Community-Based Dental Education: History, Current Status, and Future

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Abstract: This article examines the history, current status, and future direction of community-based dental education (CBDE). The key issues addressed include the reasons that dentistry developed a different clinical education model than the other health professions; how government programs, private medical foundations, and early adopter schools influenced the development of CBDE; the societal and financial factors that are leading more schools to increase the time that senior dental students spend in community programs; the impact of CBDE on school finances and faculty and student perceptions; and the reasons that CBDE is likely to become a core part of the clinical education of all dental graduates.

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As part of the seventy-fifth anniversary issue of the Journal of Dental Education (JDE), this article focuses on the impact of community-based dental education (CBDE) programs on the organization and financing of dental education. Its objectives are to 1) describe the reasons that dentistry has a different clinical education model than other health professions and examine the influence of the traditional dental model on the organization and financing of dental education; 2) consider the history of CBDE, including the role of federal government incentives, schools that were early CBDE adopters, and the efforts of researchers to promote CBDE through foundation-funded demonstration programs; 3) review the current status of CBDE programs and assess the impact of CBDE on schools' finances and clinical education; and 4) examine the societal and educational factors that are likely to influence the future of CBDE.

Clinical Education Models

There are two major differences between the clinical education models used in dentistry and those in medicine and most other health professions. First, medical students receive their clinical training in the “real” delivery system: namely, hospitals and outpatient clinics that medical schools usually do not own. The primary goal of these clinical settings is the efficient delivery of high-quality care to patients rather than the education of students. In this educational model medical school faculty members generate a large part of their incomes (e.g., 50 percent) from providing care to patients as they supervise students and residents. Since medical schools do not usually pay hospitals for educating their students, the cost of clinical medical education is passed to the delivery system. Indeed, some 40 to 50 percent of medical school expenses are covered by cross-subsidies from faculty-generated patient care. Importantly, patient charges are all at the faculty rate, even though residents and students provide some of the care.

Second, medical schools expect (and most states require) graduates to spend another few years gaining clinical skills in hospital-based residency programs. As a result, they do not provide graduates interested in surgery the technical skills needed to open practices. Surgical skills are obtained in three or more additional years of residency training. Because technical training is provided after graduation, medical schools stress the basic and clinical sciences underlying the practice of medicine and depend on hospitals and, more recently, community health centers to provide residents the practical skills and applied knowledge.

The traditional dental clinical education model is decidedly different. Dental schools own and operate their own patient care clinics, and their primary goal is education. Accordingly, these clinics are organized as teaching laboratories rather than as efficient delivery systems. In this model faculty members do not practice as they supervise students. Instead, one clinical faculty member supervises six to eight students. Students rarely see more than one or two patients in a three-to-four-hour clinical session, and it takes many visits to complete comprehensive
treatment. To attract patients, schools set students’ fees 50 percent or more below fees charged by area private dental practitioners. With few patients and low fees, student-generated clinical income does not come close to covering clinic expenses (faculty, support staff, equipment, supplies, etc.).

Finally, about 50 percent of dental graduates do not go on for additional formal clinical training. Instead, the other half seek associateships with practicing dentists, join the armed forces/uniformed services, work in community clinics or other public health settings, or open their own practices. For this reason, all students are expected to graduate with a core set of technical skills and knowledge needed to practice general dentistry.

The traditional clinical dental education model has profound implications for the organization and financing of dental education:

1. The clinical model is expensive to operate and requires substantial subsidies from tuition, state funds, and gifts. This is the primary reason that dental students graduate with more educational debt than medical students.
2. Generally, schools are not able to provide students the opportunity to work in an efficiently run delivery system with experienced dental assistants, hygienists, and support staff.
3. Students have limited clinical experience. Most graduate having provided comprehensive care to fewer than ten patients and relatively few advanced services (e.g., bridge units, molar root canals, dental implants).
4. With the need to have graduates ready for practice, most schools emphasize clinical technique and routine dental procedures and spend relatively less time (vis-à-vis medical schools) on the basic and clinical sciences and advanced clinical procedures.
5. Most schools do not have the resources to pay clinical faculty members competitive (with private practice) salaries or to provide clinical faculty members the time, facilities, and other resources needed to develop strong research programs.

