set period of time and across multiple care settings."[5]

Cost Worksheet Instructions

These instructions organize the cost worksheet into four distinct sections that correspond to the steps needed to produce the TDABC estimate:

Step 1: Procedure Times

Step 2: Labor Costs

Step 3: Other Data Needed to Compute Costs (e.g., supply costs)

Step 4: Procedure Costs and Bundled Rate: Putting It All Together

The purpose of this instructional guide is to provide detailed instructions on how to calculate TDABC estimates using the corresponding cost worksheet. These instructions provide a step-by-step explanation for that worksheet, which is a simplified version of the one that was used for the New Hampshire dental pilot. We also provide instructions using a generic template that could be used as a basis for similar VBP initiatives. Each step's instructions contain the following:

- A table with a sample template that corresponds with the Excel workbook's Cost Worksheet Blank Template tab
- A table with each step's New Hampshire example that corresponds with the Excel workbook's Cost Worksheet Example tab

STEP 1: PROCEDURE TIMES

The first section of the cost worksheet helps solve for the first parameter needed for TDABC: how much time do personnel spend on each service or activity? The goal for this section of the cost worksheet is to attribute a time to each service or activity being costed. Table 1A is a sample table that includes the same categories as the New Hampshire example in Table 1B but allows for states to customize while using the same methodology for a different clinical service bundle. The example in Table 1B includes columns that list each service, a description of each service, and the time spent by all personnel contributing to each service for the New Hampshire dental pilot. It is important to note that these are estimated times that are included only for reference. Explanations for select inputs are provided in Table 1A.

[5]Health Care Payment Learning & Action Network. *Accelerating and Aligning Clinical Episode Payment Models*. August 1, 2016. http://hcp-lan.org/workproducts/cep-factsheets.pdf

Instructions for Step 1

Instructions on how to populate each of the columns in Table 1A and 1B are provided below:

- **Service:** This column provides the discrete clinical procedures or activities for which the cost of delivery will be estimated. To populate this column, list the services of interest.
- **Description:** For services that are not delivered to the entire mouth, provide a brief description of how many teeth are treated using the procedure on average to ensure accurate estimation of average personnel time required for treatment and other details regarding what is included within the service.
- **Dental Personnel Time:** These columns list average or estimated service times in minutes for dental clinic providers (e.g., dental hygienists, dental assistants, dentists, and administrative staff) for each available service. Average times are useful because they account for variation in personnel time required for each service, such as when the patient may not be accustomed to oral health care. Refer to the service description to determine whether the time listed corresponds to the time spent for a specific number of teeth, the whole child, or another unit of measure.
- **Administrative/Nonclinical Time:** This row includes estimates for nonclinical time spent by dental providers and WIC administrative staff. To calculate a sustainable reimbursement rate, the cost estimate must include costs for dental procedures and indirect administrative activities.

Table 1A. Service and Nonclinical Time Spent by Oral Health Staff on Clinical Services

Service	Description	Dental Personnel Time, Minutes - Clinical Personnel #1	Dental Personnel Time, Minutes - Clinical Personnel #2	Dental Personnel Time, Minutes - Clinical Personnel #3
Clinical Service #1	This column should describe the amount of the clinical service provided on a typical office visit.	X	X	X
Clinical Service #2	Service description	X	X	X
Clinical Service #3	Service description	X	X	X
Administrative/nonclinical time, minutes/day	For example, billing, completing electronic dental record	X	X	X

Note: X indicates where data will be manually entered or populated by a formula.

As mentioned above, Table 1B summarizes New Hampshire's data and corresponds with the Excel workbook's Cost Worksheet Example tab.

