palatal fissures[6]. This technique is now advocated by the BSPD guidelines[7]. This, however, is not standard practice for clinicians at the LDI.

Action plan This audit shows that fissure sealant retention at approximately 8 months review, following application under general anaesthetic, do not meet the current expected standard of 95% retention rate. Therefore the following recommendations are made: (i) to ensure careful application of fissure sealants under optimal moisture control including appropriate cleaning of teeth (either dry brushing or pumice and rotary brush[7]) prior to placement; (ii) routine use of dentine bonding agent[7] for fissure sealant application; and (iii) it is the intention of the group to re-audit fissure sealant retention after the adoption of this new protocol.

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The effectiveness of undergraduate and dental therapy students in treating children under local anaesthetic in a dental school setting

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Introduction In 2002 the treatment provided and roles performed by dental therapists in the UK were extended. Therapists can now carry out all treatment on the primary dentition (except pulpectomies) and some treatment on the permanent dentition (simple filling where the caries does not involve the pulp). Consequently their training with respect to clinical experience is similar to undergraduate dental students[1]. Both undergraduates (UG) and dental therapists students (DTS) have limited exposure to paediatric dentistry and therefore it is essential to try and optimize this time[2] and identify appropriate children on which treatment can be carried out for teaching purposes.

Aim To retrospectively audit the effectiveness of DTS and UG in treating children under local anaesthetic in the Paediatric Department, Leeds Dental Institute (LDI).

Standards The authors could find no literature with regards to what level of success could be expected from UG and DTS for providing treatment under local anaesthetic. From the child's and the student's perception a 100% success rate would be beneficial to both. At some point in the student's education, however, realizing that not all children respond to treatment under local anaesthetic is important and will stimulate an awareness of alternative methods of providing treatment.

Table 1. The modified O'Sullivan Scale[3] for quantifying treatment planned and provided.

Score	Treatment
1	Fissure sealant, extraction (1°), premolar extraction (2°)
2	Preventive resin restoration (1 surface), occlusal composite, pulpotomy (1°), molar extraction (2°)
3	Stainless steel crown, Class 2
4	Anterior strip crown
5	Surgical extraction, RCT (2°)

Methods All paediatric patients seen on the undergraduate dental clinic from September 2004 to July 2005 were initially selected and each patient was assessed for suitability for this audit. The selection criteria were: (i) children had to have undergone a primary consultation on one of the consultant clinics and then be placed on the undergraduate waiting list for treatment by students. Patients who went directly for general anaesthetic or those who had previously had treatment at the LDI were excluded; (ii) children had received continuity of care by one student (DTS or UG); and (iii) children had no further appointments with the student (DTS or UG).

If the clinical records met the above criteria the following clinical information was collected: age at initial consultation, gender, proposed initial treatment plan, treatment provided, treatment outcome and operator (therapist or dental student).

The O'Sullivan Scale[3] was modified to take account of modern material and treatment provided on the clinic (Table 1). These modifications are very slightly different to the scale used in other studies investigating oral midazolam[4] to accommodate root canal treatment and the fact that amalgam is rarely used in the department. This scale has the benefit of giving a numerical value to treatment planned or achieved with a higher value indicating an increase in quantity and complexity of treatment.

Treatment outcomes: *success* was defined as a patient who had had all their carious teeth treated under local anaesthetic. A second group that were classified as successful were the planned failures. These were either children who were referred to a DTS who could not fully undertake the treatment plan as some treatment was outside their remit (e.g. the treatment plan included extraction of permanent teeth) or children who were booked for general anaesthetic for extraction of unrestorable teeth but referred to UG or DTS for restoration of other teeth prior to the anaesthetic. The *failure* group were children referred with the intention that all treatment be provided under local anaesthetic by UG or DTS. This group was sub-divided into children needing a general anaesthetic to complete all treatment or requiring referral to a member of staff and/or needing sedation or treatment was incomplete for whatever reason, e.g. patients failing to attend appointments.

Reproducibility of data collection: a random 10% sample of patient's clinical records was reassessed for reproducibility of the data collection. Both inter (PD and AS) and intra-operator (AS) agreement was assessed by collecting the clinical information discussed earlier at a different time point and then comparing it with the original data collection.

Results The study population consisted of 88 children aged between 3 and 14 years. DTS treated 19 patients compared with 69 treated by UG: (i) age: (mean and standard deviation); DTS = 6.9 ± 2.6 years (successful group = 7.2 ± 2.8); UG = 7.4 ± 2.6 years (successful group: 7.5 ± 2.8); (ii) gender: DTS = 11 male, eight female; UG = 37 male, 32 female; and (iii) outcome: using the

Table 2. The breakdown of numbers of children for the successful (highlighted) and failure groups for DTS and UG.

