International Journal of Paediatric Dentistry 2004; **14:** 402–408

Paediatric dentistry experience of the first cohort of students to graduate from Dublin Dental School and Hospital under the new curriculum

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Summary. *Aim.* To assess undergraduate clinical experience in Paediatric Dentistry in students graduating under a new curriculum.
Methods. An audit using logbooks completed by 34 students for all patients for whom they had provided treatment in the university paediatric dentistry clinic.
Results. A total of 177 child patients had received treatment from the students, age range 2–8 years. Students had performed an average of 13 restorative techniques. Sixty-eight percent had provided stainless steel crowns and 71% at least one pulpotomy for a primary tooth. All students had provided fissure sealants. Eighteen had carried out extractions and 8 had provided treatment for fractured incisors on this clinic.
Conclusions. The cohort of students included had a wide range of experience of paediatric dentistry which compared favourably with accepted guidelines. A relative lack of experience of dental extractions currently remains a problem.

Introduction

In the light of advances in education and knowledge, rapid developments in technology, changes in disease patterns and changing patient expectations, medical and dental training is undergoing a process of change world-wide [1].

Current opinion is that the undergraduate dental curriculum should produce graduates who have a basic mastery of significant issues of current therapy, who are aware of their personal limitations and who are aware of their responsibility to be life-long students [2–4].

A new undergraduate curriculum has been introduced at the Dublin Dental School and Hospital (DDSH), Dublin, Republic of Ireland, in recent years, with an increased emphasis on student-centred learning. Small group tutorials and problem-based learning (PBL) methods have replaced more conventional didactic teaching methods. The philosophy of care is patient-centred, with an emphasis on holistic care. Students are assessed for their achievement of clinical competency, and therefore, quota systems, which were previously employed, have been replaced. This is in line with the most modern teaching methods in undergraduate medicine and dentistry.

Outline of the new curriculum in paediatric dentistry

Students' exposure to paediatric dentistry begins in the final term of their third academic year. Students attend a laboratory-based course where clinical techniques in paediatric dentistry are taught. Sessions are of 3 h duration, the first hour comprising of a tutorial. The tutorials are also available to

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the students, in the form of Microsoft PowerPoint® slide shows, for private study. Videos, models and other aids are used, as appropriate. During the remaining 2 h, students concentrate on developing practical skills, using mannequin heads. The students' work is assessed at the end of each session.

The course content includes:

- behaviour management techniques for the child patient;
- dental anaesthesia and anaesthetic technique;
- radiographic technique and interpretation;
- treatment planning in paediatric dentistry;
- preparation and restoration of pit and fissure, and approximal cavities in primary molars, and use of dental materials;
- pulp therapy for primary molars;
- preparation and fitting of preformed metal crowns on primary molars;
- traumatology in the primary and secondary dentitions; and
- growth and development.

Upon completing this course, students' technical skills are assessed, and they may not progress to clinical treatment until they have demonstrated competency. This is in agreement with the recommendations of the General Dental Council [5].

The course attended by the student group audited was of 5 weeks duration and took up a total of 15 h.

In the fourth undergraduate year, students' knowledge of paediatric dentistry progresses by means of the PBL method. Students are required to attend two blocks of PBL sessions in paediatric dentistry. These PBL blocks are held in the first and second terms of fourth year, with the students tackling five problems each term. Topics covered include:

- normal and abnormal development of the dentition;
- aetiology, identification and treatment of decay in primary and young permanent teeth;
- pulpal response to decay in the primary dentition, and treatment options for each of the stages from early dentine involvement to acute abscess;
- traumatic injuries of primary and young permanent teeth, including assessment, and short- and long-term management;
- the paediatric–orthodontic interface;
- treatment of a child with a significant medical condition; and
- identification and treatment of dental developmental anomalies of size, morphology, number and structure.

Students are examined on their knowledge of paediatric dentistry in the third term, by means of a written examination (modified short answers, extended matching and best option questions) and an objective structured clinical examination.

Students commence clinical treatment sessions in paediatric dentistry at the beginning of their fourth undergraduate year, with treatment sessions every second week, until graduation at the end of fifth year. There are 19 operative sessions in fourth year (57 h), and 16 in fifth year (48 h clinical time). Students are formatively and summatively graded on each day's work, and must pass clinical competency exams by the end of each term. They may not rise to the next academic year until they have passed their competency assessments.

The competency assessments students are required to pass are, by the end of second term of the fourth year:

- provision of fissure sealants, having assessed the patient and individual tooth, in accordance with accepted guidelines [6];
- treatment planning for a child patient;

by the end of the second term of their fifth year:

- quadrant treatment of a child patient (to include, at least, an interproximal restoration in a primary molar).

