A comparison of factors in pre-anaesthetic dental assessment and post-operative outcomes following dental care under general anaesthesia in a group of disabled and anxious patients

N Prabhu¹, J H Nunn² and G R Enever³

¹Research Associate, Department of Child Dental Health, Dental School, Newcastle upon Tyne, UK.
²Professor, Head of Department of Public and Child Dental Health, Dental School and Hospital, Dublin, Ireland.
³Department of Anaesthesia, Royal Victoria Infirmary, Newcastle upon Tyne, UK

Aim: To review the pre-anaesthetic dental assessment and post-operative outcomes in a group of 100 disabled and/or anxious patients who had comprehensive dental care in an outpatient general anaesthetic (GA) unit during the year 1999–2001. Design: A questionnaire-based study. All parents or carers were asked to identify the post-operative problems experienced by the patient and to comment on the hospital services provided. Clinical data for the patients (3–31 years) were examined for pre-existing disability or medical condition, type and duration of the GA and the nature of the recovery period. Where possible, senior staff examined the patients prior to the GA, recording estimated treatment time and treatment plan. Main outcome measures: Comparisons between the predicted and actual length of treatment time. Results: Average anaesthesia time was 60–90 minutes, with a similar time for recovery, although the anxious group required a significantly longer duration of general anaesthesia than the disabled group. Most post-operative symptoms were mild and of only a few days, with no significant differences between groups. Low rates of reported pain were observed in both the groups. Treatment time was significantly less than the predicted time for both the groups. Similarly, a larger number of restorative procedures, extractions and pit and fissure sealants were carried out than was actually predicted for both groups. Conclusions: Post-operative morbidity was negligible. All respondents were very satisfied with the services offered, except one complaint about long waiting lists.

Key words: Disabled, anxiety, pre-anaesthetic assessment, day-stay anaesthesia, post-operative outcomes

Introduction

Dentistry for the disabled patient encompasses as broad and diverse an area of oral health as the range of dental problems and disabling conditions that manifest in the whole population. It is generally accepted that many persons with disabilities have extensive dental needs which, for a variety of reasons, have not been adequately met. Some of the frequently cited reasons for dental neglect are inability to locate a dentist willing to perform treatment, financial and transport difficulties, lack of motivation and most importantly, fear and behavioural problems posed by these patients (Stiefel, 1981).

To successfully treat the disabled patient, from both a physical and an emotional point of view the dentist and other staff must establish confidence with the person and his parent/carer. These patients, for the most part, have been exposed to many unpleasant experiences throughout their lives and view with suspicion those who are treating them (Smith, 1981).

Co-operation is often lacking in individuals with severe disability, so that oral care and even examination in certain cases needs to be carried out with the help of a general anaesthetic. Because of the disruption to both parents and carers, in-patient care is kept to a minimum and only offered where clinically indicated (Enever et al., 2000). The majority of the dental care for patients in this category is therefore provided on a ‘day-stay’ basis, although at times
the criteria that are otherwise applied to general day-stay patients are not met (RCS England, 1992). However, these patients may have post-operative complications which are potentially increased due to their medical conditions. Symptoms range from mild nausea and vomiting to fever, upper respiratory tract infection or in exceptionally rare cases even respiratory arrest (Libman et al., 1979).

A careful pre-anaesthetic dental screening of patients prior to general anaesthesia is highly desirable if an optimal outcome is to be achieved. It helps to organise the dental treatment plan prior to the anaesthesia and also allows for consideration of the aftercare/maintenance for individual patients. The length of dental time required under the general anaesthetic is thus reduced (Lee et al., 1997). Additionally it helps to prepare the patient, which in turn improves patient comfort and satisfaction. It also optimises communication between the anaesthetist and the dental surgeon regarding individual patient care and finally allows patients and their parents/carers to consider the dental treatment options given and raise any specific questions pertaining to the treatment plan prior to the anaesthetic appointment (Conway, 1992).

The aim of the study was to assess the impact of providing dental care under day-stay general anaesthesia for people with disabilities or severe anxiety. Anxious/phobic patients are the ones, who under the routine conditions of the dental surgery are unable to maintain the level of cooperation required to receive dental care. Similarly, a disabled patient is unable to accept or receive routine comprehensive dental care by reason of physical, intellectual, emotional or medical problems.

The first objective of this study was to investigate the relationship between factors in the pre-anaesthetic dental assessment and any post-operative morbidity, following dental care under general anaesthesia in a group of disabled and anxious patients.

The second objective was to determine if there were differences between the treatment plan and the outcome after dental care in this group of patients.