Table 1B. Service and Nonclinical Time Spent by New Hampshire's Dental Personnel (illustrative example, not real data)

Clinical or Administrative Service	Description	Dental Personnel Time, Minutes - Dental Hygienist	Dental Personnel Time, Minutes - Dental Assistant	Dental Personnel Time, Minutes - General WIC Administration
Dental sealant	This service is used to isolate tooth/teeth, apply sealant, check bite.	15	15	N/A

Clinical or Administrative Service	Description	Dental Personnel Time, Minutes - Dental Hygienist	Dental Personnel Time, Minutes - Dental Assistant	Dental Personnel Time, Minutes - General WIC Administration
Silver diamine fluoride	On average this service is provided for 2 pits/ fissures, 2 carious lesions.	10	10	N/A
Toothbrush prophylaxis	This service is provided to the whole mouth.	5	5	N/A
Interim therapeutic restoration	On average this service is provided for 2 pits/ fissures, 2 carious lesions.	15	15	N/A
Fluoride varnish	This service is provided to the whole mouth.	10	10	N/A
Dental screening	This service is provided to the whole mouth.	5	5	N/A
Oral health education and anticipatory guidance	This service is provided to each patient.	5	5	N/A
Administrative/nonclinical time, minutes/day	For example, billing, completing electronic dental record	90	90	60

Abbreviations: N/A, not applicable; WIC, Women, Infants, and Children.

Note: All data included in this table are hypothetical.

Table 1B New Hampshire Considerations

- **Dental Hygienist/Dental Assistant Time:** On the basis of the state's familiarity with the New Hampshire dental pilot and its processes, New Hampshire used estimation to determine the service times, in minutes, for all personnel, for each service.
- **Administrative/Nonclinical Time:** Times were estimated for all activities associated with the New Hampshire dental pilot, which included daily nonclinical time for the hygienist and assistant (e.g., review of patient charts) and the daily time spent by WIC administrative staff dedicated to the dental pilot through billing, patient intake, and other activities.

STEP 2: LABOR COSTS

This section of the cost worksheet solves for the second parameter necessary for TDABC: how much does the time spent on these services/activities actually cost? It does this by calculating cost per time unit (in this case, cost per minute) for each type of personnel operating at the care site. Tables 2A and 2B and the explanations below demonstrate how the per minute costs are calculated—Table 2A provides a sample table that states can customize, and Table 2B provides sample calculations for the New Hampshire dental pilot. The columns in these tables use either hourly rates or salary and fringe costs as the starting point for each personnel type to calculate the respective cost on a per minute basis.

Instructions for Step 2

Instructions for how to populate each row in Tables 2A and 2B are provided below. A description of how to populate the tables in a generic resource guide is included as well as an example of how New Hampshire used these tables for purposes of comparison.

- **Annual Salary and Fringe:** This row should be populated with the annual salary and fringe benefit costs for salaried employees. In the New Hampshire example, this row applies only to WIC administrative personnel because dental hygienists and dental assistants in the New Hampshire dental pilot are not salaried.
- **Hours per Year:** For health care practitioners who are salaried or have an annual expected income, populate this row with the number of hours worked by these personnel each year. This number is needed to compute an hourly rate from the annual salary. For the New Hampshire dental pilot, the hourly rate for WIC administrative staff was calculated as follows:

  Annual salary and fringe costs ($50,000)/*Total hours per year* (2,000) = *Hourly rate* ($25.00).

- **Hourly Rate:** When employees are compensated on an hourly basis, states can enter the fully loaded (i.e., including benefits) hourly rate in this row and disregard the first two rows. For example, dental hygienists and assistants in the New Hampshire dental pilot work on a flat hourly rate, so this number was inserted into the table.
- **Practical Capacity:** Cells for practical capacity account for the fact that individuals are paid for a certain number of hours, even though 100 percent of their time at the clinic cannot realistically be spent on providing the dental activities being costed. Therefore, the practical capacity percentage increases the per minute cost of contributing personnel's time spent delivering services to reasonably account for breaks, training, communication, and other nonclinical activities. The percentage used for practical capacity can be determined through either observation or estimation. New Hampshire used its familiarity with the WIC program to estimate a practical capacity percentage of 80 percent, leaving 20 percent for breaks and so forth.[6]
- **Per Minute Rate:** Dividing the full capacity cost per minute (i.e., the cost if 100 percent of time were spent on services) by the practical capacity percentage yields the per minute rate. Determining this rate involves two steps (we use example data from the New Hampshire dental pilot to illustrate):
  1. *Full capacity cost per minute* (dental assistant) = *Hourly rate*/60 minutes = $25.00/60 minutes = $0.417.
  2. *Per minute rate* (dental assistant) = *Full capacity cost/practical capacity* = $0.417/80% = $0.521.