With all the limitations of the traditional system, why did dentistry develop a different clinical education model than medicine? There are two primary reasons. First, dental schools had little choice. Until recently, few large public and voluntary sector community or hospital dental clinics were available in which students could receive their clinical training. Almost all dental care was (and is) provided in solo or small-group private practices that do not have the capacity to train students. Second, dentistry expected students to enter general private practice at graduation, primarily because few hospitals offered advanced training in dental residency programs. Therefore, most participants in dental school-operated specialty training programs (e.g., periodontics and orthodontics) pay tuition rather than receive a stipend like medical hospital residents. Consequently, dental schools had to establish their own patient care clinics, and they had to run them as patient care teaching laboratories rather than as efficient delivery systems. Because dental students and postgraduate trainees rather than faculty members provide most of the care, it is difficult to operate an efficient delivery system. The exception to this general situation is oral and maxillofacial surgery, which follows the medical model of dental student and resident clinical education.

This clinical dental education model continues as the primary approach to dental student patient care training. However, in the last twenty years the traditional clinical education model faced a major new challenge and opportunity.

The major challenge was a marked decrease in public support for dental education. Starting in the early 1990s, state governments began to reduce educational subsidies to all health professions schools, and this decline in support was especially difficult for dental schools. In 1990, the average public dental school obtained 60 percent of its operating revenues from state educational subsidies. In 2009, the state subsidy declined to 20 percent of revenues and continues to fall. The traditional clinical education model worked reasonably well financially with the availability of large public subsidies. Without these subsidies, dental schools had difficulty supporting their clinical operations and meeting their other missions related to education, research, and service.

The opportunity for dental schools was the development of the dental safety-net system. The system consists of public and voluntary sector community clinics that provide dental care to underserved populations. The main types of safety-net dental clinics are associated with Federally Qualified Health Centers (FQHCs), the Indian Health Service (IHS), county and municipal governments, hospitals, public schools, and dental societies. The dental safety-net has the capacity to serve some 10 million patients per year out of the close to 90 million Americans with incomes below 250 percent of the federal poverty level. This low-income population has limited access to dental care (<35 percent have a dental visit
annually) and poor oral health compared to privately insured, affluent groups. The safety-net system has grown substantially under the past two presidential administrations and is expected to continue to grow for the foreseeable future. So far, the current economic downturn has not slowed growth in the number and capacity of community dental clinics. However, the impact of further cuts in dental safety-net clinic budgets remains to be seen.

This is an opportunity for dental education because these community clinics are potential training sites for dental students and residents. Although most clinics have five or fewer dental operatories, some are large enough to accept one or two students/residents. Many dental schools are now developing partnerships with these clinics for dental student and resident rotations. The traditional dental school clinical education system is slowly adopting CBDE and making a transition to a “real” delivery system model used by other health professions schools.

History of Community-Based Dental Education

In the 1970s, federal grants were used to incentivize dental schools to develop rotations for their students in off-site facilities. The goal of this grant program was to broaden the education of dental students through service-learning, a form of experiential education that includes learning from service in the community. To qualify for a grant, schools needed to revise their curricula so senior students spent at least six weeks in community clinics providing care to underserved patients. Many schools obtained these grants and established extensive community-based education programs. However, when the federal grant funds ended, most schools terminated or curtailed their extramural programs. Nevertheless, schools gained experience operating service-learning programs, and several made a major commitment to this model of clinical education.

Over the past decade, the trend to include CBDE as a component of the clinical curriculum has gained momentum. Some schools quickly recognized the importance of dental school outreach into underserved communities, and two major foundations have supported this trend.

