product must be able to do) was developed. This information was used to explore and generate a range of solutions. An evaluation of all the potential solutions was made to select the best ideas for progression. Development of the chosen solutions with consideration of human factors and engineering issues was followed to refine the concepts into a detailed design. Testing with 3D models was required to examine design concepts and prove engineering principles. Aesthetic and ergonomic issues were evaluated through user examination of mock ups.
*Results*. Complete design of a combined CaOH/MTA carrier and packer with reloading feature. Full-scale working prototype made for testing.
*Conclusions*. The development of the 'Carr-Pack' combined carrier and packer – an effective solution for the placement of CaOH/MTA into open apices.

# 3 Minute Presentations

**1**

**An audit of dentoalveolar trauma presenting at Glasgow Dental Hospital between 2002 and 2004**

*A. BELL*, G. WRIGHT, G. MCGLASHAN & R. R. WELBURY
*Division of Dentistry, University of Glasgow, UK*

*Aims*. To examine the profile of dentoalveolar trauma in a group of children attending the trauma clinic at Glasgow Dental Hospital from 2002 to 2004.
*Methods*. A retrospective audit using computer readable data collection sheets was carried out. Data were collected from the case records of 400 children who attended the trauma clinic between 2002 and 2004. Information obtained included patient age at trauma, patient sex, location, mechanism of trauma and type of injury sustained.
*Results*. 43% were aged between 8 and 11 years. 60% were male. 50% of trauma occurred outdoors and falls were responsible for 49% of injuries. Sporting injuries and assaults were commoner in males. Falls were more common in younger age groups (100% of injuries in children under 1 year). Most trauma occurred between July and September (32%). 58% sustained an injury to the dental hard tissues (54% of these were enamel-dentine fractures and 13% root fractures). PDL injuries were recorded in 82% and injuries to the supporting bone occurred in 4% of the children.
*Conclusions*. Most dentoalveolar trauma occurred in the summer with falls accounting for the majority of injuries, especially in younger children. Other aetiological factors such as sport, bicycles/scooters and assaults were more frequent in older chidren. More males than females presented with dental trauma and the most common age group was 8–11 years.

**2**

**Dietary, dental and social characteristics of children with severe tooth decay**

*F. L. CAMERON*, L. T. WEAVER, C. M. WRIGHT & R. R. WELBURY
*Division of Dentistry and Developmental Medicine, University of Glasgow, UK*

*Aims*. To investigate the relationship between a diet high in sugar and low in fibre on: dental caries, socio-economic status, nutritional status and large bowel function.
*Methods*. Cross-sectional study of a random sample of children 3–11 years attending for dental extraction under GA. Questionnaires obtained information on diet and

bowel habit. Examination yielded dmft and socio-economic status was by Carstairs DEPCAT score. Body Mass Index (BMI) was the measure of nutritional status. Bowel habit was used as an index of GI function.
*Results.* 164 children with mean age of 5·7 (1·8) years and mean dmft of 7·9 (3·5) took part. There was a significant relationship between Carstairs scores and dmft ($P = 0{\cdot}015$), and between dmft and BMI ($P = 0{\cdot}019$). No relationship was found between fibre score and bowel frequency. 82% of children never ate green vegetables.
*Discussion.* Children with high dmft scores had lower BMI's than children with lower dmft scores. In this small sample there was no relationship between dmft and bowel habit or between BMI and scores for sugar and fibre consumption. There is a need for a larger study of a random sample of children from the general population to determine whether these findings hold good for children in general. There are important implications for public health strategies aimed at protecting children from the constellation of food-related diseases.

**3**

**An oral health education programme based on the National Curriculum**

*A. CHAPMAN*, S. J. COPESTAKE & K. DUNCAN
*Division of Child Dental Health, Department of Oral & Dental Science, University of Bristol, UK*

*Aim.* To develop a teaching programme that could be used in a primary school and based on the National Curriculum guidelines to increase children's knowledge about oral health.
*Design.* A questionnaire was used to demonstrate children's oral health knowledge prior to the teaching programme and again after two and seven weeks.
*Setting.* Inner-city state run primary schools in Manchester and North London.
*Subjects.* Children aged 7 and 8 from Manchester ($n = 58$) and North London ($n = 30$).

