

## Office-based anaesthesia: the UK perspective<sup>1</sup>

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### Abstract

Although office-based anaesthesia is not prevalent in the United Kingdom, anaesthesia has long been provided in community dental surgeries. Because of concerns over the safety of providing anaesthesia in hazardous remote locations, several expert working parties have examined UK dental anaesthesia and made numerous recommendations for safe practice. Concerning training, general anaesthesia, sedation, equipment, monitoring, resuscitation and building layout, these recommendations provide an excellent basis for local, regional or national guidelines for many forms of office-based anaesthesia. Putting the recommendations into practice, however, has had a fundamental impact on the provision of UK dental anaesthetic services and may have significant cost implications. These aspects should be carefully considered by anyone involved with planning or delivering office-based anaesthesia. © 1998 Elsevier Science B.V. All rights reserved.

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### 1. Introduction

The current enthusiasm for office-based anaesthesia in the United States has yet to reach the United Kingdom. No doubt this latest trend will make the Atlantic crossing sooner or later, just as so many fashions have done in the past, but currently the phenomenon remains an American one. Given the pioneering status of the United States in office-based anaesthesia, can Americans really hope to learn anything from their British colleagues? I believe that they can, for although Britain does not yet conduct office-based anaesthesia for general surgery, we have a long history in the related field of community-based dental anaesthesia. For many years, patients have been receiving sedation and general anaesthesia in their dental practitioner's surgery for a variety of procedures, especially simple tooth extractions. This was once a very common procedure, although the number of general anaesthetics ad-

ministered has been declining for many years. In 1967 there were approximately 2 million dental general anaesthetics administered, compared to about 370000 in 1988 [1]. This decrease is due partly to overall improvements in dental health, as well as to increased promotion of the use of local anaesthesia. Nevertheless, it is recognised that there will continue to be a public demand for general anaesthesia for dental procedures, especially amongst children, and that this is better conducted in the familiar and friendly atmosphere of the dental surgery than in a hospital unit. This desire to distance minor procedures from the hospital environment is also one of the factors which is driving the development of office-based anaesthesia in the USA. Overall, dental anaesthesia has a good safety record, with a mortality rate which compares very favourably with that for hospital-based general anaesthesia. Nevertheless, a number of deaths have occurred (Fig. 1) and while the overall number is comparatively small, any death resulting from a simple dental procedure in an otherwise healthy patient is a cause for serious concern. For this reason, several expert working parties have reviewed the practice of dental anaesthesia and have

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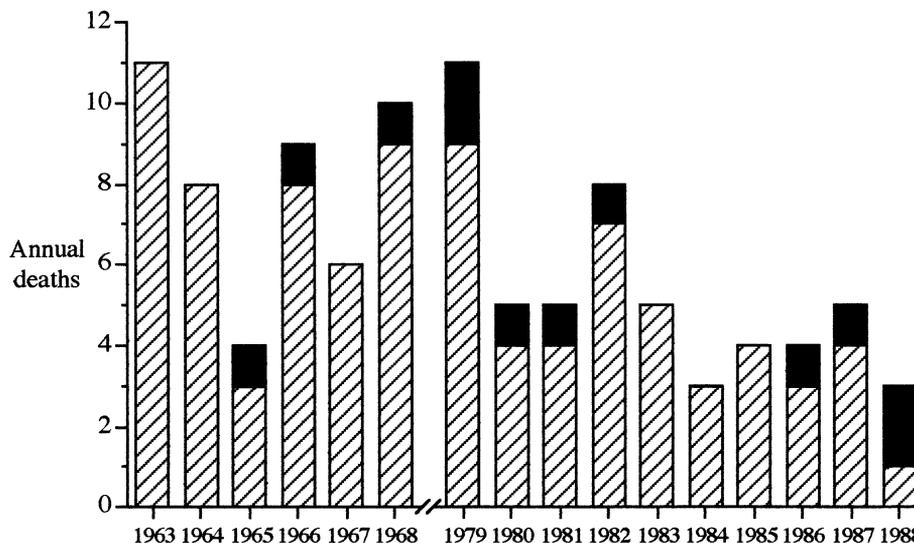