Known as the early adopters, these schools included the dental schools at Harvard University, the University of Colorado, and Columbia University. At Harvard School of Dental Medicine, clinical rotations in community facilities have always been a key component of clinical education. With a small class of thirty or fewer students, it was relatively easy to find hospital and community clinic rotations for students, especially in Boston, a large urban area. In the 1980s, the University of Colorado developed a far-ranging plan to rotate its dental students to practices and clinics in underserved areas of the state as a condition of receiving state financial aid. Columbia University recognized the need for dental schools to take a leadership role in improving the oral health of underserved communities through a mission change that created the Community DentCare Network, a system of clinics in public schools, a mobile van, and neighborhood sites in northern Manhattan. These three schools have shown that community facilities can be used successfully to provide a component of clinical education (Harvard), to utilize students to care for patients while serving as an educational setting (Colorado), and to demonstrate how dental schools can take on a leadership role in the university through service in underserved communities lacking access to care (Columbia).

With an understanding that CBDE lacked general acceptance as an important component of the dental education system in the United States, the Josiah Macy Jr. Foundation provided funding in the mid-1990s for a study to examine the role of CBDE programs in dental education. The 1999 Macy study report, published as a supplement to the JDE, addressed the financial, management, and legal issues in affiliations with off-site facilities and studied the design of nine dental school programs. CBDE was found to enhance the education of students and residents, even though the schools’ programs were quite different from each other. The study suggested that each school must design community programs that make sense in its local environment. Another major finding was that students have a positive impact on community clinic revenues, while making care more accessible to the underserved. Also, it was reported that management issues are complicated and become more complex depending upon whether the community clinics are owned by the school or are school affiliates. For the latter, well-structured affiliation agreements become a legal necessity. The Macy study recommended that a major national demonstration project be carried out to learn about the best practices of CBDE in order to develop programs to become part of the dental education system.

The Robert Wood Johnson Foundation next provided major funding for the Pipeline, Profession,
and Practice: Community-Based Dental Education program\textsuperscript{16} in collaboration with The California Endowment and the W.K. Kellogg Foundation. This demonstration project, the largest ever carried out in the United States in dental education, provided funds to twenty-three dental schools in two phases over a nine-year period from 2000 to 2009 to develop CBDE programs.

Much information that all schools can use to plan, implement, manage, and operate successful community programs is available from this demonstration project. From the findings of the Pipeline program, it is clear that CBDE adds an important dimension to dental education; it is a vivid expression of one of the pillars of the profession: service to the public and in particular the underserved public. In providing services, students also gain considerable self-confidence in their clinical skills and experience in patient management. In all but one of the participating schools, dental students were enthusiastic about their experience, and faculty members, although dubious at the beginning of the program, came to appreciate the value of students’ off-site experiences.\textsuperscript{17,18}

Several design principles of CBDE emerged from the best practices of the twenty-three participating schools. They include the following: 1) adequate clinical preparation and cultural competency training for students prior to their community rotations; 2) sufficient length of extramural assignments so that students can become providers of care and not just observers; 3) an organized educational program that includes course goals, objectives, and expected student competencies; 4) faculty appointments for community faculty and a school-based faculty program manager; and 5) course/clinical credit for work accomplished. It is also evident from the Pipeline program that students are capable of providing much-needed care in facilities in underserved communities. In just one year, the students in the Pipeline program provided 129,000 dental services to almost 69,000 patients.\textsuperscript{18}

**Current Status and Impact of CBDE Programs**

**Current Status**

In 2009, a study of dental school curriculum trends reported that the most significant change has been the increase in time that students spend in community clinics and practices. Over a ten-year period, the number of schools with twenty-five or more days in community rotations increased from eight to twenty-two.\textsuperscript{19} Also, the Commission on Dental Accreditation now recommends that community-based dental education should be a significant component of the clinical education of all dental students.\textsuperscript{20}

As expected, there is great variation among schools in the time allocated to CBDE. Figure 1

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**Figure 1.** Hours spent by junior and senior students in community rotations by number of schools, 2008–09
shows the distribution of hours junior and senior students spent in community sites for the 2008–09 academic year. Students in the majority of schools spent less than thirty days over a two-year period (mean is 263 hours). In contrast, students in four schools spent 800 hours or more (Boston University, A.T. Still University, University of Colorado, and Harvard University). Clearly, there is little consensus among schools on the appropriate time that senior students should spend in community externships. But the trend is clear: more schools are increasing the time senior students spend in outreach facilities. Several examples illustrate this point.

