

An Economic Study of Expanded Duties of Dental Auxiliaries in Colorado

This document highlights some of the information contained in the full report. Readers are encouraged to refer to the full report which is available as a free download to all at: <http://www.ada.org/goto/economics>.

Background

This study, approved by the ADA Board of Trustees, began in 2006 and built upon a previous (non-ADA) Colorado productivity study. The main objectives of this study were to assess the effects of delegation on dental output (measured by gross billings, dental visits and value-added) and efficiency of general dental practices in Colorado.

Colorado was chosen as the site for the study because the range of procedures that can be delegated is among the most comprehensive in the U.S., and the state has permitted these forms of delegation for several years, so those practices that delegate have had time for that style of practice to be fully integrated into their operations.

Respondents of the previous study who had indicated that they

“would be willing to consider phase 2 participation” were identified and surveys were sent out to a total sample size of 403. The total number of respondents was 164. After accounting for dentists who were retired, deceased, not in private practice, and not locatable, the adjusted response rate was 43%. The survey responses were reviewed for completeness and consistent entries. This process yielded 154 general dental practices with usable data.

Characteristics of Practices

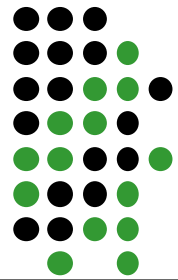
Two questions on the survey instrument dealt with delegation. In one question, dentists were asked if they currently use, or at one time used, expanded function auxiliaries in their primary practice locations. Almost two-thirds (63.6%) of the respondents delegated some activities to their auxiliary staff.

Do you currently use, or at one time used, expanded function auxiliaries in your primary practice location?

	Number	Percent
Yes, currently use	98	63.64%
Yes, once used but have discontinued	17	11.04%
No, never used	39	25.32%

The categories of “Yes, once used but have discontinued,” and “No, never used” were combined to indicate no delegation. The differences between the two groups (delegation=yes and delegation=no) were statistically significant for a number of

HIGHLIGHTS



Special points of Interest:

PRODUCTIVITY AND EFFICIENCY

✓ *Productivity* generally refers to output per unit of some input (e.g., gross billings per dentist or per hour of dentist time), or output relative to some index of input use (e.g. visits per dollar of total cost, where total cost is interpreted as a price-weighted measure of input use).

✓ *Technical efficiency* refers to the producer’s ability to achieve the highest attainable output from a particular mix of inputs, given the current “technology” of production. This approach translates into the analysis of efficient combinations of staff and equipment.

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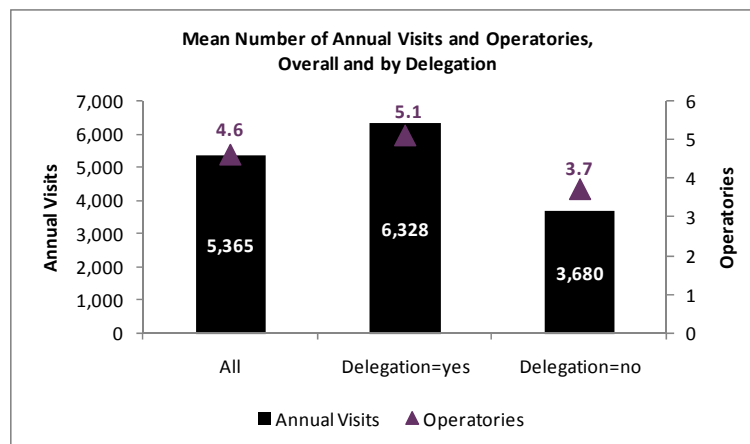
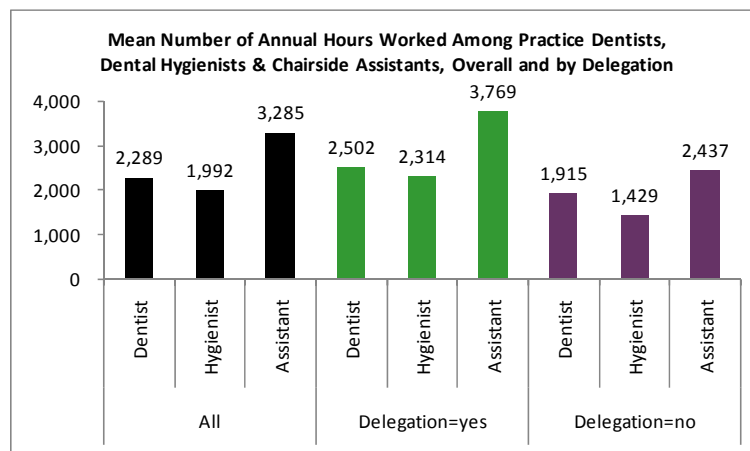
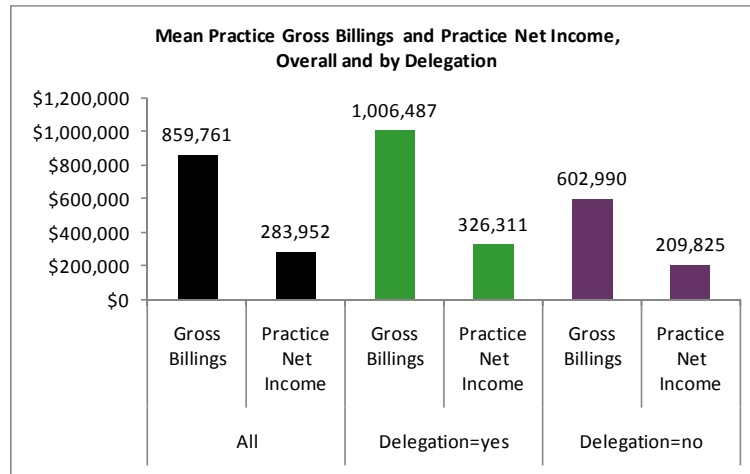