Fig. 1. Annual deaths resulting from dental practice involving general anaesthesia (hatched bars) or sedation (solid bars) in the years 1963–1968 and 1979–1988. Data from Tomlin (1974) [7] and The Poswillo report (1990) [1].

produced a number of recommendations aimed at greatly improving its safety. While some of these recommendations are specific to dental practice and the UK environment, the majority are equally applicable to other forms of office-based anaesthesia and should be considered by anyone attempting to establish local (or preferably national) guidelines for such a service.

## 2. General anaesthesia

Perhaps because of their pioneering role in the development of general anaesthesia, the administration of anaesthetics has always been a part of British undergraduate dental training. Previously, the majority of dental anaesthetics were administered by dentists, often working as both operator and anaesthetist. As long ago as 1967, the Joint Subcommittee of the Standing Medical and Dental Advisory Committee recommended that “all general anaesthetics should be administered by specialist anaesthetists trained in dental anaesthesia”. In practice, very little changed as a result of this report and in 1978 a further working party was set up, which published its findings in 1981 [2]. Usually referred to by the name of its chairman, the Wylie report called for a register of recognised dental anaesthetists, although it allowed dentists to be included on this list, provided they had received adequate training at both undergraduate and postgraduate level. The practice of a single person acting as both operator and anaesthetist was deplored, however. The requirement for specialist training was taken a step further by a more recent working party which was set up in 1989. When published in

1990, the Poswillo report recommended that dental anaesthesia should be regarded as a postgraduate subject, that all anaesthetics should be administered by accredited anaesthetists and that anaesthetic training should include specific experience in dental anaesthesia [1]. All of these suggestions are equally applicable to office-based anaesthesia. Just as dental anaesthesia presents its own unique problems and challenges, so too does office-based anaesthesia. Office-based anaesthesia should be recognised as a subspecialty, just as ambulatory anaesthesia has been in the past, and specific training should be provided. There is also a strong safety case for insisting that general anaesthetics should only be administered in offices (and other remote locations) by accredited (or Board-certified) anaesthetists. Trainee anaesthetists, who frequently work unsupervised in British hospitals, are rarely permitted to work alone in dental practices in the United Kingdom (where Nurse anaesthetists are not recognised at all).

The Poswillo report also considered the need to continue to provide general anaesthesia in dental offices. The authors advocated the use of local anaesthesia with sedation wherever possible, but recognised a continuing need for general anaesthesia. Local anaesthesia ( $\pm$  sedation) should probably be the preferred choice for all forms of office-based surgery, although with a far wider range of procedures than are encountered in dentistry, this will not always be possible. Taking the recommendations of the British expert working parties and extrapolating from them to the wider arena of office-based anaesthesia would produce the guidelines set out in Table 1.

### 3. Anaesthetic equipment

Traditional dental anaesthetic apparatus has adopted a different design to that used elsewhere and has involved intermittent (on-demand) gas flows and frequently incorporated the ability to administer hypoxic gas mixtures to patients. Although such equipment has not been manufactured for many years, older apparatus has often been retained for long periods, especially in infrequently used locations. It is common practice in hospitals (and elsewhere) that new equipment is sited in 'front-line' areas and older apparatus is displaced to less frequently used locations. The Wylie report recommended that equipment for the delivery of anaesthesia should conform to similar standards to those in hospital practice, in particular with regard to the inability to deliver hypoxic mixtures and the provision of oxygen failure alarms [2]. It is imperative that offices which propose to offer an anaesthetic service be equipped with modern anaesthetic equipment and are not furnished with old or 'second hand' apparatus. Not only should the equipment be inherently safe, but it should also be sufficiently similar to that which the anaesthetist is familiar with using in other locations. Arrangements must also be made for servicing such equipment and maintaining it to the accepted standard, with provision for its eventual replacement in due course. In the olden days, anaesthetists frequently carried their equipment with them as they moved from location to location. With the development of more sophisticated equipment, which was larger and heavier, it became necessary to fix apparatus at its site of use. Manufacturers are beginning to develop more transportable anaesthetic delivery equipment, but the effect of frequent movement and handling on the accuracy and safety of such apparatus needs to be considered. Offices which intend to provide an anaesthetic service should ideally

have anaesthetic equipment (and scavenging apparatus) installed as part of their infrastructure.