Main outcome measure. Change in knowledge attributable to a newly developed teaching programme.
*Results.* The children in Manchester had a higher level of knowledge prior to the teaching programme. Following the teaching programme, children in both schools showed a significant improvement in dental health knowledge ($P < 0{\cdot}001$). Seven weeks later the Manchester children showed no significant loss of knowledge ($P < 0{\cdot}001$).
*Conclusions.* The results suggest that dental health education in schools can be effective and that knowledge is retained over time empowering children to make educated choices about their own health.

**4**

**Developmental dental defects in the child of a methadone user**

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[1]*Rotherham PCT and* [2]*School of Clinical Dentistry, University of Sheffield, UK*

*Presenting problem.* A 5-year-old boy was referred to the dental hospital by his dental practitioner for extraction of multiple primary molars under general anaesthesia. His grandfather, his legal guardian, reported that the teeth had deteriorated rapidly in the preceding few months. An initial medical history revealed only that he suffered from eczema. On examination, he was in the early mixed dentition. All primary teeth exhibited enamel hypoplasia. All primary molars were carious. Further questioning revealed maternal methadone, temazepam and tobacco use throughout pregnancy. In the postnatal period, the child had been treated for neonatal abstinence syndrome (opiate withdrawal). There was no known family history of similar dental defects.
*Clinical management.* Eight primary molars were extracted. The child returned to his dentist for preventive care. Ground and decalcified sections showed enamel hypoplasia and hypomineralization, and dentine hypomineralization, possibly restricted to tissue of postnatal origin. At follow-up, aged 9, the permanent molars and upper central incisors exhibited similar hypoplastic enamel defects, but later-developing incisor teeth were spared.
*Discussion.* Both clinical and histopathological findings suggest an acquired, rather than inherited, pathogenesis. The pattern observed suggests the acute systemic disturbance of neonatal abstinence syndrome as the likely cause. The association of such environmental factors and developmental dental defects in the child has not previously been described.

**5**

**Treatment planning extractions for children referred for general anaesthesia**

*H. M. HARTE*, N. A. O. PALMER & M. V. MARTIN
*Department of Clinical Dental Sciences, University of Liverpool, Liverpool, UK*

*Aims.* To investigate treatment planning of extractions for paediatric dental patients requiring general anaesthesia (GA).
*Method.* A prospective study where data was collected from a sample of 369 children referred to 3 Community NHS Trusts between July 01–January 03. The information collected

included numbers, types and distribution of teeth requested for extraction and changes to treatment plans at the pre-GA assessment. Any influence of waiting times was also investigated.
*Results.* Most children (67%) were aged 5–9 years, referred for multiple extractions of deciduous teeth, of which 85% were molars. Only 10% referrals were for permanent and 7% for mixed extractions. At assessment 49% patients had treatment plans changed, in 96% of cases to include more teeth. Children needing multiple extractions increased to 90%, where 60% required extractions in 3 sextants or more. The proportion of amended deciduous treatment plans increased with year of age for children aged 3–10 years, except those aged 8 years. Waiting times varied widely between referral and assessment (0–278 days). As waiting times lengthened beyond 2 weeks amended treatment plans increased from 44% to 52%. Length of delays from assessment to treatment (0–174 days) did not affect planned treatment.
*Conclusion.* CDS trained assessors appear to be more radical than referring dentists in prescribing extractions. Patient age and long delays from referral to assessment may be predisposing factors. Guidelines on planning extractions would be helpful. Supported by the Dept of Health.

**6**

**Juvenile arthritis of the temporomandibular joints: multi-diciplinary management and case review**

*O. A. JACKSON* & P. AYLIFFE
*Great Ormond Street Hospital for Children. University College London, UK*

*Presenting complaint.* Juvenile Arthritis (JA) is defined as a chronic condition that causes inflammation in one or more joints and begins before the age of 16. Joint deterioration can be mild, moderate or severe. The aetiology is unknown with genetic and environmental factors under research. There are few reported cases of JA affecting the temporomandibular joints alone. The debilitating consequences of such a presentation are discussed. The dominant presenting complaint of restricted mouth opening and mandibular hypoplasia demands early treatment, as there are major consequences to the form, function and aesthetics of the face and mandible.
*Clinical management.* Management strategies are complicated involving medical (methotrexate) and surgical (costochondral grafting) intervention as well as many other supporting disciplines.
*Discussion.* This condition has serious long-term sequelae through childhood into adulthood. Two clinical cases illustrate early and late complications.