Method

All parents or carers of disabled or phobic patients who had attended for comprehensive dental care under outpatient general anaesthesia at The Dental Hospital, Newcastle upon Tyne, during 1999–2001 were invited to participate in a questionnaire based study on a voluntary basis. Ethical approval was obtained for the study. Subjects were recruited for a period beginning from January 1999 until June 2001. The participants were assured of confidentiality and that their responses to the questionnaires would not affect future treatment. On the day of the treatment they were given a questionnaire with an explanatory letter stating the purpose of the study. The patients were either disabled and/or suffering from severe anxiety or phobia, making dental treatment difficult or impossible under local anaesthesia or sedation. The contents of the questionnaire were related to the post-operative problems experienced by the patient in the period after their day-stay attendance. It specifically questioned the parent/carer if they had noticed any change in the behaviour of the patient over the next 24–48 hours, any specific habits like tooth grinding, disturbed sleep and inability to eat. The parent/carer was also asked to make a note of the time period for which these symptoms lasted and if any medications were given to the patient to relieve the symptoms. Finally they were requested to make any comments on the services provided by the hospital. The parents or carers were then asked to return the completed questionnaires at the time of their subsequent follow-up visit to the Dental Hospital.

Simultaneously, the dental case records of each of these patients were carefully studied to obtain further information on their personal details, medical history, the type of anaesthesia delivered including the duration and the length of time of the recovery following anaesthesia.

Additionally, senior members of the staff examined these patients (where it was permitted by the patient) under the routine conditions of the dental surgery, prior to the general anaesthesia and recorded their estimate of the approximate length of time that would be required to complete the dental procedures. Similarly, in those subjects whose co-operation made it possible to examine the oral cavity, a provisional treatment plan was drafted, based on the clinical and radiographic evidence available.

After the completion of the dental procedure under anaesthesia, details were recorded in the patient’s record of both the length of time taken as well as the actual treatment that was delivered.

Data analysis were conducted in two stages using the SPSS software package. In the first stage, simple descriptive statistics were generated to describe the frequency of the variables amongst the two groups. In the second phase, bivariate correlation and multiple response analysis were used to make comparisons between the two groups.

Results

Demographics

A total of 100 subjects (44 females and 56 males) ranging in age from 3–31 years (mean age =13 years) were the subjects of this study. Physically and/or intellectually impaired patients made up 58 per cent of this study group (Table 1). The remaining patients, were either anxious, phobic or otherwise in need of general anaesthesia for dental treatment due to a variety of reasons, for example, the extensive or surgical nature of the procedures to be undertaken.

Anaesthesia

Most of the patients received EMLA cream or amethocaine gel and then an induction with either IV propofol (71 per cent) or gaseous sevoflurane and oxygen (26 per cent). The
patients were then intubated following a dose of vecuronium. Soft 6.0 I.D. cuffed nasal or RAE oral tubes were used as appropriate for the patient’s age or anatomy. All patients then had their throats packed with gauze prior to the surgery. Maintenance was by ventilation with nitrous oxide, isoflurane and oxygen. Atropine was required in only one case.

The average duration of general anaesthesia ranged from 30 minutes to over 90 minutes with a mean value at 62.20 ± 21.62 minutes for the disabled group and from 10 minutes to over 100 minutes with a mean value at 67.88 ± 27.13 minutes for the anxious group of patients. On comparison between the two groups, the anxious group of anxious patients required a significantly longer duration of anaesthesia than the disabled group (p<0.05).

The average length of time for the recovery ranged from 20 minutes to over 120 minutes with a mean of 72.89 ± 21.81 minutes for the disabled group and from 20 minutes to 120 minutes with a mean at 77.50 ± 25.27 minutes for the anxious group (Table 2). The majority of the patients in both the groups required between 60–90 minutes of time for the anaesthesia as well as for the recovery period. Patients were sent home with appropriate post-operative instructions and an outpatient appointment, usually between one to three months after the dental treatment.

Table 1. Demography

<table>
<thead>
<tr>
<th>Group</th>
<th>Sex</th>
<th>Mean age – yrs (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Disabled (58)</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td>Anxious (42)</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Total (100)</td>
<td>44</td>
<td>56</td>
</tr>
</tbody>
</table>

Table 2. Mean and standard deviation of duration and recovery from general anaesthesia (in minutes)

<table>
<thead>
<tr>
<th>Group</th>
<th>Duration (range)</th>
<th>Recovery (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>62.20 ± 21.62 (30–90)</td>
<td>72.89 ± 21.81 (20–120)</td>
</tr>
<tr>
<td>Anxious</td>
<td>67.88 ± 27.13 (10–100)</td>
<td>77.50 ± 25.27 (20–120)</td>
</tr>
</tbody>
</table>

Table 3. Mean and standard deviation of predicted and actual length of time for dental procedures (in minutes)

