Critical Issues in Dental Education

Financing Clinical Dental Education

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Abstract: Many reports have documented the growing financial challenges faced by dental schools. This article examines the financial implications of two new models of dental education: 1) seniors spend 70 percent of their time in community clinics and practices, providing general dental care to underserved patients, and 2) schools develop patient-centered clinics where teams of faculty, residents, and senior students provide care to patients. We estimate that the average dental school will generate new net revenues of about $2.7 million per year from the community-based educational programs for senior students and about $14 million per year from patient-centered care clinics. These are upper boundary estimates and vary greatly by school. The organizational and financial challenges of moving to these new educational models are discussed.

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The financial challenges facing dental schools have received a great deal of attention in the past few years. It is well documented that state and federal funding has declined substantially (inflation-adjusted dollars) for most schools and that community practitioner incomes are increasing at twice the rate of full-time clinical faculty salaries. In an earlier article, we reported that these financial problems were beginning to have a negative impact on state-supported school operations in terms of faculty staffing patterns, diversity of the student body, investment in physical plants, and faculty scholarship. Further, we projected that if the financial trends of the past ten years continue for the next ten, many schools will have serious problems maintaining the quality of their educational programs and meeting the scholarship mission of research-extensive universities.

There are no easy solutions to these financial problems. Federal and state funding for dental education is unlikely to increase substantially in the next five to ten years. Federal funding is already declining (either reduced rate of increase or absolute cuts) for biomedical research, Medicaid, safety net clinics, and underrepresented minority health professional student scholarships. Further, the large and growing national debt and rapidly rising health care expenditures will continue to strain public budgets. We doubt that large increases in public resources will become available for health professions education within the foreseeable future.

Although most schools are likely to continue to increase tuition by 5 to 6 percent a year and raise more funds from gifts, this will not solve the financial problems of most state-supported schools because tuition and gifts account for only a relatively small percentage of total revenues.

Since the majority of total school expenditures is related to the operation of clinical programs, schools have tried to operate their clinics more efficiently. State-supported schools have made some progress, increasing net revenues from patient care, but expenses have increased at almost the same rate (1994 to 2003).

In this article, we examine two other options for increasing the net revenues available to dental schools. First, building on the experience of the Pipeline, Profession, and Practice: Community-Based
Dental Education program, we estimate the financial impact of having senior dental students receive their general dentistry (or comprehensive care) clinic experience in community clinics and practices. In this model, community sites are not owned or managed by dental schools, and they have no financial risk in their operation. Likewise, schools receive no payment from the sites for revenues generated by students but are expected to lower their operating costs.

Second, we estimate the financial impact of transforming clinics owned and managed by schools into patient-centered operations, where faculty practice as they supervise residents and students. In this model, faculty and residents provide care using multiple operatories, staffed with types and number of allied dental health and administrative staff similar to private practices.

These two models are not mutually exclusive, and many schools may employ both strategies. However, in this study, we examine each model separately in its steady-state configuration. The transition costs, especially for patient-centered delivery systems, will be substantial and are only briefly discussed here.

**Description of Model Programs**

This section presents a brief description of the two models and reviews the limited literature on their effectiveness in meeting educational objectives, achieving financial goals, and providing care to underserved populations.

**Community-Based Education**

Almost all dental schools assign senior students to rotate through community clinics as part of their education; in 2003-04, we estimate that the median time senior students spent in these community rotations was eleven to fifteen days. (The American Dental Association’s most recent survey of predoctoral education reports that the total median hours of extramural patient care for junior and senior students was 179 hours. Assuming an eight-hour day, this comes to twenty-two days in total or eleven days for seniors.) The rationale behind these community assignments varies among schools, but is mainly educational: providing opportunities for students to treat a more diverse patient population in terms of age, income, race/ethnicity, medical/dental conditions, geography, etc. Some schools also use community assignments to supplement their available numbers of dental chairs and faculty.

The University of Colorado was the first dental school to make community-based education an integral part of its program. Colorado senior dental students spend at least six months of the year in community rotations in both clinics and private practices. Likewise, for many years, Harvard University dental students have spent most of their senior year doing clinical rotations in Boston area community clinics.

In 2002, the Robert Wood Johnson Foundation and the California Endowment granted funds for a demonstration project on the impact of community-based dental education on reducing disparities in access to dental care. Some fifteen schools are now participating in this program, the objective of which is to have senior students (and General and Pediatric Dentistry residents for the California schools) average sixty days in community clinics and practices, treating low-income patients. The rationale for this objective is that students are three to four times more productive in community clinics and practices than in dental school clinics. This is because they have access to trained dental assistants and administrative staff, and perhaps more importantly, the primary goal of community sites is the efficient delivery of high-quality patient care. This is decidedly different from most dental school clinics, which are organized as teaching laboratories, where students seldom see more than two or three patients a day and generate relatively little income annually. These clinics are very expensive to operate and require large subsidies.