Outcome	Group	
	Dental therapist students, *n* = 19	Undergraduate students, *n* = 69
Success	9	29
Planned failure GA†	0	7
Planned failure therapist referral	2	0
Unplanned failure GA†	5	20
Unplanned failure other (sedation, staff)	2	4
Unknown (DNA*/PCA‡)	1	9

*Did not attend the appointment; †general anaesthetic; ‡patient cancelled the appointment.

success criteria defined, 11 of 19 (58%) children successfully completed treatment in the DTS group and 36 of 69 (52%) in the UG group. A more detailed breakdown of the success and failure groups is given in Tables 2 and 3.

Figure 1a,b show the quantity and type of treatment provided by UG and DTS. This treatment is broken down into treatment planned (for all children) and then treatment planned and completed (for those children who successfully completed treatment). Reproducibility of data collection for a random 10% sample was 94% for intra-operator agreement and 86% for inter-operator agreement.

Discussion As the number of patients treated by DTS is small in comparison to UG it is meaningless trying to interpret any difference in the success rates between the two groups. Due to the difference numbers of UG and DTS taught per year, a random sampling of the UG would be required to give equal numbers in each group. It is important that students with limited clinical time maximize their paediatric experience during their training[2]. Students frequently find paediatric dentistry stressful as not only are they learning new clinical techniques but they also have to manage their child patient in a limited time frame of cooperation. Consequently for some students their experiences are negative as despite their best efforts the child is unable to cope with a course of treatment under local anaesthetic. Therefore, it is essential to try and identify appropriate children for treatment by DTS and UG.

This audit shows that both UG and DTS successfully completed all treatment required under local anaesthetic in over 50% of cases. In addition UG and DTS provide similar amounts and types of treatment for their patients. When differences between *successful* and *failure* groups are compared the results help to identify children suitable for treatment by DTS and UG.

Children in the successful group were: (i) older; (ii) required less units of work using the modified O'Sullivan scale. It should be noted, however, that these children still required significant amounts of clinical treatment; (iii) received work on fewer sextants of the mouth. Similar results have been shown for oral midazolam sedation[4] and confirm as more sextants of treatment are need the number of treatment visits increase; and (iv) for the UG group only, those cases that did not involve extraction of permanent teeth.

Table 3. The mean modified O'Sullivan scores[3] for treatment planned and achieved and the number of sextants involved for UG and DTS patients overall and those in the *successful* group.

	Modified O'Sullivan Scores[3]		
	Treatment planned	Treatment completed	Number of sextants
Dental therapy students, overall (*n* = 19)	13 (±7.8)		3.5 (±1.2)
Dental therapy students, successful (*n* = 11)	12 (±7.9)	14.1 (±7.4)	3.2 (±1.5)
Undergraduate student, overall (*n* = 69)	16.6 (±8.4)		4.2 (±1.0)
Undergraduate students, successful (*n* = 36)	14.4 (±8.3)	16.7 (±8.4)	3.9 (±1.2)

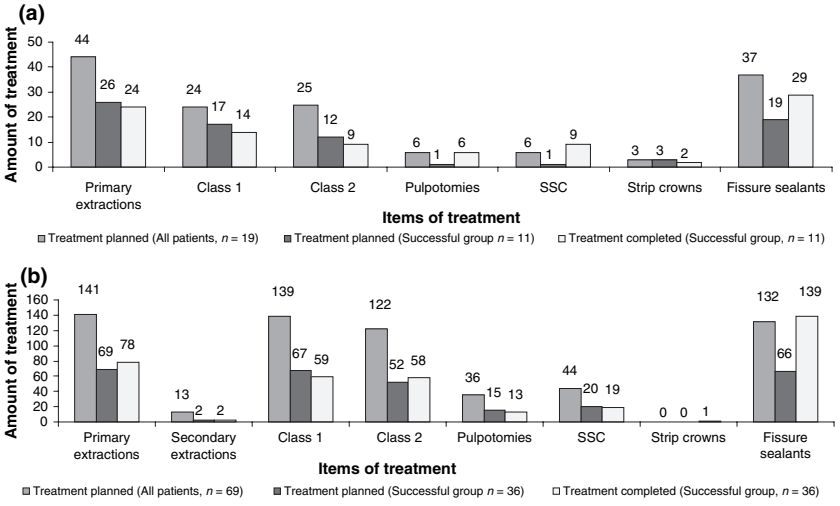

Fig. 1. (a) Dental therapists students treatment planned for all patients and treatment planned and completed for successful group. (b) Undergraduate treatment planned for all patients and treatment planned and completed for successful group.

Action plan The findings of this study have led to changes in the referral criteria to the UG and DTS treatment clinics. This audit will be repeated in the near future to determine whether the change in referral criteria has made any difference to the proportion of children successfully completing their course of treatment under local anaesthetic.