<table>
<thead>
<tr>
<th>Group</th>
<th>Disabled (range)</th>
<th>Anxious (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted</td>
<td>53.93 ± 19.33 (15–120)</td>
<td>63.08 ± 21.26 (15–120)</td>
</tr>
<tr>
<td>Actual</td>
<td>49.15 ± 16.73 (15–120)</td>
<td>60.38 ± 24.93 (15–120)</td>
</tr>
</tbody>
</table>

Nature of the procedures

The dental procedures that were undertaken included examination under anaesthesia, radiographs, endodontic treatment, advanced restorative procedures and some preventive care. The two most commonly predicted treatments for these subjects in both the groups were examination under anaesthesia and restorative procedures. However, the actual treatments received by the majority of the subjects, apart from examination under anaesthesia and restorative treatment, were extractions. Pit and fissure sealants were recommended for 26 per cent of the subjects in contrast to 51 per cent of patients who actually received them (Tables 4 and 5).

Post operative questionnaire results

The response rate to our questionnaire study was 78 per cent. Eleven out of the forty disabled patients who had returned the questionnaire suffered from mild post-anaesthesia, dentally related symptoms like pain and tenderness, including one who had bleeding for four days and was advised antibiotics by the dental practitioner, and one who complained of pain and needed analgesics.

Ten out of the 38 anxious/phobic patients who had returned the completed questionnaires complained of symptoms such as soreness of the mouth, swelling and feeling pale with the exception of two who had pain and swelling.

Dental procedures

Duration

The predicted length of time to complete the dental procedures ranged between 15–120 minutes for both the groups of patients with a mean value at 53.93 ± 19.33 and 63.08 ± 21.26 for the disabled and anxious group of patients, respectively. The actual length of time that was required to undertake the dental procedures ranged between 15–120+ minutes with mean values at 49.15 ± 16.73 minutes for the disabled group and 60.38 ± 24.93 minutes for the anxious group (Table 3). Although this difference in the length of time between the predicted and actual values for both the groups was very small it was statistically significant (p<0.005). Therefore the actual length of time taken to complete the dental treatment procedures was significantly less than the predicted time for both the groups of patients.
Discussion

An earlier, retrospective study relied on the patients/carers memory to recall the nature and extent of the problems after out-patient general anaesthesia for comprehensive dental care over a period of up to one year (Enever et al., 2000). It was therefore decided to embark on this investigation where the questionnaires would be given immediately after the general anaesthesia to the parent/carer for more reliable and accurate recall of events.

The average duration of time for the general anaesthesia in both the groups was between 60–90 minutes with mean values at 69 minutes; with the anxious group requiring slightly more time than the disabled group, this difference being statistically significant. The reason for this could be explained by the fact that since these patients are known to be phobic, they may have required more time at the induction phase than the disabled group.

There is no set limit as to how long a patient may safely be rendered unconscious for dental treatment under in-patient general anaesthesia; however operating times from two to four hours are not uncommon. The overall goal should be to provide as much dental treatment as possible within an acceptable time frame and to prevent the need for subsequent treatment under local anaesthesia (Dicks, 1981). However according to the guidelines of the Royal College of Surgeons of England, the duration for general anaesthesia for a child undergoing an operative procedure as a day-stay patient should not exceed 30–40 minutes (RCS, England, 1992).

Preventable delays during anaesthesia can be minimised to a certain extent by a dental examination where possible,
prior to the anaesthesia. This improves operating theatre efficiency and also gives the dentist and the dental team/assistants adequate time to plan and prepare for the procedures (Lee et al., 1997).

In the present study there was a significant difference between the predicted length of time for the dental procedures and the actual time taken to complete the procedures in both the group of patients. The actual length of time taken to complete the dental procedures for both the groups was less than the predicted time. One of the possible reasons for this being as most of these patients are uncooperative, a comprehensive dental examination including x-rays would have been possible only after induction of general anaesthesia. Therefore there is a strong likelihood that certain potential lesions could have been accurately diagnosed as carries free only at the time of the general anaesthesia, thereby accounting for a slightly shorter length of working time than was predicted for both the group of patients.