Table 2A. Average per Minute Cost for Dental Personnel

Resource	Dental Personnel - Clinical Personnel #1	Dental Personnel - Clinical Personnel #2	Dental Personnel - Administrative Staff
Annual salary and fringe, $	If applicable	If applicable	If applicable
No. of hours per year	If applicable	If applicable	If applicable
Hourly rate, $a	X	X	X
Practical capacity, %	X	X	X
Per minute rate, $	X	X	X

[6] See Kaplan RS, Anderson SR. Time-driven activity-based costing. *Harvard Business Review.* 2004;82(11):131–138, 150.

Note: X indicates where data will be manually entered or populated by a formula.

[a] Compute by either (1) dividing annual salary and fringe by number of hours per year or (2) manually entering hourly rate.

Table 2B. Average per Minute Cost for WIC Personnel in New Hampshire State WIC Clinics (illustrative example, not real data)

Resource	Dental Personnel - Dental Hygienist	Dental Personnel - Dental Assistant	Dental Personnel - General Clinic Administration
Annual salary and fringe, $	N/A	N/A	50,000
No. of hours per year	N/A	N/A	2,000
Hourly rate, $	40.00	25.00	25.00
Practical capacity, %	80	80	80
Per minute rate, $	0.83	0.52	0.52

Abbreviations: N/A, not applicable; WIC, Women, Infants, and Children.

Note: All data included in this table are hypothetical.

STEP 3: OTHER DATA NEEDED TO COMPUTE COSTS (E.G., SUPPLY COSTS)

This section of the cost worksheet serves as a catch-all for costs that are not captured by the calculation of time costs but should reasonably be attributed to the activities/program being costed. In the case of the New Hampshire dental pilot, this analysis predominantly included both direct procedure supply costs and indirect general supply costs used by the program.

Instructions for Tables Step 3, Part 1

Procedure supply costs (see Tables 3A and 3B) are costs that can be linked directly to a specific billable procedure (e.g., the cost of silver diamine fluoride). General supply costs (see Tables 4A and 4B) are costs that are necessary to run the dental program but are not related to a specific service (e.g., the cost of gloves). Explanations for select cells are provided in Table 3A. Again, Tables 3A and 4A provide a blank table with guidance on how to populate, and Tables 3B and 4B provide an example from the New Hampshire dental pilot.

Table 3A. Direct Cost Estimates for Dental Procedure Supplies

Procedure	Estimated Supply Cost per Procedure, $
Procedure #1	Total cost of all supplies used during procedure
Procedure #2	Total cost of all supplies used during procedure
Procedure #3	Total cost of all supplies used during procedure

Table 3B. Direct Cost Estimates for Dental Procedure Supplies for New Hampshire's WIC Preventive Dental Care Model (illustrative example, not real data)

Procedure	Estimated Supply Cost per Procedure, $
Dental sealant	3.00
Silver diamine fluoride	1.00
Toothbrush prophylaxis	1.00
Interim therapeutic restoration	3.00
Fluoride varnish	2.50
Dental screening	1.00
Oral health education and anticipatory guidance	1.00

Abbreviation: WIC, Women, Infants, and Children.

Note: All data included in this table are hypothetical.

Instructions for Step 3, Part 2

- **Estimated per Patient Cost:** Per patient cost in Tables 4A and 4B (far right column) is calculated by dividing the cost per package by the number of units per package and then multiplying that value by the number of units per visit. For cases in which the number of units per patient per visit is given as a range, the average of that range is used as the multiplier. In Table 4B, an example from the New Hampshire dental pilot shows that the cost per single glove is calculated as $8.49 per package/50 gloves per package = $0.17 per glove. For each visit, between four and 12 gloves are used; therefore, one can assume that eight gloves are used per visit on average. The estimated per patient per visit cost is calculated as follows:

  *(Cost per package/units per package) * (Number of units per patient per visit) = Estimated per patient cost per visit* = 0.17*8 = $1.36.