**7**

**Factors affecting postoperative morbidity in children following dental general anaesthesia**

*R. MALHOTRA*, H. D. RODD, S. ROBERTSON, S. NORTH & L. E. DAVIDSON
*Department of Paediatric Dentistry, Charles Clifford Dental Hospital, Sheffield, UK*

*Aim of the research.* This study sought to investigate factors associated with postoperative problems amongst children undergoing general anaesthesia (GA) for dental treatment.
*Methods.* Clinical data were collected prospectively for 73 children undergoing comprehensive dental care at the Sheffield Children's Hospital. Information included: medical history, treatment performed, total operating and anaesthetic time, type of analgesia prescribed by the anaesthetist, postoperative problems (pain, bleeding, vomiting) and time spent on the ward prior to discharge. All patients were treated by one of three paediatric dental consultants, who adopted a standard approach for extractions: 0·5% bupivacaine with 1 : 200 000 adrenaline was given as an intraligamentary injection prior to tooth removal.
*Results.* 18 (25%) children were reported to have some postoperative problem prior to discharge. Children who experienced a problem were kept on the ward a significantly longer time (mean = 10·3 h) than asymptomatic children (mean = 3·8 h) ($P < 0{\cdot}001$, independent *t*-test). The frequency of problems was as follows: vomiting (16%), pain (11%) and bleeding (3%). Further statistical analysis revealed that reported postoperative problems were not significantly associated with the presence of a significant medical history, nature of dental treatment performed or total operating or anaesthetic time. However, the type of analgesia used by the anaesthetist did have a significant effect on postoperative problems ($P < 0{\cdot}012$, chi-square test). Notably, all patients who had been given morphine experienced postoperative vomiting and delayed discharge time.
*Conclusion.* Immediate postoperative problems in children appear to be influenced by the anaesthetist's choice of analgesia.

**8**

**Caustic soda ingestion: the oral implications**

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*Great Ormond Street Hospital for Children. University College London, UK*

*Presenting problem.* Although the effects of caustic soda ingestion in children are described in the literature, it is predominantly limited to the oesophageal and gastric

effects. Ingestion of sodium hydroxide-containing substances is fortunately rare, however, the effects can be devastating. Caustic soda is present in many common household products including dishwasher detergent and drain cleaner. Of all reported cases, over 65% are children, the majority being between the ages of two and three. Caustic soda causes liquefaction necrosis. The severity of the injury is associated with the quantity, concentration and duration of exposure.

*Clinical management*. The early and ongoing treatment of three children who ingested caustic substances is described. They were treated at Great Ormond Street Hospital for Children. Immediate management was supportive, and included elective intubation and rehydration. From an oral perspective, early treatment consisted of the construction of oral splints and screens in an attempt to preserve as much oral function as possible. Oral hygiene measures were adopted and hydrocortisone cream 1% was prescribed.

*Discussion*. The oral effects of caustic soda ingestion can be debilitating. Severe scarring can lead to stenosis of the oral musculature and extra-articular ankylosis, leading to microstomia and trismus. This has deleterious effects on oral hygiene and the dentition.

In the cases studied, it is too early to acertain the effect of the scarring on mandibular and maxillary growth and on the developing dentition. These patients require close lifelong follow up.

**9**

**Burden of cleft care**

*V. SRINIVASAN*, N. KILPATRICK & A. VELJANOVSKI
*Royal Children's Hospital, Parkville, Australia*

*Aim*. The aim of this study was to establish the burden of care for patients with unilateral and bilateral cleft lip and palate in terms of hospital visits with the medical, dental and allied health professionals.