Virtually all treatment is provided under rubber dam isolation, and local analgesia is given for all restorations, except when atraumatic restorative techniques are performed.

Supervisors of the clinical sessions are consultants/specialists in paediatric dentistry, and general dental practitioners with an interest in the specialty, who are employed by the hospital on a part-time basis. This blend of full- and part-time teachers has proved very beneficial over the years, and as a principle, has been recommended by Hjørting-Hansen [3].

An overview of the paediatric dentistry experience of the cohort of students who graduated in June 2002 is presented in Table 1.

Because this student cohort was the first to complete their education entirely under the new curriculum, it was considered appropriate to audit their paediatric clinical activity.

Therefore, the aim of this study was to assess the undergraduate clinical experience in paediatric dentistry of the first cohort of students to graduate under the new curriculum.

Table 1. Paediatric experience of student cohort: (MSAs) modified short answers; (EM) extended matching; and (BOQs) best option questions.

Academic year	Learning method	Time devoted to timetabled learning (h)	Assessment method
3	Laboratory-based course (5 weeks)	15	Competency test
4	Problem-based learning (10 problems)	30	Written exam (MSAs, EM and BOQs)
4	Clinical treatment sessions ($n = 19$)	57	Competency test Grading of clinical work Objective structured clinical examination Written exam (MSAs, EM and BOQs)
5	Clinical treatment sessions ($n = 16$)	48	Competency test Grading of clinical work Written exam (essay, MSAs, EM, BOQs)
Total time		160	

The objectives of this audit were:
1 to establish a baseline of the students' clinical experience in paediatric dentistry;
2 to determine the range of clinical procedures performed;
3 to determine if the students had achieved core skills, in line with established guidelines and recommendations [4,5,7,8];
4 to identify deficiencies in the students' clinical experience; and
5 to determine if there was a need for closer monitoring of students' clinical performance in paediatric clinics.

Methods

Prior to their final examination in June 2002, students were required to provide a logbook of all patients for whom they had provided treatment in paediatric dentistry clinics. The content of the logbooks was cross-checked using a computerized patient tracking system.

Since this audit preceded the introduction of electronic dental recording at DDSH, each patient's clinical file was examined and cross-checked with the students' logbooks by one of the authors (D. F.) to ensure accurate documentation of the treatment provided. This was done to obtain greater detail of the clinical procedures undertaken by the students than was contained in their logbooks and on the computer record, and not as a validation exercise.

Thirty-eight students presented for the final dental examination in June 2002. Four student records were incomplete (some charts could not be accessed), and therefore, the audit was carried out on data from 34 students. These 34 students treated a total of 177 child patients.

Results

There was a total of 177 patients treated, with a mean of five patients (range = 2–8) cared for by each student.

Table 2 shows the number, type and range of restorations for primary and permanent teeth provided for this group of patients. Also illustrated are the mean number and type of restoration provided per student, the mean number and type of restoration provided per patient, and the number of students who did not perform a restoration of each particular type. This number is also expressed as a percentage of the student group. Students each performed an average of 13 restorative techniques for children in the course of their undergraduate clinical experience. The majority of students restored primary molars, with 68% providing stainless-steel crowns. Primary molar pulpotomy was performed by 71% of students, while pulpectomy of primary molars was performed less commonly, 27% of students having experience of this procedure.

The number, type and range of preventive treatments provided for this patient group is illustrated in Table 3. All students provided fissure sealants for their patients, while two students were recorded as not having provided any preventive advice. It is probable that all students provided preventive treatment for their patients, since this is standard procedure in the department; however, recording deficiencies may underestimate this aspect of care.

Table 4 illustrates the number, type and range of treatment, other than restorations and preventive

Table 2. Number, mean and range of restorations in primary and secondary teeth.

Variable	All restorations	Primary tooth		Primary molar		Preformed stainless-steel crowns	Permanent tooth		Preventive resin restoration	Composite restoration of secondary incisor
		Pit and fissure restoration	Approximal restoration	Pulpotomy	Pulpectomy		Pit and fissure restoration	Approximal restoration		
Number of restorations provided by all students (range)	450 (5–20)	72 (0–8)	65 (0–6)	41 (0–4)	13 (0–3)	59 (0–5)	67 (0–8)	12 (0–2)	58 (0–6)	56 (0–6)
Mean number provided per student ($n = 34$)	13·2	2·1	1·9	1·2	0·4	1·7	1·9	0·3	1·7	1·6
Mean number provided per patient ($n = 177$)	2·6	0·4	0·4	0·2	0·1	0·3	0·37	0·1	0·3	0·3
Number of students who did not undertake this procedure (%)	0 (0%)	9 (26%)	8 (23%)	10 (29%)	25 (73%)	11 (32%)	12 (35%)	24 (71%)	9 (26%)	11 (32%)

treatment, provided for this cohort of patients. Almost half the student cohort performed extractions for their child patients, whereas treatment of traumatized incisors was rarely accomplished in the paediatric clinics.

