



An outcomes assessment of 15 years of patient care experiences in predoctoral pediatric dentistry

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Abstract

The purpose of this study was to examine the trends in numbers, demographic characteristics, and treatment history of pediatric dental patients under the care of dental students over the period 1980 through 1994. Data were collected for: exams, sealants, surfaces of amalgam, composite resin surfaces, pulpotomies, stainless steel crowns, and extractions. Correlations were done across the 15-year period to determine significant trends over time. During the 15-year period, the average number of patient visits required for each student to complete the requisite number of patients, declined from 45 appointments to complete 10 patients in 1980, to 35 visits to complete 13 patients in 1994. Over time, the numbers of amalgam surfaces, pulpotomies, extractions and stainless steel crowns decreased significantly, while the number of composite resin surfaces increased ($P < 0.05$). Based on a previous outcome assessment that indicated declining numbers of procedures performed between 1980 and 1985, the required number of patients treated per student was raised from 10 to 13, beginning with the 1986 class. (Pediatr Dent 18: 272-76, 1996)

It is essential for predoctoral dental students to receive clinical experience in treating children because general dentists provide most dental treatment for children.^{1,2} Several studies have reported a decrease in the clinical pediatric dentistry experiences of predoctoral students³⁻⁸ associated with reported pediatric patient shortages⁶⁻⁸ and the decline in dental caries activity in children.^{9, 10} The rapid development of new dental materials, especially in the area of bonding and composite resins, has enabled us to provide new approaches to prevention and restorative procedures for children (i.e. composite resin/sealant occlusal restorations).^{11, 12} The impact of these factors on the clinical pediatric dentistry experiences of dental students at the Medical College of Georgia (MCG) over the last 15 years is the focus of this report.

The American Dental Association's Accreditation Standards for Dental Education Programs require that dental graduates be competent to provide patient assessment and diagnosis, preventive therapy, pulp therapy, appropriate restorative procedures, and uncomplicated oral surgery for pediatric patients and adults.¹³ Competency as defined in the accreditation standards, is "a level of skill displaying special skill and knowledge derived from training and experience".¹³ Accreditation standards also require educational programs to conduct "ongoing and systematic assessment of educational outcomes" with documentation of activity based on findings.¹³ The Institute of Medicine study of dental education, *Dental Education at the Crossroads: Challenges and Change*, indicates that dental schools need to make a stronger commitment to the regular collection of data on oral health status and services.¹⁴ In order to address the changing pediatric dental needs and the need for educational programs to incorporate outcomes assessment activities in planning and decision making; the purpose of this study was to examine the trends in numbers, demographic characteristics, and treatment history of child patients under the care of dental students over the period 1980 to 1994.

Methods and materials

At the MCG School of Dentistry, senior students are expected to complete all the treatment planned (excluding comprehensive orthodontic treatment) for a minimum of 13 patients between the ages of 5 and 15. Patients are assigned randomly to distribute those with significant treatment needs evenly. Within that framework, student accomplishments in pediatric dentistry were recorded for each patient encountered from 1980 to 1994. Annual data were collected on the number of patient visits, number and kind of procedures, and number of student providers over a 15-year period. These procedures were followed: number of patient visits; examinations; sealants; surfaces of amalgam and

composite resin; pulpotomies; stainless steel crowns; and extractions. Over the 15 years, two categories of patients have been examined — new patients, and patients who previously had dental treatment completed by a student. The latter category consisted primarily of patients who had not received dental treatment for at least a year. The Table provides the percentages of new and reassigned patients per year. Statistical correlations were performed to assess treatment trends over time.

TABLE. THE NUMBER OF EXAMINATIONS PER YEAR AND THE PERCENTAGE OF NEW PATIENTS

Year	Exams Per Year	% New Patients
1980	689	77
1981	1097	73
1982	906	75
1983	976	77
1984	885	76
1985	744	76
1986	690	76
1987	848	46
1988	768	52
1989	780	45
1990	700	49
1991	690	38
1992	705	45
1993	752	46
1994	704	45