Table 4A. Direct Cost Estimates for General Dental Supplies

General Clinical Supplies	Cost per Package, $	No. of Units per Package	No. of Units per Patient per Visit	Estimated per Patient Cost, $
Supply #1	X	X	X	X
Supply #2	X	X	X	X
Supply #3	X	X	X	X

Note: X indicates where data will be manually entered or populated by a formula.

Table 4B. Direct Cost Estimates for General Dental Supplies for New Hampshire's WIC Preventive Dental Care Model (illustrative example, not real data)

General Clinical Supplies	Cost per Package, $	No. of Units per Package	No. of Units per Patient per Visit	Estimated per Patient Cost, $
Gloves	8.49	50	4–12	1.36
Disposable mirrors	48.99	200	1	0.24
Microbrushes	11.99	100	1	0.12
Toothbrushes	48.18	72	1	0.67
Toothpaste	18.95	72	1	0.26
Floss	53.99	144	1	0.37
Cups	13.99	300	2	0.09
Cotton tip applicators	3.29	100	1–4	0.08
Tray covers	29.99	1,000	1	0.03
Masks[a]	12.49	50	2	0.50
Printer paper, sheets	6.00	500	1–3	0.02

Notes: All data included in this table are hypothetical.

[a] The Centers for Disease Control and Prevention guidance for dental services in light of COVID-19 is here: https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html.

STEP 4: PROCEDURE COSTS AND BUNDLED RATE: PUTTING IT ALL TOGETHER

To review, this resource guide has demonstrated how to create the building blocks for a TDABC estimate in the first three steps of this process. Those building blocks are as follows:

1. The time it takes for clinicians and other personnel to perform the activities that are being costed (e.g., dental services and administrative activities)
2. The per minute cost of time spent for each participating person
3. Additional costs that need to be included to accurately assess the costs of delivering a service (e.g., direct and indirect supply costs)

This section of the cost worksheet is designed to show how to assemble these building blocks into a fully costed estimate. At its most basic, this estimate can be calculated using the following formula:

Cost estimate for a service or activity = [*(Time, in minutes, to perform a service or activity) * (Cost per minute of contributing personnel)*] *+ Additional direct and indirect costs.*

In the case of New Hampshire and other states hoping to implement a bundled payment, the cost estimate is slightly more complex. The state began by estimating the cost of each individual service. However, because the state's goal was to implement a bundled payment, New Hampshire also needed to estimate the

cost of the bundle in its entirety. The process of going from individual service costs to total bundled costs is demonstrated in Tables 5A and 5B, and the cell explanations are provided below.

> *Calculation Note:* Tables 5A and 5B show how to cost a service bundle by adding together the full cost of each service and incorporating indirect administrative and supply costs on a per patient encounter basis. New Hampshire's actual costing approach, like most payers that are developing a bundled or episode-based payment, does not assume that every service is performed at each encounter. The result is that New Hampshire's actual determined encounter cost is significantly lower than what is shown in the illustrative Table 5B example.
>
> To cost a bundle of services that are not performed at each patient visit, states can use historical utilization data to generate probabilities that each individual service would be performed at a given encounter (e.g., if 10 percent of historical visits included a dental sealant, a 10 percent probability would be assigned to dental sealants in the cost worksheet). Once these probabilities have been generated for each service, they can be used to calculate a weighted average cost for each encounter (e.g., using the dental sealant example, 10 percent of the cost of a dental sealant would be incorporated into the weighted average encounter cost).

Instructions for Step 4

- **Dental Hygienist/Dental Assistant Cost:** Direct procedure costs for personnel are based on procedure times and resource costs. For each participating provider (e.g., dental hygienist, dental assistant) the cost for each service is determined by multiplying the procedure time by the per minute capacity rate. For example, using the data from Tables 1B and 2B, we can calculate the value in Table 5B. Therefore, the cost of a dental hygienist's work performing a dental sealant in Table 5B is calculated as follows:

  Dental sealant cost for a dental hygienist = 15 minutes * $0.833 per minute = $12.50.