In addition to the treatment figures shown in Tables 2–4 for this cohort of child patients, five students provided endodontic treatment of permanent incisors, four students provided aesthetic treatment (microabrasion and bleaching of permanent incisors), three students treated medically compromised patients, one student treated two cases of amelogenesis imperfecta, and one student provided a crown for a permanent incisor.

Discussion

Prior to the introduction of the new undergraduate dental curriculum, students had to complete quotas of treatment items before they were permitted to present for the final examinations, with the assumption that their completion implied that the student was clinically competent. Such a system was common to many dental schools throughout Europe, but is now being replaced by systems that evaluate the student's clinical competence [9,10]. Students are now assessed for their overall clinical competence, rather than for their ability to complete items of treatment. By virtue of their having passed their end-of-term assessments, all 34 students were deemed competent to present for the final dental examination.

With the increased emphasis on holistic patient care, aided by the change in teaching philosophy, all the patients' dental treatment needs are addressed. This may mean, however, that certain procedures will not be required, and therefore, the student may not necessarily gain clinical experience of a wide range of procedures. Because of this constraint, it is impossible to guarantee that the graduate has had comprehensive clinical operative experience. While she or he should have achieved competency in core skills, it will be necessary for the newly qualified dentist to undertake continuing postgraduate education, such as vocational training, to gain greater experience. As is stated in the General Dental Council recommendations, 'the undergraduate phase is only the start of education, training and professional development' [5].

At present, vocational training is undertaken on a voluntary basis only in the Republic of Ireland.

It is encouraging to note that the cohort of students included in this audit have had a wide range of

Table 3. Number, mean and range of preventive treatments provided.

Variable	Prevention*	Fissure sealants	Topical fluoride applications
Total number of interventions	97	374	42
Mean number of interventions per student ($n = 34$) (range)	2·8 (0–7)	11 (3–24)	1·2 (0–4)
Mean number of interventions per patient ($n = 177$) (range)	0·6 (0–7)	2·2 (3–24)	0·2 (0–4)
Number of students who did not undertake this procedure (%)	2 (6%)	0 (0%)	11 (32%)

*Oral hygiene instruction, diet analysis and advice.

Table 4. Number, mean and range of other treatments provided.

Variable	Treatment of traumatized permanent incisors	Extractions	Orthodontic intervention
Total number treated	11	74	7
Mean number performed per student ($n = 34$) (range)	0·3 (0–3)	2·2 (0–9)	0·2 (0–1)
Mean number treated per patient ($n = 177$) (range)	0·06 (0–3)	0·4 (0–9)	0·04 (0–1)
Number of students who did not undertake this procedure (%)	26 (76%)	16 (47%)	27 (79%)

experience of paediatric dentistry. Their range of experience compares favourably with accepted guidelines [5,8].

The clinical productivity/experience of this student group also compares favourably with published audits from other centres [11–13].

Nonetheless, some deficiencies have been identified. This audit has revealed a need for students to have greater clinical experience of management of traumatized teeth. Seventy-six per cent of students audited had not treated any traumatized incisors. As a result of this audit, patients are now referred from the interdisciplinary trauma clinic to undergraduates for continuation of care. This has the dual advantages that students learn to treat the more straightforward cases, and also that they follow the cases to completion, so having exposure to the sequelae of trauma.

It is probable, however, that the students had greater experience of traumatology than this audit suggests, since they will have had exposure to trauma cases in the Accident and Emergency (A & E) Department, where students are assigned every second week in the fourth and fifth years of their academic course. Such experience is not included in the present audit. A recent departmental audit revealed that approximately eight trauma cases a week present to the A & E department of DDSH, with the majority (78%) of patients being below the age of 15 years.

Students' relative lack of experience of exodontia for child patients remains a problem. All child patients are screened prior to going on the undergraduate treatment waiting list, and therefore, emergency care will have been undertaken prior to the patient's first visit with a student. This helps to explain why so many students (47%) did not gain experience of dental extractions in paediatric clinics. This may, of course, also be a reflection of our success with dental care, with a bias towards restorations rather than extractions, and the fact that all children treated came from areas where the water supply is fluoridated.