Figure 1. Visits/student/year

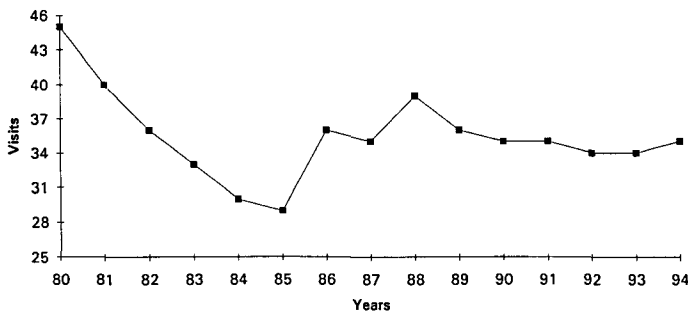
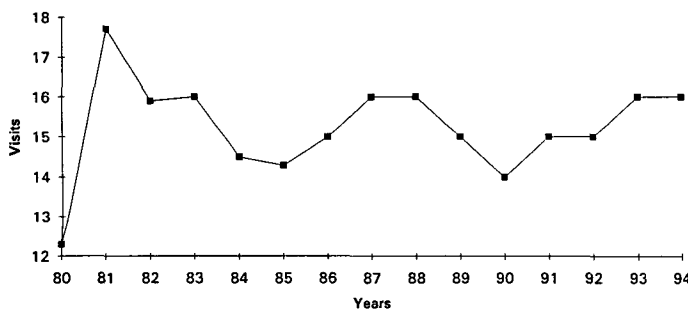


Figure 2. Exams/Student/Year



Results

As a result of the continued decline in clinical procedures performed by each student between 1980 and 1985, the number of completed patients required for graduation was increased from 10 to 13 for the class of 1986. The data from 1985 to 1994 reflect this change. For example, the average number of visits per student per year declined from 45 in 1980 to 29 in 1985 (Fig 1), a 36% decline. However, because of the increase in expectations, the average number of visits per student in 1986 increased to 36. From 1986 to 1994 the average number of visits per student per year has remained essentially the same.

The average number of examinations performed by each student each year declined by 22% between 1980 and 1985 (Fig 2). Since that time, the average number of children examined each year by each student has remained relatively constant (14–16).

In 1980 the average number of sealants placed by each student was 25. By 1984, the number had increased to 47 (Fig 3). Since 1984, the average number of sealants placed by students has varied from a low of 33 in 1985 and 1991 to a high of 47 in 1989.

The average number of amalgam surfaces placed by a student has declined steadily from a high of 45 surfaces in 1980 to a low of 19 surfaces in 1992 and 1993. There is a highly significant ($P < 0.0001$) negative correlation between the year and the average number of amalgam surfaces completed.

The average number of stainless steel crowns and pulpotomies performed annually by each student also declined (Fig 4). There is a significant negative correlation between time and both stainless steel crowns ($P < 0.01$) and pulpotomies ($P < 0.05$). In 1980 an average of 3.40 stainless steel crowns was completed per student; by 1987 that number had dropped to less than 1. Beginning in 1993, the average number of stainless steel crowns placed by each student increased to 2.

The average number of pulpotomies completed per year in 1980 was 1.7, and although it fluctuated some over time, by 1994 it had dropped to 0.8 per student.

There is a significant positive correlation between the average number of composite resin surfaces completed and time ($P < 0.002$; Fig 5). In 1980 the average number of surfaces of composite resin per student was 1.3. By 1989, the average number had increased to 5, but then declined to 4 in 1990 and remained at that level through 1994.

The average number of extractions dropped by more than 50% between 1980 and 1985. After the increase in required completed cases in 1986, the number of extractions stabilized at an average of 3 to 4 per student. The negative correlation between average number of extractions and time was significant ($P < 0.01$).