### 4. Sedation

The expert working parties on dental anaesthesia considered the use of sedation, with local anaesthesia, to be safer than general anaesthesia. 'Sedation' is a nebulous term which can describe a spectrum of consciousness ranging from almost fully alert to comatose. Ideally, the needs of the individual patient should be assessed and specific drugs should be used to treat pain, discomfort and anxiety, with each drug separately titrated to effect [3,4]. Because of their familiarity with potent sedative-hypnotic drugs and managing unconscious patients, anaesthetists are ideally suited for providing sedation and monitoring its effects. In dental and office-based practice, however, it may be impractical to have anaesthetists available whenever sedatives are used. At present, British surgeons frequently administer sedative drugs (e.g. for endoscopy) for this reason. The provision of simple sedation by non-anaesthetists may be reasonably safe, provided that there is a low risk of unconsciousness or respiratory depression. This will depend upon the technique, with certain drugs (e.g. propofol) being more likely to produce loss of consciousness [5] and some combinations (especially opioids and benzodiazepines) producing severe respiratory depression [6].

The Poswillo report [1] defined the term 'simple sedation' as "a carefully controlled technique in which a single intravenous drug (or a combination of oxygen and nitrous oxide) is used to reinforce hypnotic suggestion and reassurance..." . In addition, the technique "allows verbal contact with the patient to be maintained at all times". Furthermore, "the technique must carry a margin of safety wide enough to render unintended loss of consciousness unlikely". Any technique of sedation not coming within the above definition was considered to be general anaesthesia and therefore unsuitable for non-anaesthetists to perform. On this basis, the Poswillo report suggested that dentists could safely administer sedatives to their patients, provided that they also received training in practical aspects of sedation and were able to adequately monitor their patients and respond to any likely problems. The routine use of flumazenil was also disallowed, both because it would encourage the development of excessive sedation and because its short duration of effect permits resedation to occur after the patient is discharged. Once more, many of the recommendations concerning sedation may be adapted to office-based anaesthesia, as illustrated in Table 2. Where sedation is managed by adequately-trained anaesthetists, these guidelines need not all be applied.

Table 1  
Recommendations concerning the use of general anaesthesia in office-based practice, modified from Poswillo (1990) [1]

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- (1) The use of general anaesthesia should be avoided wherever possible
  - (2) The same general standards in respect of personnel, premises and equipment must apply irrespective of where the general anaesthetic is administered
  - (3) Office-based anaesthesia must be regarded as a postgraduate subject
  - (4) All anaesthetics should be administered by accredited anaesthetists who must recognise their responsibility for providing office-based anaesthetic services
  - (5) Anaesthetic training should include specific experience in office-based anaesthesia
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Table 2

Recommendations concerning the use of sedation (by non-anaesthetists) in office-based practice, modified from Poswillo (1990) [1]

- (1) Sedation be used in preference to general anaesthesia wherever possible
- (2) Intravenous sedation should be restricted to the use of a single titrated dose of one drug with an end point remote from anaesthesia
- (3) The use of flumazenil should be reserved for emergencies
- (4) Additional caution should be exercised when administering sedation to children
- (5) Practical training in office-based sedation should be provided for surgeons
- (6) More emphasis should be given to (surgical) undergraduate training in sedation
- (7) Surgeons wishing to administer simple sedation should complete a recognised training course
- (8) All surgical undergraduates should be proficient in venepuncture and the use of indwelling cannulae
- (9) Surgeons must be aware of the significance of pulse oximeter readings
- (10) Patients receiving sedation should be accompanied by a responsible person

### 5. Facilities, monitoring and support staff

Offices which provide sedation and, especially, general anaesthesia for minor surgery will require more equipment and facilities compared to those which are used only for consultations. The additional requirements for resuscitation will be considered later. Patients who have received general anaesthesia should be allowed to recover in a separate room and be cared for by a dedicated and adequately trained member of staff. Supervision of patients recovering from sedation is also required, although it has been suggested that additional personnel may not be required because of the shorter recovery period [1]. Other recommendations concerning basic facilities are listed in Table 3.