Based on the Pipeline experience and other published reports, we can conclude that 1) many community sites will accept senior students and provide them the necessary clinical resources to provide care efficiently; 2) most senior students are more productive in these settings, averaging six to eight patients a day, during a multiple-week rotation; 3) community clinic dentists are able to provide adequate supervision of one or two students while treating a full panel of patients, if the student rotations are for at least a few weeks’ duration; 4) students report having positive experiences and are more self-confident and clinically productive when they return from the rotations; 5) community clinic dentists, staff, and patients are positive about having senior students; and 6) large numbers of underserved patients receive dental care.
Patient-Centered Care Education System

In this form of education, the primary goal of dental school clinics is patient care, and faculty practice in an integrated system with residents and senior students, following a private practice model. Medicine, nursing, and pharmacy have always educated their residents and students in patient-centered delivery systems. This is also the predominant system for training residents in oral and maxillofacial surgery.25

A few dental schools have specialty faculty and residents practice together in patient-centered clinics. Faculty generate substantially more clinical income than in traditional faculty practices, and reportedly, residents receive an excellent educational experience.26

In a historical examination of patient-centered clinics in dental education, Formicola et al. reported that the University of Pennsylvania ran an experimental clinic in the 1980s in which faculty, residents, and students practiced together.27 This experiment was successful educationally and was more cost-effective than traditional dental school clinics, but for complex reasons was not extended to the entire school. Several other schools have tried different strategies to operate their clinics more efficiently, but none has had faculty, residents, and students practice together, following the patient-centered model.

Methods

The methods used to estimate the financial impact of community-based dental education and patient-centered clinics are described as follows.

Community-Based Education Assessment Methodology

For this model, our financial estimates are based on the assumption that 70 percent of senior student clinical educational experiences are devoted to general dentistry and that all general dentistry training takes place in community clinics and practices. We expect that students will continue to receive specialty training in school-run specialty clinics, since few community sites provide specialty services.

To estimate the financial impact of senior students spending 70 percent of the year in community rotations, we used aggregate data from the 2003-04 ADA financial survey.28 Complete data was available on fifty-four schools.

Using the survey data, we determined clinic operating and clinic instructional expenses for residents (specialty graduate students and AEGD/GPR residents) and junior and senior students for each school. We assumed that these expenses were essentially the same for all three groups and obtained the average expense per provider. We multiplied expense per provider times the number of senior students and, then, multiplied this number by 70 percent. This calculation gave the reduction (savings) in clinic operating and instructional expenses when seniors spend 70 percent of their senior year in community rotations.

We determined the revenues generated by senior and junior students (excludes revenues from residents and faculty) and allocated 59 percent of these revenues to senior students, since seniors are known to generate more revenue than juniors.29 This number was multiplied by 70 percent. This estimate gave the expected loss of clinic revenues when senior students spend 70 percent of the year in community sites. We then subtracted the revenue loss from the estimated reduction in operating and clinic instructional expenses to get the net savings per school. This value was divided by total school expenses to get the percent net savings per school.

To determine the factors that explain the net savings per school, we used ordinary least squares regression. The dependent variable was net dollar savings per school, and the independent variables were total number of dental student equivalents (control for school size), public versus private (and private state-related) schools (the two types of schools have well-known differences in staffing patterns and operating efficiency),3 and the number of specialty residents and general dentistry residents (residents contribute to clinic operating and instructional expenses).

Patient-Centered Care Education Systems Assessment Methodology

The financial estimates are based on several assumptions about the operation of a patient-centered delivery system in a dental school clinical environment. We assume that one faculty member heads a team of two residents and two senior students. Working out of four operatories, faculty members treat patients while supervising residents and students. The faculty member is supported by one hygienist and four dental assistants. We further assume that the
two residents work closely with the faculty member and have access to the same number of operatories and allied dental health personnel. Also, as part of the core team, the two senior students each have one operatory and one dental assistant.

Since 50 percent of the clinical faculty are specialists in the average dental school, we assume that ten of the twenty teams of faculty, residents, and senior students are led by specialists. The facilities and allied health staff used per team member are portrayed in Table 1.