As with dental trauma, students' experience of exodontia is somewhat underrepresented by this audit, since they will also have gained some experience of primary tooth extractions in the A & E and Oral Surgery departments. Such experience is not recorded here.

Students treat patients in orthodontic clinics in their fourth and fifth years, with an average of five patients under their care over the 2-year period. When a patient requires extractions as part of the orthodontic treatment plan, the student usually undertakes the procedure. In this way, further experience is gained of exodontia in young patients.

In other schools, students gain experience of dental extractions for children in day-stay general anaesthetic clinics. As a stand-alone hospital with no intensive therapy unit facilities on site, this is an option that is not open to the DDSH.

Only three students in this audit were recorded as having had experience of treating medically

compromised patients. However, this audit has not recorded that, in the third term of their third academic year, students attend clinics at community dental centres, where they observe the treatment of patients with special needs.

Students now attend clinics at DDSH in the second term of their fourth academic year, where they treat patients with special needs.

Following this audit, the third-year, laboratory-based clinical technique course has been increased to 9 weeks (27 h).

The requirement for a more detailed log of treatment provided by each student has been identified, given that each patient's DDSH chart had to be read to gain the required information for this audit. In other institutions, reflective logbooks have proved useful tools for monitoring students' clinical progress, and ensuring that they have a good range of experience prior to graduation [14]. It may be appropriate to develop further the logbooks in the DDSH.

An electronic patient record is currently being introduced, and it is anticipated that this system will also support the student-held portfolio of clinical experience, as well as facilitating future audit projects and research [15].

Conclusions

Having completed a laboratory course wherein core skills are taught, it is encouraging that the majority of students had good experience of clinical paediatric operative dentistry, with exposure to clinical situations where these skills could be perfected. The students' clinical experience of paediatric dentistry compares favourably with that reported from other institutions.

All the students qualifying in June 2002 had experience of operative dentistry for children, with the majority providing treatment for primary molars, which included pulp therapy and placement of preformed crowns.

Deficiencies have been identified in the students' exposure to trauma cases and to patients with special needs. These have been addressed, following this audit. However, students' relative lack of experience of dental extractions in children remains a problem that is yet to be addressed.

Résumé. Une évolution importante s'est faite jour ces dernières années dans le cadre de l'enseignement initial en dentaire à la faculté et à l'hôpital dentaires de Dublin. L'enseignement par la résolution de problèmes a remplacé le cours magistral traditionnel et l'évaluation des compétences cliniques des étudiants dans des matières spécifiques a remplacé la nécessité de réaliser certains quotas de traitement.

Le nouveau curriculum a été introduit progressivement, sur plusieurs années. Le groupe d'étudiants diplômé en juin 2002 a été la première promotion à bénéficier du nouveau curriculum complet. Un audit sur leur expérience et leur productivité clinique en dentisterie pédiatrique est présenté ici. Un large spectre d'expériences cliniques est documenté, avec soin complet réalisé chez une moyenne de 5 patients par étudiant.

Zusammenfassung. In den letzten Jahren wurde das Curriculum des Zahnmedizinstudiums an der Dublin Dental School radikal umgestaltet. Problemorientiertes Lernen hat die traditionellen Vorlesungen ersetzt, die Ermittlung klinischer Kompetenzen hat die Absolvierung von bestimmten Mindestpensen an Behandlungen abgelöst.

Das neue Curriculum wurde schrittweise, über mehrere Jahre eingeführt. Die Absolventen des Junis 2002 waren die erste Gruppe, welche vollständig nach dem neuen Curriculum studierten. Eine Überprüfung ihrer Erfahrung und klinischen Produktivität in Kinderzahnheilkunde ist hier präsentiert. Es wird eine große Spanne an klinischer Erfahrung dokumentiert, je Student wurden im Schnitt 5 Patienten behandelt.

Resumen. En los años recientes se ha producido un desarrollo radical del curriculum dental de la prelicenciatura en la Escuela y Hospital Dental de Dublín. El Problema basado en la Evidencia ha reemplazado a la tradicional estructura de lección teórica y se han transferido requisitos para completar ciertas cuotas de tratamiento en la valoración de la competencia clínica de los estudiantes en áreas específicas.

El nuevo currículo se ha introducido de forma gradual, a lo largo de varios años. El grupo de estudiantes que se graduaron en junio del 2002 fue la primera clase en tener completado en su totalidad el nuevo currículo. Se presenta aquí una auditoría de su experiencia y productividad clínica en Odontopediatría. Se documenta una amplio margen de su experiencia clínica y la provisión de extensos tratamientos a una media de cinco pacientes por estudiante.

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