American anaesthesiologists are familiar with minimal monitoring standards, although these have been less strictly applied in the UK. The level of monitoring suggested for dental surgeries providing general anaesthesia are listed in Table 3, and these recommendations would also be suitable for other forms of office-based anaesthesia. Capnography was only considered necessary in association with tracheal intubation because readings obtained from the alternative, a dental nasal mask, are often unhelpful. In the wider office-based setting, capnography should be used with laryngeal masks and probably also with face masks.

Skilled assistance for the anaesthetist has always been a cornerstone of UK anaesthetic practice and hospital-based anaesthetists always work with a specifically-

trained nurse or operating department assistant. In an isolated environment, where additional help may be far away, the provision of skilled assistance is even more essential. The assistant should be dedicated to helping the anaesthetist in caring for the patient and not also responsible for aiding the surgeon or performing other duties [2]. This assistant should be adequately trained in order to be capable of looking after and monitoring an unconscious patient, assisting with the anaesthetic and monitoring equipment, helping with venous access and airway management and should also be trained in resuscitation [2].

### 6. Resuscitation

Patients may collapse in a surgeon's office at any time. This may be due to a variety of reasons, and may not necessarily involve general anaesthesia or sedation. For this reason, resuscitation facilities should always be available and staff should be adequately trained. Where general anaesthesia and sedation are practiced, these provisions are of even greater importance. Fortunately, the need for resuscitation occurs relatively infrequently, even in quite busy units. For this reason, it is essential that all necessary equipment is regularly checked and maintained and that procedures are rehearsed frequently. Effective resuscitation cannot be provided by a single person so it is important that all members of the team are adequately trained. In order to ensure effective resuscitation, the team must work well together and training and practice should therefore be a group event. Awareness of the patient's underlying medical condition(s) and chronic medication may help in identifying the likely cause of collapse and guide successful resuscitation, and so a thorough medical history should always be obtained (and documented) prior to begin-

Table 3

Recommendations concerning facilities for office-based anaesthesia and minimal monitoring standards (for general anaesthesia), modified from Poswillo (1990) [1]

The same general standards in respect of premises must apply irrespective of where the general anaesthetic is administered

Offices delivering general anaesthesia should be registered and regularly inspected

Adequate recovery facilities (and personnel) should be available

At no time should the recovering patient be left unattended

Minimal monitoring should include the following:

Pulse oximeter (also recommended for sedation)

ECG

Noninvasive blood pressure

Capnography (whenever the trachea is intubated)

Appropriate training must be provided for those assisting the anaesthetist and surgeon

Table 4

Recommendations concerning resuscitation in office-based anaesthesia, modified from Poswillo (1990) [1]

- (1) Every member of the office team should be trained in resuscitation. Training should be a team activity
- (2) Every member of the office team should have their proficiency in cardiopulmonary resuscitation tested and certificated
- (3) Resuscitation procedures should be regularly practiced in the office under simulated conditions
- (4) A history of preexisting medical conditions and regular medications should be taken from the patient prior to starting any treatment
- (5) Surgeons must be proficient in the use of airway adjuncts. Surgical students should be taught basic life support at an early stage and be proficient in airway management
- (6) All anaesthetists practicing office-based anaesthesia must have advanced life support skills
- (7) All surgeons must be proficient at establishing access to the circulation
- (8) All surgeons should examine their offices critically with regard to their suitability for resuscitation and access for paramedics and emergency services
- (9) Suitable equipment (Table 5) and drugs (Table 6) should be available for resuscitation. Equipment must be regularly serviced and maintained, while drugs must be checked regularly and out of date stock replaced

ning treatment. Many of these points were highlighted by the Poswillo report, and their recommendations concerning resuscitation are especially pertinent to other forms of office-based practice (Table 4).