A significantly greater number of restorations and pit and fissure sealants were provided than was predicted for both the groups. In the disabled group 72 per cent received restorations relative to the 53 per cent who were predicted to need them. Similarly in the anxious group 54 per cent were planned to have restorations when 66 per cent actually received restorations. Likewise, it was planned that 27 per cent of the disabled and 23 per cent of the anxious patients were to have pit and fissure sealants as a part of their preventive procedure as compared with 63 per cent of the disabled and 33 per cent of the anxious patients in whom these procedures were actually carried out. These differences between the predicted and actual number of sealants and restorations could be because proper oral examinations were not carried out due to behaviour management problems posed by both these groups of patients. Moreover as there is a waiting period, which could extend up to six months between the patient’s initial examination and the day of the treatment it is possible that some new lesions would have developed during this period accounting for this discrepancy. Alternatively, some lesions could have progressed beyond restorations and would have required extractions. The other striking difference between the predicted and the actual procedures was in the disabled group of patients where only 27 per cent and 25 per cent of the patients respectively were predicted for extractions and preventive treatments as against 52 per cent for whom extractions were required and 52 per cent who needed preventive procedures.

Contrary to earlier studies (Holt et al., 1992), in the present study both the group of patients received a greater number of restorations than extractions. The responses to the questionnaires showed that many, potentially high-risk patients had comprehensive dental treatment under general anaesthesia with very few post-operative complications. In a retrospective study (Enever et al., 2000) 18 per cent of the disabled and 14 per cent of the anxious group of patients suffered from some form of post-operative symptoms in comparison to 27 per cent of the disabled and 26 per cent of the anxious patients in the present study. One of the reasons for this difference could be the retrospective nature of the earlier study which had to rely on the parent/carer recall of events over a period of up to one year, therefore the responses may not have been very accurate or reliable.

Low rates of reported pain were observed in both the groups, supporting the view that the experience of post-operative pain requiring analgesia was low; this is in agreement with the earlier retrospective study where 12 per cent of the total number of patients required some form of pain killers which is comparable to the 7 per cent in the present study. It is inevitable in the present study, that the accuracy of reporting on post-operative symptoms could differ between the disabled and the phobic patients. The low rates of reported pain in the disabled group might be because these patients are unable to express or communicate effectively their discomfort. However, parents and carers are capable of detecting quiet subtle changes in behaviour or demeanour which signal pain (Enever et al., 2000).

Similarly only 2 per cent of the total group of patients (one from the disabled and one from the anxious group) as against 10 per cent in the retrospective study, complained of post-operative vomiting and our results also suggested that nausea and vomiting occurred as frequently in the anxious and phobic group of patients as was seen amongst the disabled group. Following on from the retrospective study, a more pro-active approach to prescribing anti-emetics, in situations where post-operative nausea and for vomiting were likely, was adopted. This intervention is a possible explanation for the differences reported between the studies.

An important part of this study was in eliciting parent/carer satisfaction with the services offered. These responses serve as a useful tool allowing patients’ priorities to be identified, which may at times be different from the dentists’ perception. The parents/carers were very pleased with the treatment offered which was concluded from the positive comments received. Only one parent of an anxious patient complained of a long waiting period. Scarce resources mean that waiting times are seen as excessive by those who, not unnaturally, perceive their child’s needs as paramount, particularly if that child has an impairment (Enever et al., 2000).

**Conclusions**

The dental needs of severely disabled and anxious patients who require general anaesthesia for treatment pose a treatment planning dilemma. The ability to meet this challenge depends on a close co-operation between the dental team and the anaesthetist.

A pre-anaesthetic dental assessment is of prime impor-
tance in ensuring a quality dental service for these patients. In the present study the actual time taken to undertake the dental treatment was significantly less than the predicted time for both groups of patients. However, both groups required a greater number of restorations and pit and fissure sealants than was predicted, the possible reason for this being limited access to a proper oral examination either due to the patient’s medical condition or because of the behavioural problems posed by these patients.

In the present study the overall post-operative outcomes after outpatient general anaesthesia for dental procedures appeared to be very low in both groups, and the parent/carer satisfaction was reported to be high. Day-stay treatment under general anaesthesia can help successfully provide extensive treatment for the disabled and the fearful patient for whom treatment in the dental chair is very difficult or at times even impossible.

Acknowledgements
We are indebted to staff in the Oral Surgery Theatre suite for completing part of the data set and to patients and parents/carers for completing the questionnaire.

References
2. Smith LB. Dental care of the medically compromised child; A

References
2. Smith LB. Dental care of the medically compromised child; A

Acknowledgements
We are indebted to staff in the Oral Surgery Theatre suite for completing part of the data set and to patients and parents/carers for completing the questionnaire.

References
2. Smith LB. Dental care of the medically compromised child; A

Acknowledgements
We are indebted to staff in the Oral Surgery Theatre suite for completing part of the data set and to patients and parents/carers for completing the questionnaire.

References
2. Smith LB. Dental care of the medically compromised child; A

Acknowledgements
We are indebted to staff in the Oral Surgery Theatre suite for completing part of the data set and to patients and parents/carers for completing the questionnaire.

References
2. Smith LB. Dental care of the medically compromised child; A