At the University of Michigan, the time that senior dental students spend in community clinics has increased over the past ten years and now is about fifty days. Unlike most other schools, community clinics in Michigan share student-generated surplus patient care revenues with the school. On average, students produce about $1,000 in revenues per day. The school is receiving $165 per day per student from these clinics. In addition to providing students an excellent educational experience, the community clinic rotations generate about one million dollars in additional revenues for the school annually. This is an important new source of clinical income.

The University of Illinois at Chicago senior dental school students were not involved in any extramural rotations at the beginning of the Pipeline program in 2002. Now, students spend from fifty to 100 days in community rotations, and the plan is to have all students spend 100 days within the next few years. Considering that the entire senior year consists of about 150 days, community experiences are now a core component of the clinical curriculum.

The new dental school at East Carolina University plans to own and operate ten dental clinics in rural communities. Senior students and residents will spend most of the year in these facilities practicing with faculty. They will also rotate through community clinics that are not university-owned. In both types of settings, faculty will continue to provide care to patients as they supervise one or two students or residents.

The Boston University Henry M. Goldman School of Dental Medicine considers itself a school without walls. This is an appropriate name, because starting in their sophomore year, students have two ten-week rotations in local community clinics and practices. In these settings, they assist in both patient care and practice management. In their third and fourth years, students have a required two-week pediatric dentistry rotation and a ten-week continuous general dentistry assignment to community clinics in the New England states.

Most new dental schools associated with osteopathic medicine such as that at A.T. Still University in Mesa, Arizona, are committed to service-learning programs. Students spend a large part of their senior year rotating through community clinics, providing care to disadvantaged populations.

Impact of CBDE

As a generalization, there is little hard data on the influence of differences in dental (or medical) curricula on school finances and organization. With this limitation in mind, the available information regarding the impact of CBDE in several areas is briefly reviewed here.

Finances

A common concern among dental educators is the loss of student-generated patient care income when students are assigned to community clinics and practices. This makes intuitive sense since students spend less time in dental school clinics. For three reasons, however, CBDE appears to actually increase net school revenues.

First, it is important to note that per chair expenses (faculty, staff, supplies, etc.) are much greater than student-generated patient care revenues. In fact, on average, schools run net deficits of about $40,000 per chair per year. For example, a school with 200 chairs—one for each junior and senior student—loses twice as much as a school of the same size with 100 chairs. In contrast, schools with fewer chairs per student have students spend more time in community clinics. Because the latter schools often increase class size to fill the newly available dental operatories, dental school clinic revenues stay the same. At the same time, with increased class size, schools generate substantially more funds from tuition and fees.

Second, several schools report that senior students who have completed their community rotations are more self-confident, clinically skilled, and productive. As a result, they generate the same or greater patient care revenues even though they spend less time in the dental school clinics. A Boston University study found that most of the gain in productivity comes from higher performing students who are assigned to the community first.
Third, some community clinics share surplus student-generated revenues with schools. As already noted, the University of Michigan generates about one million dollars annually from clinic payments. Because many community clinics are paid per visit (e.g., $150) rather than per service and students average six to seven patients per day, they can easily generate $1,000 per day. Even after deducting expenses (e.g., dental assistant, minor changes in clinic dentist productivity), most community clinics generate a substantial surplus from student and resident patient care services.27

In a recent review of the impact of CBDE on dental school finances, Brown and Bailit suggested that under ideal conditions, CBDE programs may increase school net revenues by about 20 percent ($12 million).27 These increased revenues include the additional funds from tuition and fees with larger student enrollment, a modest increase in dental school clinic revenues, and payments from community clinics and practices.