*Material and method*. Records of patients who completed orthodontic treatment following orthognathic surgery between January 2000 and October 2003 were reviewed. A total of 21 consecutive patients with unilateral and bilateral cleft lip and palate were identified. Patients with clefting syndromes were excluded from the study. A single investigator methodically went through the dental and medical case notes of all patients and collected data regarding the number of admissions for operations, number of outpatient (OP) consultations, interdisciplinary reviews, dental and orthodontic treatment, diagnostic investigations and allied therapy.

*Results*. The results are presented in Table 1:

*Conclusion*. There was a wide variation in the number of visits for all categories with most children requiring a minimum of 4 admissions for treatment under general anaesthesia including primary lip and palate repair, tonsillectomy/grommets insertion, alveolar bone grafting and orthognathic surgery.

| | GA treatment review | Outpatient treatments | Outpatient treatments | Orthodontics (OP) | | Dentistry (OP) | |
|---|---|---|---|---|---|---|---|
| | | | | Review | Treatment | Review | Treatment |
| Mean | 8 | 58 | 64·2 | 8·9 | 44·6 | 12·2 | 12 |
| St. deviation | 3·45 | 15·16 | 16·98 | 4·46 | 15·60 | 4·17 | 6·58 |
| Range | 4–20 | 34–97 | 43–106 | 1–19 | 9–68 | 5–20 | 3–25 |

**10**

**Access to dental care amongst looked-after-children in the East Riding**

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[1]*School of Clinical Dentistry, University of Sheffield;*
[2]*East Riding of Yorkshire Council, UK*

*Aim of the research*. The aim of this study was to determine the dental registration status of looked-after-children in the East Riding of Yorkshire. The study also investigated whether information relating to a child's previous dental history was available to carers at the time of placement.

*Methods*. The study was undertaken June–July 2003, in collaboration with the Directorate of Social Services, Housing and Public Protection of East Riding of Yorkshire Council. Structured telephone interviews were conducted with 46 (of a possible 54) foster carers in the East Riding region. Information was sought regarding the past dental history and registration status of the 92 children, currently in their collective care.

*Principal results*. It was reported that, at the time of placement, very little dental information was available for these children. In over 70% of cases no information was given regarding the child's dental health, oral hygiene practices or most recent dental attendance. In only 32% of cases was the name of the child's previous dentist known. Over 60% of carers reported that looked-after-children did not keep the same dentist when they entered or moved within the care system. This led 50% of carers to approach their own

family dentist when seeking dental treatment for children placed in their care. Overall, 87% of looked-after-children were reported to be currently registered with a dentist, with 78% having attended in the previous 6 months.
*Conclusions.* This study found a very high level of dental registration amongst looked-after-children, but improved communications regarding previous dental history are needed at the time of placement.

**11**

**Intravenous midazolam sedation for orthodontic extractions in paediatric dental patients**

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[2]*Glasgow Dental School, UK*

*Aim.* To assess the safety and effectiveness of intravenous midazolam sedation in paediatric dental patients attending for orthodontic extractions.
*Method.* A randomized, controlled, crossover study was designed. Children aged 12–16 years, referred for orthodontic extractions, where two appointments were required were recruited. Sedation with either nitrous oxide/oxygen titrated to 30%/70% or intravenous midazolam titrated at 0·5 mg $min^{-1}$, to a maximum of 5 mg was used at the first visit, the alternative being used at the second visit. Every 2 min the patient's vital signs were recorded. Sedation levels, behavioural scores, and postoperative satisfaction were also reported.
*Results.* Forty-two children, mean (range) age 13·2 (12–16) years, were recruited A mean dose of 2·8 mg midazolam was administered to achieve adequate sedation for treatment. Verbal communication was maintained at all times. Vital signs for nitrous oxide and midazolam treatments were within acceptable clinical limits. The median (range) time to the maximum level of sedation was similar in both groups, 8 (4–20) minutes for midazolam compared to 6 (2–18) minutes for the nitrous oxide group. Fifty-one percent of children preferred intravenous midazolam, 80% being prepared to have this form of sedation again.
*Conclusion.* Intravenous midazolam (0·5 mg $min^{-1}$ to a maximum of 5 mg) for 12–16-year-olds, appears to be an effective form of conscious sedation, comparable to nitrous oxide/oxygen inhalation sedation.