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.

<table>
<thead>
<tr>
<th>Do you currently use, or at one time used, expanded function auxiliaries in your primary practice location?</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, currently use</td>
<td>98</td>
<td>63.64%</td>
</tr>
<tr>
<td>Yes, once used but have discontinued</td>
<td>17</td>
<td>11.04%</td>
</tr>
<tr>
<td>No, never used</td>
<td>39</td>
<td>25.32%</td>
</tr>
</tbody>
</table>

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
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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.

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:

<table>
<thead>
<tr>
<th>Number of Dentists</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>102</td>
<td>66.2%</td>
</tr>
<tr>
<td>2</td>
<td>33</td>
<td>21.4%</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>7.1%</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>1.8%</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>1.8%</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>12.3%</td>
</tr>
<tr>
<td>Total</td>
<td>154</td>
<td>100%</td>
</tr>
</tbody>
</table>

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.
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%

#### 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%

#### 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%

#### 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%
- Obtrurate root canal: 1.32%

#### Oral Surgery
- Place suture: 0.24%
- Remove suture: 45.91%
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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:

<table>
<thead>
<tr>
<th>Percent of Functions Delegated</th>
<th>Percent of Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 15.00%</td>
<td>20.1%</td>
</tr>
<tr>
<td>15.00% - 24.99%</td>
<td>20.8%</td>
</tr>
<tr>
<td>25.00% - 34.99%</td>
<td>18.8%</td>
</tr>
<tr>
<td>35.00% - 44.99%</td>
<td>16.9%</td>
</tr>
<tr>
<td>45.00% - 54.99%</td>
<td>11.1%</td>
</tr>
<tr>
<td>55.00% and Over</td>
<td>12.3%</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Percent of Functions Delegated</th>
<th>Percent of Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 15.00%</td>
<td>46.8%</td>
</tr>
<tr>
<td>15.00% - 24.99%</td>
<td>19.4%</td>
</tr>
<tr>
<td>25.00% - 34.99%</td>
<td>7.8%</td>
</tr>
<tr>
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<td>7.8%</td>
</tr>
<tr>
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<td>10.4%</td>
</tr>
</tbody>
</table>

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 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.
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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.