Figure 3. Amalgams and Sealants/Student/Year

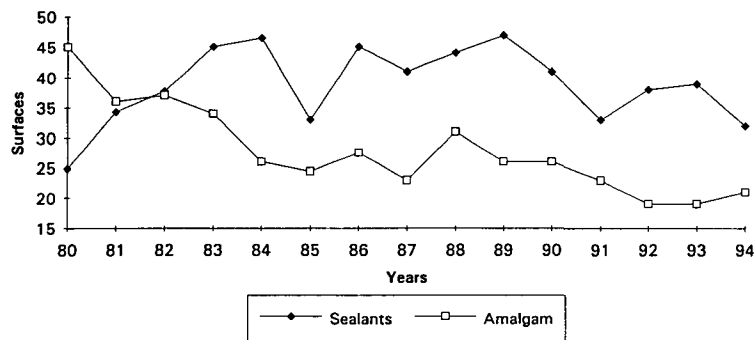


Figure 4. Stainless Steel Crowns and Pulpotomies/Student/Year

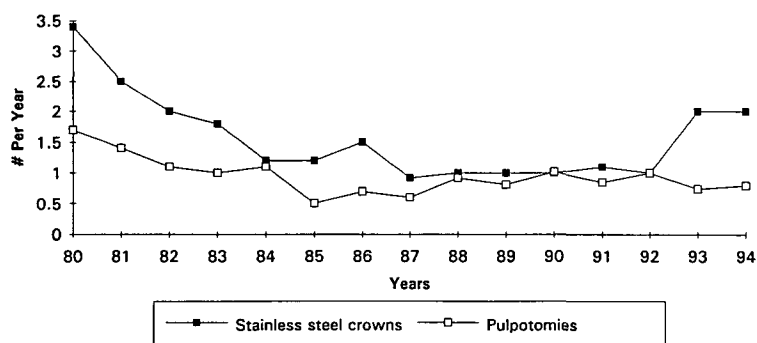
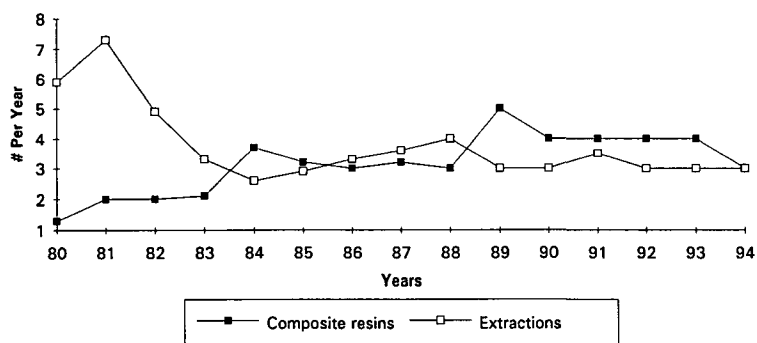


Figure 5. Composite Resins and Extractions/Student/Year



In this time span, the percentage of newly enrolled patients in the program declined from 77% in 1980 to 45% in 1994 (Table). Therefore, the percentage of patients who had been in the program and had treatment completed previously increased by 32% over the 15-year period.

Discussion

The data reveal that over the 15-year period, the number and types of therapeutic procedures received by the child patient population changed. Inevitably, the change in the therapeutic requirements impacted the clinical experience of the predoctoral dental students. In 1980 each student had a clinical performance pro-

file of approximately 10 patients, 45 visits (Fig 1), 94 procedures including 12 examinations (Fig 2), 45 amalgam surfaces (Fig 3), 3.4 stainless steel crowns (Fig 4), and 5.9 extractions (Fig 5) by graduation. In 1994 the typical clinical experience profile of predoctoral dental students involved 13 patients, 35 patient visits (Fig 1), 74 patient procedures, including 16 examinations (Fig 2), 21 amalgam surfaces (Fig 3), two stainless steel crowns (Fig 4), and three extractions (Fig 5).

The average number of amalgam surfaces placed by the students declined significantly from 45 in 1980 to 29 in 1985. Even with the change in student clinical expectations, amalgam surfaces completed continued to decline (19 per student for 1992 through 1994; Fig 3). This decrease in amalgam surfaces partially reflects the decline in dental caries — particularly interproximal carious lesions — observed in U.S. children over the past decade.

Another factor in the decline in number of amalgam surfaces is the increasing use of occlusal sealants and composite resin/sealant restorations to treat incipient carious lesions. The increase in the number of occlusal sealants and composite/sealant restorations, along with the decline in amalgam restorations, suggests that additional treatment options have been utilized for occlusal restorations in recent years, resulting in fewer experiences with any particular material such as amalgam. A positive benefit for the patient is that the newer techniques and materials tend to conserve more tooth structure than did traditional amalgam preparations. The fluctuation in the number of occlusal sealants placed by students over the 15-year period relates to the fact that sealants were relatively new in 1980, and as experience was gained with sealants, practitioners recognized situations where occlusal sealants were not indicated.

Student experiences placing stainless steel crowns declined significantly from an average of 3.4 per student in 1980 to less than 1 in 1987, and have recently increased to 2 per student. Pulpotomy procedures also have declined; currently the average number of pulpotomies is less than 1 per student. The decline in both of these procedures appears to be associated with the decline in extensive carious lesions in children. The significant decline in the number of extractions over the 15-year period (Fig 5) also supports the decline in primary teeth with nonrestorable carious lesions.