  This calculation was performed for each service for both dental hygienists and dental assistants in Table 5B.

- **Supply Costs:** Supply costs listed in each service row refer to the direct procedure supply costs. For the example in Table 5B, the data are taken from Table 3B.

- **Total Direct Costs:** Total direct costs are calculated by adding all of the values across each row. For example, in Table 5B, the direct cost for dental sealants are calculated as follows:

  Direct dental sealant cost = *Dental hygienist cost* ($12.50) + *Dental assistant cost* ($7.81) + *Supply cost* ($3.00) = $23.31.

  This calculation is performed for each service. The direct costs for each service are added together to calculate the total bundled service cost if all services are performed ($100.52). New Hampshire uses probabilities for this calculation because not every service is provided at each visit; thus, New Hampshire's total bundled service cost is slightly lower.

As discussed at various points in this guide, the full costing of the dental program should also include the costs of indirect nonclinical administrative time, as well as the cost of general supplies not directly linked to a service. These costs are captured in the Supplies and Administration section of Tables 5A and 5B and are broken down row by row below:

- **General Clinical Supplies Costs:** The general supply costs per procedure (for New Hampshire, $3.76) are calculated by adding together all of the general dental supply costs from Tables 4A and 4B. Because the supply costs in Tables 4A and 4B were estimated per patient encounter, the entire amount can be added on top of the direct service costs. Please note that, although the values in the

columns in Table 4B with estimated per patient costs appear to sum to $3.74, the total for general clinical supplies shown in Table 5B ($3.76) is accurate. The apparent discrepancy (and discrepancies in subsequent calculations) is due to the rounding of the elements in Table 4B.

- **Number of Patients per Day:** Although these are indirect costs, it is necessary to incorporate them into the cost on a per patient encounter basis to accurately estimate the cost of the bundle. From the New Hampshire example, because the nonclinical administrative time of personnel at the WIC clinic in Table 1B, for example, was provided on a per day basis, one needs an estimate of how many patients are seen per day to attribute nonclinical administrative time to the cost of providing a bundle. Historical experience can be used to estimate this number.
- **Additional Costs per Day:** This amount was calculated for each personnel type by multiplying *Administrative/nonclinical time, minutes per day* by the *Per minute rate*. For the New Hampshire example, the additional costs per day for dental hygienists were calculated using data from Tables 1B and 2B using the following formula:

  Additional costs per day, dental hygienist = 90 minutes * $0.833 = $75.00.

- **Cost per Patient:** This amount is calculated by dividing *Additional costs per day* by the number of patients per day, which we assume for New Hampshire to be 10 patients per day. *Additional costs per patient, dental hygienist* = $75.00/10 patients per day = $7.50.
- **Total General Supply and Administration Cost per Patient:** This row simply organizes the *Cost per patient* for each personnel type and the *General clinical supply costs per patient encounter* on a single row. The exception to this is the Total Direct Cost column, which, similar to the Clinical Services section of Tables 5A and 5B, adds together the values from each cell in the row:

  Total general supply and administrative costs per patient = $7.50 + $4.69 + $3.13 + $3.76 = $19.07.

- **Total Cost per Patient Encounter (or bundle)** is calculated by adding the *Total bundled service cost* to the *Total general supply and administrative costs per patient*. An example using data from New Hampshire to calculate the value in Table 5B is below:

  Total cost per patient encounter (or bundle) = $100.52 + $19.07 = $119.59.

Once the total cost is calculated, a state should determine whether it wants to pay providers the exact cost required to provide all services; an incentive above this amount, if additional services (such as care coordination or enhanced data reporting) are required; or a slightly smaller amount, if the state is seeking to incentivize providers to reduce their own costs by delivering care more efficiently.