Students

The independent evaluation of the Pipeline program reported strong student support for community programs.18 Some important advantages that students identified include the opportunity to work with a full-time dental assistant and other staff and to see a new patient every hour. These opportunities increased their skills, self-confidence, and speed. A related advantage was an increased understanding of practice management, including the roles of clinical and administrative staff. Students also mentioned the value of working in multiple practice settings and learning various clinical processes and methods.

Further evidence of student productivity is seen in Table 1, which reports on student productivity—completed services per full-time equivalent senior student working five days per week for ten months at a California community clinic.28 Although there are no published comparative data on senior student service output, it is obvious that students in community clinics are very productive. The exception is fixed prosthodontics. Most community clinics do not provide this service to patients. This is a limitation of CBDE, and students need to spend time in dental school clinics and other settings where advanced clinical procedures are provided.

Another benefit of community rotations is exposing students to the dental safety-net system. Many schools report a significant increase in the number of graduates who seek employment in these facilities as a result of their community experiences.

Faculty

Initially, faculty members at many Pipeline schools had reservations about increasing the time that senior students spent in community clinics and practices. The concerns related to the quality of the educational experience and the potential loss of dental school clinical income. The independent evaluation of the Pipeline program found a marked change in faculty attitudes over time. Specifically, the great majority of faculty became strong supporters of the community experience. This resulted from several factors: 1) faculty visits to see community facilities and to meet community clinic dentists, 2) the development of formal community preceptor training programs (i.e., calibration) on evaluating students, 3) the strong and enthusiastic support of students for their community experiences, and 4) perhaps most importantly, the marked improvement in student clinic skills, knowledge, and self-confidence after completion of their community rotations.18

Workforce Diversity and CBDE

There is a link between CBDE and diversity in the student body. Community sites generally treat those with the worst oral disease. In the United States, high oral disease levels are found among minority graduates.

### Table 1. Services provided in a community clinic by one FTE senior student by service type

<table>
<thead>
<tr>
<th>Service</th>
<th>Community Clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>1,212</td>
</tr>
<tr>
<td>Preventive</td>
<td>728</td>
</tr>
<tr>
<td>Restorative</td>
<td>280</td>
</tr>
<tr>
<td>Removable Prosthodontics</td>
<td>19</td>
</tr>
<tr>
<td>Fixed Prosthodontics</td>
<td>–</td>
</tr>
<tr>
<td>Endodontics</td>
<td>16</td>
</tr>
<tr>
<td>Periodontics</td>
<td>185</td>
</tr>
<tr>
<td>Surgery</td>
<td>251</td>
</tr>
<tr>
<td>Other</td>
<td>516</td>
</tr>
</tbody>
</table>

*Note: Student worked five days per week for ten months.*

groups and low-income individuals who have little to no access to care. While the profession of dentistry cannot solve this problem by itself, it requires practitioners who are sensitive to the problems of the underserved and who will consider providing care in community clinics, treating Medicaid patients in their practices, and advocating for government support for the poor to receive oral health care. The knowledge and attitudes to educate practitioners with such sensitivity are imparted while students are in training. The link among CBDE, access to care, and the diversity of the student body was summarized by Strauss et al. who wrote: “by making the composition of the student bodies more diverse, a greater number of dental graduates would be more inclined and better equipped to address the access to care issues. . . . Addressing issues of equity and access both inside and outside of higher education is a hallmark of service-learning of which CBDE is an example.”

Knowledge of cultural, ethnic, and racial diversity becomes critical to understanding the problems of the underserved.