Another variable influencing the number of restorative procedures required for each patient is that an

increasing number of previously completed patients have been reassigned after varying lengths of time (Table). The percent of new patients examined dropped from 76% in 1986 to 46% in 1987, and has remained at approximately that level since that time. This shift in patient population from predominantly new patients to almost half recall patients can be explained partially by the increase in the number of both students in the class of 1987 and the requirement for completed cases.

Another related factor continues to be the increasing number of patients in the system to whom there is responsibility for follow-up. The protocol for these patients is to complete a comprehensive oral examination, so the students gain diagnostic experience. However, the number of new restorative experiences as well as number of sealants these patients provide is limited, because they previously had preventive and restorative services and are generally in good dental health. Over the 15-year period it has become increasingly difficult to balance the educational experience needs of the students with the need to provide dental services to a growing recall patient population.

There are some changes being considered to address this dilemma. These options include: providing students with an earlier experience in pediatric dentistry, i.e. recall patients treated by second- or third-year students with available comprehensive restorative patients assigned to seniors for management. Alternatively, a cooperative team clinic with dental hygiene and dental students managing recall patients.

Ongoing evaluation of outcomes has resulted in program changes over the 15 years; e.g. the increase in the number of required completed patients from 10 prior to 1986, to 13. Also, the average number of stainless steel crowns (2 per student) and pulpotomies (0.80 per student) performed indicate that not all students perform these procedures. In an attempt to address this during the 1993-94 year, selected patients with extensive treatment needs, including multiple pulpotomies and stainless steel crowns, were identified and were appointed on a block basis to be treated by students who had not previously performed these procedures. These represent the significant changes that have occurred in clinical pediatric dentistry; the amount of curriculum time devoted to clinical pediatric dentistry has remained relatively constant over the period. One other change that may have some impact is decreasing class size. For the first six years (1980-86) the average class size was 58 students. The average class size for the last nine years was 48. Therefore, the number of restorative experiences since 1986 was higher than if the class size had remained at the 1980-86 level.

Between the junior and senior year, all students complete a 3-week off-site clerkship that may include providing dental care for children. The daily logs kept by the students during the summer of 1994 indicate that they provided 45 stainless steel crowns, with each student performing from 0 to 8 crowns. The total number

of pulpotomies performed was 42, with each student performing from 0 to 10. Therefore, some students are receiving valuable experience in restorative procedures for children through participation in off-site clerkships.

Results clearly show that predoctoral students at MCG are actually treating more child patients, but receiving less experience providing amalgams, stainless steel crowns, pulpotomies, and extractions than did students 15 years ago. This undoubtedly reflects the impact of the diminished incidence of caries and other dental diseases as well as the impact of a pool of available patients who are increasingly on annual recall. Students are providing fewer amalgam restorations as a result not only of the caries decline, but also due to the introduction of improved preventive procedures employing sealants and composite/sealant restorations. The dilemma for educators is that students must be able to provide restorative and pulpal services for their future patients. It is imperative that the necessary steps are taken to assure that students are providing clinical care that allows them to gain necessary competency, and the educational program to meet accreditation standards. Currently, patient demographic data related to shifts in age, county of residence, socioeconomic status, increased use of third-party payment, and availability are being evaluated. These issues have not been explored fully and may be at least as significant as the caries decline in explaining the current clinical data. It may be necessary to provide more flexible appointment times, such as evening or Saturday clinics or to develop an outreach program to include children with greater dental needs than the patient mix in the school's clinical program.

In 1993, when 3,000 senior dental students responded to the American Association of Dental Schools senior survey, 11% of students nationwide responded that they received inadequate instruction in the area of pediatric dentistry.¹⁵ Less than 5% of MCG seniors responded that they received inadequate instruction in pediatric dentistry. Similarly, in response to an MCG curriculum committee survey of the graduating classes of 1990 through 1994, approximately 5% indicated they did not feel adequately prepared in pediatric dentistry when they began treating patients after graduation.¹⁶ Despite a decline in restorative procedures performed while in the pediatric dentistry clinic, most MCG graduates feel adequately prepared to provide dental care for children.

As we prepare for the 21st century, it is essential that dental education be creative and look for alternate sources of patients, develop new teaching methods, and improve ways to assess dental students' performance and readiness to practice independently. These data support the IOM study that many dental schools may need to devise approaches to provide students with a greater volume and breadth of clinical experience¹⁴ and should actively pursue patients who are otherwise underserved. At the same time, dental schools

are being encouraged to become more patient oriented, which adds to the challenge of balancing patient needs with the educational needs of the students.

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