The average dental school has eighty students, forty-eight residents (excluding oral surgery and dental public health), sixty FTE clinical faculty (excluding oral surgery and dental public health), and 280 operatories allocated to residents and senior students. The number of FTE faculty assigned to third-year students is about twenty, leaving forty FTE faculty to supervise senior students and residents. Faculty have other responsibilities, so we assume that only 50 percent of their time is spent in clinical practice/teaching. This leaves twenty FTE faculty for clinical teaching. Likewise, we estimate that students and residents spend 30 percent of their time on activities outside the dental clinic. This leaves thirty-four FTE residents and fifty-six FTE students available to work in patient-centered clinics run by the school.

Within these physical and staffing constraints, twenty teams can operate at the same time. Open for at least 250 days per year, this means that twenty FTE faculty (general dentists and specialists), forty FTE residents, and forty FTE senior students are needed to operate the system. We assume schools will increase the number of residents to meet this staffing requirement. We also assume that seniors will spend some time in community clinic and practice rotations, since they can not all be accommodated in patient-centered dental school clinics. Some schools may have adequate facilities, faculty, residents, and staff to operate additional teams and could accommodate all the senior students in the patient-centered clinics. Finally, because seniors are in school for about eight months, they will not be present for all 250 days of clinic operations.

The expected net revenues generated per team FTE faculty member are a percentage of the revenues generated by private general dentists. In 2002-03, general practitioners had an average net income of $174,350. With an overhead of 68 percent, their gross income was $550,920. In the same year, specialists had gross and net incomes of $778,630 and $291,250, respectively, and overhead costs of 63 percent. Based on discussions with experienced clinical faculty, we estimate that faculty can generate 85 percent of the net income of full-time community practitioners with the same training. We assume that the remaining 15 percent is spent on instruction. This may underestimate faculty revenues, since in the Pipeline program, community dentists reported no loss of income when they supervised one or two senior students or residents, providing the rotations were for three or four weeks’ duration. Finally, we assume there is no separate faculty practice independent of residents and seniors.

The revenues generated by residents are calculated the same way. We assume that residents are 65 percent as productive as private practitioners in a given type of generalist or specialty office and that their productivity will be reduced by 10 percentage points because they assist in the supervision of senior dental students (one student per resident). Thus, on average, residents will be 55 percent as productive as private practitioners.

Senior students working with an assistant are expected to treat seven patients per day and generate an average of $40 per hour for a total of $280 per day. On an FTE basis, this comes to about $45,000, which should come close to covering the marginal expenses per FTE student, including the salary of a dental assistant, supplies, laboratory charges, etc.

This analysis assumes that faculty and residents treat full-pay patients. That is, patients are charged usual and customary fees for the geographic area whether services are provided by faculty members or residents. In contrast, we assume that senior student fees are reduced by about 50 percent from faculty/resident fees.

For the purpose of comparison with the traditional model of clinical dental education, we calculated the reported revenues of faculty (intramural practice), residents, and predoctoral students in the average dental school from the ADEA 2002-03 sur-

| Table 1. Number of operatories, hygienists, and assistants by type of dental provider |
|---------------------------------|------|-----|-----|
| Provider                        | Operatories | Hygienists | Assistants |
| Faculty (1)                    | 4    | 1   | 4   |
| Residents (2)                  | 8    | 2   | 8   |
| Senior Students (2)            | 2    | 0   | 2   |
| Totals                         | 14   | 3   | 14  |
vey data. As previously noted, we allocated 59 percent of predoctoral revenues to seniors. Expenses for intramural practice are reported separately, but clinic operating and instructional expenses are reported collectively for residents, seniors, and juniors. To estimate resident and senior expenses, we divided aggregate expenses by provider and multiplied by the number of residents and seniors.

Results

Community-Based Dental Education

Table 2 presents the estimated expenses, revenues, and net savings for fifty-four dental schools based on 2002-03 survey data. For the fifty-four schools, the average clinic instructional expense savings ($2.2 million) were greater than operating expense savings ($1.5 million). Clinic revenue loss was about $1 million and came to about $12,342 per senior student. The net savings per school were $2.7 million and represented 8.1 percent of total school expenses. The range for each of the variables in Table 2 was very large and reflected, in part, the substantial differences in class size among schools.

Table 3 gives the results of the regression analysis. State-supported schools averaged $0.78 million more in net savings than private schools when senior students spent 70 percent of their senior year in community clinics and practices. Schools with more dental students saved significantly more than schools with smaller enrollments. The number of specialty and general dentistry residents did not have a statistically significant effect on net savings.