practice characteristics including gross billings; practice net income; hours worked by dentists, dental hygienists, chairside assistants; annual visits; and number of operatories.

Based on the qualitative (yes/no) measure of delegation, the mean gross billings and practice net income were higher among dentists who answered “yes, currently use” expanded function auxiliaries in the primary practice location (i.e., delegation=yes).

Similarly, the hours worked per year of dentists, dental hygienists and chairside assistants were higher among the “delegation=yes” group.

The mean number of operatories was 5.1 for those who answered yes (i.e., delegation=yes) compared to 3.7 for those who did not. Those who answered yes had an average of 6,328 annual visits compared to 3,680 visits among those who did not.



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Special points of Interest:

VALUE-ADDED

✓ Value-added is defined as the dollar value of dental practice output (gross billings) minus the dollar value of inputs purchased from other firms (in this study the dollar value of these inputs consists of lab expenses and dental supplies).

MEAN NUMBER OF DENTISTS PER PRACTICE

✓ Overall, the mean number of dentists per practice was 1.6, and the distribution was as follows:

Number of Dentists	Frequency	Percent
1	102	66.2%
2	33	21.4%
3	11	7.1%
4	3	16.9%
5	3	1.3%
6	2	12.3%
Total	154	100%

Among dentists who answered “yes, currently use” expanded function auxiliaries in the primary practice location—i.e., “delegation=yes”—the mean was 1.7 dentists and among the “delegation=no” group, the mean was 1.3.

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Aside from the qualitative measure of delegation (i.e., “yes/no” to the question of “do you currently use expanded function auxiliaries”), in a separate detailed question, dentists were asked of all the times specific procedures/activities were performed, approximately what percentage were delegated to chairside assistants or dental hygienists. The results are presented below by category of procedure/activity.

Mean Percentage Level of Delegation by Procedure/Activity

Diagnostic/Preventive/Adjunctive	
Take PA or BW radiographs	95.93%
Take panoramic radiographs	97.96%
Provide prophylaxis	91.69%
Place occlusal sealant(s)	66.88%
Administer topical fluoride	97.48%
Apply fluoride varnish	94.24%
Take and pour alginate impressions	87.82%
Take PA or BW radiographs	95.93%
Take panoramic radiographs	97.96%

Fixed Prosthodontics	
Place cord for a C&B impression	52.91%
Take final C&B impression	37.10%
Make temporary crown	70.70%
Cement temporary crown	69.19%
Remove temporary crown	68.21%
Adjust permanent crown before cementation	48.28%
Cement permanent crown	32.97%
Initial placement/adj of stainless steel crown	23.33%
Cement stainless steel crown	35.95%
Make temporary bridge	67.53%
Cement temporary bridge	70.80%
Remove temporary bridge	66.75%
Adjust permanent bridge before cementation	43.21%
Cement permanent bridge	28.64%

Other	
Adjust orthodontic appliance	27.50%
Place or remove orthodontic brackets/wires	45.95%
Local anesthesia	17.53%
Perform brush biopsy	23.00%

Operative, Primary and Permanent Teeth	
Place wedge/matrix for amalgam	33.67%
Place/finish amalgam (1 surface)	38.24%
Place/finish amalgam (2+ surfaces)	36.23%
Place/wedge matrix for composite	35.89%
Place/finish anterior composite	37.97%
Place/finish posterior composite (1 surface)	38.38%
Place/finish posterior composite (2+ surface)	34.04%
Place temporary filling material	46.08%

Removable Prosthodontics	
Take preliminary RPD impression	80.03%
Take final RPD impression	48.39%
Try RPD framework in mouth	30.32%
Take preliminary CD impression	74.57%
Take final CD impression	35.72%
Take records for CD	29.11%
Adjust RPD or CD	36.69%
Rebase, reline, or repair denture	36.53%

Periodontics	
Place subgingival medicaments	75.02%
Scaling, root planing, and/or curettage	90.30%

Endodontics	
Medicate root canal	9.93%
Obturate root canal	1.32%

Oral Surgery	
Place suture	0.24%
Remove suture	45.91%

Special points of Interest:

THE QUESTIONNAIRE

✓ The questionnaire for this study was prepared in 2005/2006. Since then, there have been changes in the scope of services that can be provided by dental hygienists and chairside assistants. Those changes and any future changes are not part of the quantitative analysis of this study.