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Provision of dental care for paediatric oncology patients at Brimingham Children's Hospital

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Introduction Childhood cancer is fortunately rare with the UK incidence rates being in the range of 110–150 per million children per year. One in 500 children will be affected during the first 15 years of life[1]. There has been a large reduction in mortality due to early diagnosis and improved treatment regimes. By the year 2000, one in 900 adults aged 16–34 were survivors of childhood cancer[2].

In 2005, The National Institute for Health and Clinical Excellence published a document; Guidance on Cancer Services *Improving outcomes in children and young people with Cancer*[3]. This evidence-based document acknowledged that cancer treatment can result in acute oral problems such as mucositis and other viral, bacterial and fungal oral infections. Later in life, previous cancer treatment can cause structural anomalies of the developing dentition. The document identified that oncology patients often have inadequate dental input during their illness and are later often lost to dental follow up[3].

Further publications from The United Kingdom Children's Cancer Study Group (UKCCSG) and the Paediatric Oncology Nurses Forum (PONF)[4] included evidence based guidelines about mouth care for children and young people with cancer. The audit was carried out to investigate the current provision of oral health care for these individuals further.

Aims (i) To establish how much need there is for specialist paediatric dental input for paediatric oncology patients at Birmingham Children's Hospital; and (ii) to aid in the planning of future service provision at Birmingham Children's Hospital.

Objectives (i) To determine the number of patients currently regularly attending a dentist; (ii) discover when their last visit to the dentist was; (iii) establish if oral health screening was undertaken before chemotherapy treatment commenced; (iv) ascertain if patients have received specialist paediatric dental input; (v) investigate the barriers to dental care subsequent to a cancer diagnosis; and (vi) explore whether information on the effects of cancer therapy to the oral cavity is provided for the families of individuals requiring cancer therapy.

Standards The recommendations made by NICE 2005 and UKCCSG-PONF 2007 were taken as the gold standard[3,4]:

(i) All patients are screened at the time of cancer diagnosis by a dentist and any required oral health treatment is carried out before commencing cancer therapy. This would be ideally by a dentist linked to the cancer centre; any treatment required should be undertaken by a consultant or specialist paediatric dentist; (ii) information on the effects of cancer therapy on the oral cavity should be given to all cancer patients and their families; (iii) during medical treatment a dental assessment should occur every 3–4 months by a dentist linked to the cancer centre but the patient should also retain registration and communication with the usual dental provider. Any treatment required should be undertaken ideally by a dentist linked to the cancer centre. If this is not available, then oral health treatment by the usual dental provider should occur with clear communication and guidance from the cancer centre; (iv) a named professional should be identified to coordinate care throughout cancer therapy and during the transition to adult services; and (v) there should be clear protocols and referral routes for dental care.

Methods Data were collected in the form of a questionnaire (available at: http://www.bspd.co.uk) from the parents/guardians of children attending the oncology clinic. Following piloting, the questionnaire was distributed to all parents/guardians of children already attending the oncology out-patient department.

Results Fifty-six questionnaires were completed by parents/guardians of children aged 0–16 years over a 4 month period. Of these 80% (45) had acute lymphoblastic leukaemia, 5% (3) chronic myeloid leukaemia and the remaining 15% (8) a mix of other cancer types. The majority of patients 89% (50) were receiving chemotherapy, 9% (5) other chemotherapy and radiation therapy and 2% (1) were being observed. Ninety-one per cent (51) of patient's parents/guardians reported their child to be registered with a general dentist with 86% (48) having attended for an oral examination in the last 12 months. Only 9% (5) reported to have specifically visited a dentist for an oral examination before starting cancer therapy. Twenty-seven per cent (15) were referred by the oncologist during cancer therapy to the dental specialities department for further dental treatment due to specific oral health problems. Four per cent (2) of general dentists were reported to have said they were uncomfortable treating the child due to the medical diagnosis. Thirty-six per cent (20) of families were unsure of the general dentists thoughts and 59% (33) said the general dentist was still happy to see their child. Fifty-two per cent (29) would prefer dental care to occur locally and 25% (14) preferred the hospital with the remainder showing no preference. Eighty-nine per cent (50) had received information regarding care of their child's mouth during cancer therapy and 66% (37) said the effects of the medical treatment on the child's mouth and teeth had been discussed.

Discussion Regular access to general dental services did not meet the gold standard as 9% (5) of patients reported not to have a dentist and only 86% (48) were examined by a dentist in the preceding 12 months. Children were not routinely screened for oral disease or potential causes of infection on the diagnosis of cancer. Only a small number received specific specialist paediatric dental care. These were patients referred during cancer therapy by the oncologist when they were having problems and were often then seen as an emergency. Regular oral assessment by a dentist during cancer therapy did not occur. The families were reasonably well informed regarding oral health care during cancer therapy and the effects cancer therapy may have on their mouth and teeth.

At the present time it was recognized that, unfortunately, not all the gold standard recommendations as created by UKCCSG-PONF[4] could be met within the dental specialities department at Birmingham Children's Hospital due to lack of funding and limited staffing levels.