Patient-Centered Clinics

Table 4 shows the estimated annual income generated by one generalist and one specialist team of faculty, residents, and senior students, based on 2002-03 data. Each FTE generalist and specialist faculty member generated net revenues of $148,198 and $247,563, respectively. The two teams of generalist and specialist residents each generated $191,786 and $320,376, respectively. The two seniors generated $90,000 in gross revenues but no net revenues. The combined annual net revenues for the generalist and specialist teams were $907,923.

For the average dental school, Table 5 presents gross revenues and expenses and net revenues. For the average school, the patient-centered model generated $27.7 million in gross revenues, $18.6 million in clinic operating expenses, and $9 million in net revenues. In contrast, under the traditional educational model (2002-03), clinic revenues and expenses generated by faculty, students, and residents averaged $6.2 million and $11.2 million, respectively. Thus, the average school had about a $5 million deficit from clinical operations (including faculty teaching time) that was

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ($ in thousands)</th>
<th>Std. Deviation ($ in thousands)</th>
<th>Range ($ in thousands)</th>
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<td>$522-$6,646</td>
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<td>$270-$3,247</td>
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<tr>
<td>Net Savings</td>
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<td>$317-$9,326</td>
</tr>
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<td>% Net Savings of Total Revenues</td>
<td>8.1%</td>
<td>2.6%</td>
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<table>
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<th>Variable</th>
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<td>General Dentistry Residents</td>
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Table 2. Estimated mean school expense savings, revenue loss, net savings, and percentage net savings when students spend 70 percent of the senior year working in community clinics and practices (fifty-four schools, 2002-03)

Table 3. Regression analysis to determine factors that explain the variation in net savings among fifty-four dental schools, when senior students spend 70 percent of the year in community clinics and practices, 2002-03
subsidized from other funds (e.g., tuition, state allocation, gifts). These data indicate that conversion to a patient-centered model can be expected to increase total net revenues available to the average school by about $14 million.

Discussion

The financial models presented in this article are limited by the amount and quality of data available. The annual surveys of dental school financial and educational operations obtained from the ADA and ADEA surveys have well-known problems. Specifically, schools may not respond to the survey questions the same way, and no effort is made by the survey group to assess the validity of the data reported by schools. Also, schools receive different types of cross-subsidies from their universities, and these are difficult to describe, measure, and allocate. For all these reasons, financial comparisons among schools must be drawn cautiously.

These limitations notwithstanding, the data used in the financial models is the only fiscal information on dental schools available. Also, using aggregate values across all schools provides more accurate and stable estimates of school financial operations than those based on any one school. Therefore, the results are probably reasonable estimates of the financial impact of the two new educational models.

The analyses indicate that the savings from community-based education are significant, but the overall financial impact is rather modest. The average school generated a net savings of $2.7 million; this represents an 8.1 percent gain in net revenues. The variation among schools in net savings was substantial. State-supported schools had greater savings on average than private schools ($0.8 million) because the former schools have higher operating costs than the latter schools. As expected, larger schools had larger absolute savings than smaller schools. The number of specialty and general dentistry residents did not have a significant impact on savings.

Relative to the magnitude of the financial challenges facing most dental schools, community-based dental education does not offer a total solution. That is, the annual increase in net revenues, $2.7 million, is not large enough to meet the growing revenue needs of the average dental school. This is especially true as the gap between private practitioner and faculty incomes continues to widen.

This strategy could be more financially attractive to schools if they received some payment for the services provided by senior students in community clinics. A few schools have negotiated payments from federally qualified health centers (FQHCs)
when residents and senior students are involved in the rotations.\textsuperscript{34} The feasibility of having partnerships between dental schools and FQHCs is now being explored with the U.S. Health Resources and Services Administration, since both schools and FQHCs could benefit from the association. With about 603 FQHCs nationally that provide dental care in 2004, these clinics could be an important training site for dental students and residents.\textsuperscript{35}

In contrast, the development of patient-centered clinics owned and operated by dental schools showed considerable financial promise. The estimated increase in total net revenues averaged about $14 million per school. Although there will be many demands on these funds, increasing support for full-time clinical faculty is critically important. Based on discussion with several medical and dental school deans, we believe that schools need to raise clinical faculty salaries to 70 percent of the incomes of comparable private practitioners. This is necessary to recruit and retain a full-time clinical faculty member who is adequately prepared, clinically and scientifically, for an academic career in a major research university. Based on 2002-03 data, sixty full-time clinical faculty need an additional $4 million in salary support to bring their incomes to 70 percent of comparable private practitioners. With an average clinical faculty (specialist and generalist average) income of $97,000 in 2002-03, the addition of $4 million per school would increase the average salary of full-time clinical faculty to $163,000.