A diverse student body can enhance the learning environment for all students. Having actual experiences with diversity in and out of the classroom exposes all students to a broader range of viewpoints and can result in intellectual growth and active thinking as well as cultural awareness. Developing cultural awareness and appreciation for differences in perspectives from one’s own experiences is a prerequisite for CBDE. A recent Institute of Medicine report states that CBDE improves students’ “comfort level in caring for vulnerable and underserved populations and increases the likelihood that students will care for such populations in their future careers.”

The results of strong community programs and recruitment of underrepresented minority students can be seen at the University of North Carolina at Chapel Hill School of Dentistry. Its student body takes a pledge to provide at least four hours each month of free services to underserved patients after graduation. The school utilizes case studies, role-playing, communication skill development, and critical incident essays from experiences in community clinics to build upon the benefits of diversity in the student body. Through diversity in the classroom setting and a rich array of service-learning experiences in the field, these students gain the knowledge and skills needed to address access to care issues.

Research has found that students’ behavior in their practice environment is based upon their educational experiences during dental school. A diverse student body and CBDE become the cornerstones of a dental educational system that responds to the problems inherent in improving access and reducing the disparity in oral health in underserved and minority population groups.

**Future of CBDE**

In the twentieth century, dental education incorporated many new pedagogical, scientific, and technological advances and was influenced by societal needs, resulting in broader curricula offerings such as electives and behavioral science courses. CBDE is one expression of societal concern about access disparities for large segments of the public. Schools with well-managed CBDE programs provide students with educational experiences that enhance their understanding and sensitivity to the problems of underserved populations and at the same time increase their self-confidence and clinical skills. Access to oral health care will continue to be a major concern for the public and for the profession. During the first decade of the twenty-first century, CBDE has gained an important position in the clinical curriculum in many schools.

CBDE provides dental schools the opportunity to play a leading role within universities that embrace the value of service in the learning process. At the same time, schools will continue to be stressed financially, and CBDE is one way to help control costs and increase net revenues. As state governments reduce general funds to dental schools, legislative bodies may subsidize CBDE programs in an effort to reduce access problems.

How will CBDE evolve in the future? Given that the Commission on Dental Accreditation now includes a standard that says “dental education programs must make available opportunities and encourage students to engage in service-learning experiences and/or community-based learning experiences,” schools are likely to strengthen their CBDE programs. By 2020, most schools may require at least one full semester or fifteen weeks (450–500 hours) of CBDE experience for senior students. Community programs will evolve to address local access issues such as care of the elderly, those with disabilities, or other populations that are vulnerable or with special needs. Dental schools will continue to expand the number of community sites with which they affiliate, and the location of the sites may include more
out-of-state and international facilities. The manner in which schools organize and manage their CBDE programs will vary, but schools will embrace a set of principles similar to the five noted above as accrediting teams examine their programs.

CBDE will also influence how schools organize and operate their dental school clinics. Specifically, school clinics need to provide students with initial competence in procedures they perform in CBDE sites. When students return from their off-site assignments, they will have greater confidence in their clinical skills and will be able to provide care to patients with more efficiency than permitted in most current dental school clinics. Schools will adapt to this new reality by streamlining clinic operations and by changing the way faculty members supervise students. In return, students will provide more efficient and advanced care to patients in dental school clinics.

One cautionary note: CBDE is more than just a rotation of students to off-site facilities. Students need to be prepared for their community experiences with coursework in cultural competence and communication skills and selected clinical specialty rotations. Community experiences during the first through third years also help prepare students for their fourth-year rotations. Finally, greater diversity in the student body and faculty makes students more aware of others’ viewpoints and the value of service-learning programs.

Conclusion

Overall, CBDE will positively influence dental schools and student education. Schools will eventually understand and appreciate the financial, educational, and service benefits from sending their students to community sites, increasing the number of faculty based in community facilities, and reorganizing dental school clinical operations. When fully implemented, CBDE will also have a significant impact on reducing access disparities. In sum, CBDE is here to stay and is likely to become a core part of the dental curriculum in the twenty-first century.

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