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Based on the answers regarding percentage of procedures/activities delegated—excluding those falling under the category of diagnostic/ preventive adjunctive services because almost all sampled practices delegated these procedures—two overall indices of delegation were created.

The first index is a **simple average**, with a mean value of 31.43%. The frequency distribution of this index is as follows:

Percent of Functions Delegated	Percent of Practices
Less than 15.00%	20.1%
15.00% - 24.99%	20.8%
25.00% - 34.99%	18.8%
35.00% - 44.99%	16.9%
45.00% - 54.99%	11.1%
55.00% and Over	12.3%

The second index is a **weighted average** (the weights being the shares in gross billings of category of services), with a mean value of 24.05%. The frequency distribution of this index is as follows:

Percent of Functions Delegated	Percent of Practices
Less than 15.00%	46.8%
15.00% - 24.99%	19.4%
25.00% - 34.99%	7.8%
35.00% - 44.99%	7.8%
45.00% - 54.99%	7.8%
55.00% and Over	10.4%

The specific expanded services delegated are mainly associated with restorative and prosthetic services. For example, about 35% of amalgam placement and finishing procedures were delegated to auxiliary staff (among about 50% of all practices). An even larger percentage of practices had auxiliary staff placing and adjusting temporary crowns and bridges. Approximately 43%

of practices had auxiliary staff cementing and adjusting permanent crowns and bridges. Likewise, a large percentage of tasks associated with removable dentures were delegated to auxiliary staff. Examples include final RPD impressions (48.4%) and adjusting RPDs (36.7%).

Of particular interest is the fact that many practices delegated critical steps in the construction of fixed and removable prostheses. These include final impressions for crowns and partial and full dentures and the cementation and adjustment of permanent crowns and bridges. This suggests that properly trained and supervised auxiliaries can provide these services effectively and at lower cost to the practice. Of course, this is conjecture, and more detailed studies are needed to assess the impact of delegation on the cost and quality of care.

Special points of Interest:

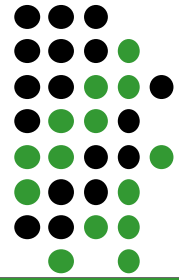
COBB-DOUGLAS PRODUCTION FUNCTION

✓ A production function describes the technical relation between the output of a firm and the production factors used to produce it—i.e., it predicts how output will vary when different amounts of various inputs are utilized. A general Cobb-Douglas production function is: $Q=aL_1^bL_2^y$. In this formula, Q is output; L1 is labor input 1; L2 is labor input 2; “a” is the overall output factor of the two labor units (it is a positive constant); and the relative productivity of the two labor inputs determines the values of the exponential factors b & y.

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HIGHLIGHTS



Findings

□ Production

Using three different measures of output (gross billings, visits and value-added), a total of twelve Cobb-Douglas production function specifications (excluding and including – separately – three measures of delegation as an input) were estimated. All estimated coefficients were positive and statistically significant at conventional levels of significance. In addition, the sum of the estimated input coefficients with and without the delegation exceeded the value of one (and the difference was statistically significant) indicating increasing returns to scale. With respect to delegation, the estimates from the Cobb-Douglas regressions indicated that delegation in general, as well as delegation of specific procedures/activities to dental hygienists and assistants, has an important effect on gross billings, patient visits and value-added.

□ Efficiency

Similarly, delegating specific procedures/activities to dental hygienists and assistants has an important effect on the clinical (technical) efficiency of a general dental practice based on gross billings. For example, the efficiency scores of those with a simple delegation index of 80% were on average 14.62% higher than those with a simple delegation index of 0%.

□ Income

One of the most powerful effects of delegation seems to be on practice net income. The average difference in net income was over \$100,000.

Policy Implications

This study suggests that private general dental practices can substantially increase gross billings, patient visits, value-added, efficiency and practice net income with the delegation of more duties to auxiliaries—assuming sufficient quantity demanded of dental care services. This is an important issue as the nation addresses the problem of access disparities.

From both a professional and community perspective, it may be more effective and less costly to channel additional resources into training dentists to practice more efficiently than to simply increase the number of dentists. Yet, current trends are moving in the opposite direction. This is an important health policy issue that warrants immediate but careful attention.

Special points of Interest:

RETURNS TO SCALE

✓ A production function exhibits constant returns to scale when any equi-proportionate change (increase or decrease) in all inputs also results in exactly the same proportionate change in the output. Diminishing returns to scale occur when the proportionate increase in output is lower than the proportionate increase in inputs. Increasing returns to scale occur when the proportionate increase in output is higher than the proportionate increase in inputs.

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