Table 5A. Calculation of the Time-Driven Activity-Based Cost Estimates: Procedure Costs and Bundled Rate

Unit	Procedure Cost, $ for Clinical Personnel #1	Procedure Cost, $ for Clinical Personnel #2	Procedure Cost, $ for Administrative Staff	Procedure Cost, $ of Supplies	Procedure Cost, $ - Total Direct Cost
Clinical Service	N/A	N/A	N/A	N/A	N/A
Service #1	X	X	X	X	X
Service #2	X	X	X	X	X
Service #3	X	X	X	X	X
Total bundled clinical service cost	X	X	X	X	X

Unit	Procedure Cost, $ for Clinical Personnel #1	Procedure Cost, $ for Clinical Personnel #2	Procedure Cost, $ for Administrative Staff	Procedure Cost, $ of Supplies	Procedure Cost, $ - Total Direct Cost
Administration	N/A	N/A	N/A	N/A	N/A
General clinical supplies (calculated from Table 4A)	X	X	X	X	X
Additional cost/day	X	X	X	N/A	X
Cost per patient (cost/day ÷ 10 patients[a])	X	X	X	N/A	X
Total general supply and administrative costs per patient	X	X	X	X	X
Total cost per patient encounter (or bundle)	N/A	N/A	N/A	N/A	X

Note: X indicates where data will be manually entered or populated by a formula.

[a] It is assumed that 10 patients receive services per day on average.

Table 5B. Calculation of the Time-Driven Activity-Based Cost Estimates for New Hampshire's WIC Dental Program: Procedure Costs and Bundled Rate (illustrative example, not real data)

Unit	Procedure Cost, $Dental for Hygienist	Procedure Cost, $Dental for Dental Assistant	Procedure Cost, $Dental for General Clinic Administration	Procedure Cost, $Dental of Supplies	Procedure Cost, $ - Total Direct Cost
Clinical Services	N/A	N/A	N/A	N/A	N/A
Dental sealant	12.50	7.81	N/A	3.00	23.31
Silver diamine fluoride	8.33	5.21	N/A	1.00	14.54
Toothbrush prophylaxis	4.17	2.60	N/A	1.00	7.77
Interim therapeutic restoration	12.50	7.81	N/A	3.00	23.31
Fluoride varnish	8.33	5.21	N/A	2.50	16.04
Dental screening	4.17	2.60	N/A	1.00	7.77
Oral health education and anticipatory guidance	4.17	2.60	N/A	1.00	7.77
Total bundled service cost	N/A	N/A	N/A	N/A	100.52
Administration	N/A	N/A	N/A	N/A	N/A
General clinical supplies (calculated from Table 4B)	N/A	N/A	N/A	3.76	N/A
Additional cost/day	75.00	46.88	31.25	N/A	153.13
Cost per patient (cost/day ÷ 10 patients[a])	7.50	4.69	3.13	N/A	15.31
Total general supply and administrative costs per patient	7.50	4.69	3.13	3.76	19.07
Total cost per patient encounter (or bundle)	N/A	N/A	N/A	N/A	119.59

Abbreviation: NA, not applicable; WIC, Women, Infants, and Children.

[a] It is assumed that 10 patients receive services per day on average.

Note: All data included in this table are hypothetical.

Final Considerations

TDABC is a flexible costing approach that can be used to build cost estimates systematically for a variety of dental and/or medical procedures and activities. This resource guide is intended to provide a snapshot of how New Hampshire used this costing approach to build the basis for a sustainable reimbursement methodology for its preventive dental service pilot program at select WIC sites. Additional detail regarding New Hampshire's approach is available in the cost worksheet (corresponding Excel workbook), which contains the formulas used and additional explanations for the worksheet's inputs and outputs. This resource guide, in conjunction with the cost worksheet, may serve to assist Medicaid agencies and alternative care delivery sites in finding ways to estimate the cost of VBP pilots or other care delivery models under consideration.

Additional information about this initiative and resources developed around technical assistance provided are available on the Medicaid IAP Value-Based Payment and Financial Simulations web page: **https://www.medicaid.gov/state-resource-center/innovation-accelerator-program/iap-functional-areas/value-based-payment/index.html**. Additional information on the OHI is available on the Medicaid Dental Care Benefits web page: **https://www.medicaid.gov/medicaid/benefits/dental-care/index.html**.