We also suggest that schools cover the stipends ($40,000) and fringe benefits ($8,000) of residents. For forty FTE residents this comes to $1.9 million. Of course, in many schools GPR/AEGD and oral and maxillofacial surgery residents already have GME support, and in a few other schools, all specialty residents are covered by GME funds. In these schools, residents would not need additional support, and the funds could be used for other purposes.

Beyond faculty and residents, schools will have many other demands on new net revenues. Previous reports indicate that schools need to make greater investments in learning resources, physical facilities, and the curriculum and in moderating tuition increases.

Even though the $14 million is a large increase in total resources, schools that need more net revenues can increase the percentage of time clinical faculty spend providing care and teaching from the base of 50 percent used in this financial model. This strategy has obvious limits, since schools need faculty to cover other teaching assignments and committee activities and to have adequate time for their research and other scholarly activities.

Schools could also employ some dentists on a clinical (non-tenure) track and have them spend most of their time in patient care and clinical teaching. The net revenues generated by these faculty may be large enough to use a portion of it to cross-subsidize school programs. This strategy has been used by medical schools for many years. Close to 35 percent of medical school revenues come from patient care programs.\textsuperscript{36}

Thus, even though patient-centered clinics staffed by full-time faculty, residents, and senior students show considerable promise to address the financial challenges faced by most dental schools, variants of the proposed model program may be needed to further increase net revenues.

While financially promising, the capacity of schools to convert their existing patient care operations to patient-centered clinics is a large unknown. A few schools do have some experience with this model, but most involve teams of specialty faculty and residents working together. To our knowledge, none have integrated senior students into their operations or established patient-centered programs to deliver general dental care.

This suggests that the average school would require considerable effort to convert to a patient-centered clinical education model for seniors, residents, and faculty. Further, the increases in net revenues presented in the financial models represent an upper boundary estimate and is what could be achieved under ideal conditions. We would be surprised if many schools achieve the level of clinical operational efficiency reported in this article.

In addition, there are substantial capital costs to transition to a patient-centered model. Based on discussions with practice management consultants and dental school financial officers, we estimate that it may take from $500,000 to $1 million in capital investment per team to convert traditional dental school clinics into patient-centered practices. However, we also believe that about 14 percent of overhead costs generated in patient-centered clinics are available for long-term capital investment. This is about the percentage of private practice overhead used for capital investments and, therefore, should be available to schools. Also, schools can begin slowly to make this conversion, starting with a few faculty,
residents, and senior student teams and, then, over a period of ten years, fully implement the model.

Some of the barriers that schools face in converting to a patient-centered delivery system are easy to predict. They include convincing faculty and staff of the need to change to a new educational model, dealing with the constraints of state and/or university human resource policies that provide little flexibility in hiring and managing staff, recruiting faculty and staff who have experience running patient-centered delivery systems, having adequate numbers of full-pay patients, and dealing with concerns from local stakeholders such as community organizations and private practicing dentists. Of all these barriers, changing the mind-set of faculty and staff may be the most challenging.

Another important caveat concerns how increases in net revenues from the successful operation of patient-centered dental clinics are allocated. We assume that the additional funds will be used to strengthen dental school educational, research, and service programs. The reality is that declines in academic health center budgets are expected because of the slow growth in Medicaid and Medicare reimbursement rates. In this fiscal environment, any financial gains made by dental schools could be used to subsidize the operation of other health professions and educational programs. Further, some dental schools may have to pass the additional funds on to their parent universities. This is especially true for the few dental schools that are investor-owned.

Finally, this study has focused on the financing of dental education. Of equal importance is the impact of these models on the quality of educational programs. There is substantial evidence that well-run community-based dental education programs do provide excellent clinical experiences. As previously noted, many schools now have senior students spend from three to eight months in community clinic rotations.

Little is known about the impact of dental school patient-centered care programs on the quality of resident and senior student clinical education. However, since many other health professions and oral and maxillofacial surgery use patient-centered teaching programs, there is some reason to believe that dental schools would be successful, both educationally and financially, in converting to this new model of dental education. Indeed, the education of students and residents may be significantly better in a patient-centered model. In contrast to the current clinical education system, they will work with a team of experienced allied dental health personnel and administrators, learn how to deliver care in a real delivery system, and perhaps most importantly, have the opportunity to model their own clinical performance on clinical faculty who provide high-quality care efficiently that meets or exceeds patient expectations.

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