In addition to training staff and providing equipment, consideration should be given to resuscitation when planning new offices (or adapting old ones) to deliver anaesthesia. The operating surface must be sufficiently firm to permit closed chest compression and the operating table should also be able to be tilted head-down quickly. There should be sufficient space around the patient to allow several people to perform the tasks which will be necessary during resuscitation, including cardiac massage, airway management and establishing additional venous access. Consideration should be given to how long it will take for an ambulance to arrive and what will be the additional journey time to the nearest hospital. Once the ambulance has arrived, it would be unfortunate for additional time to be wasted trying to gain access to the office via stairways or narrow corridors and doorways. Ideally, offices providing an anaesthetic service should be located on the ground floor with an unimpeded approach for emergency services [2]. The workload implications for a hospital supplying emergency care to patients receiving office-based anaesthesia should also be considered.

Table 5

Essential resuscitation equipment, modified from Poswillo (1990) [1]

Airway maintenance	Suction apparatus (portable) Simple airway adjunct (e.g. pocket mask) Self-inflating bag, valve and mask Portable oxygen supply and delivery system Cricothyroid puncture needle
Circulation maintenance	Syringes, needles and iv cannulae Infusion sets Defibrillator
Miscellaneous	Stethoscope Scissors and tape Tourniquet Sphygmomanometer
Additional items available where sedation is used	Suction tubing and catheters Oropharyngeal airways
Additional items available where general anaesthesia is used	Additional items as for sedation Nasopharyngeal airways Range of tracheal tubes Adult and paediatric laryngoscope Mouth gag (with offset jaws) Magill forceps Lubricant jelly

Because outside help will never be immediately available, the office should be self-sufficient in basic equipment (Table 5) and drugs (Table 6) for resuscitation and life support. Emergency equipment should be regularly inspected and serviced to ensure that it remains functional on those rare occasions when it is actually

Table 6

Drugs for emergency use, modified from Poswillo (1990) [1]

First line drugs	Oxygen Adrenaline (epinephrine) Lignocaine (lidocaine) Atropine Calcium chloride Sodium bicarbonate Glyceryl trinitrate (tablets or sublingual spray)
Second line drugs	Aminophylline Salbutamol (albuterol) inhaler Injectable antihistamine Dextrose 50% Hydrocortisone Flumazenil Naloxone Midazolam or diazepam Suxamethonium (succinylcholine) Crystalloid infusion solution Colloid infusion solution

required. Drug supplies should be stored under appropriate conditions and stock should be replaced when it approaches its expiration date. Since many of these drugs will (with luck) never be used, arrangements may be made with more frequent users to exchange supplies of older stock, rather than having to discard out of date drugs. The decision on whether or not to stock dantrolene (for treatment of malignant hyperpyrexia) is a difficult one (because of the short shelf-life and significant cost), and may depend on the rapidity with which supplies can be obtained from another source. Sharing arrangements may be possible where several offices (or office and hospital) are located nearby.

## 7. Summary

Office-based anaesthesia may appeal to patients because of informality and convenience and to providers because of greater efficiency and economy. However, the physician's office must be recognised as a hostile environment in which to deliver anaesthetic services and be treated accordingly. It is essential that adequate levels of equipment be provided for anaesthesia administration, patient monitoring and resuscitation and that all staff are adequately and appropriately trained. The possibility of complications must be recognised and planned for if office-based anaesthesia is not to become "a disaster waiting to happen". Many of the necessary lessons have already been learned during the long experience of outpatient dental anaesthesia in the UK and these should be considered before moving further forward. Safe practice is possible, but the UK experience

has demonstrated that this standard of care is not necessarily cheap. Apart from the improvements in safety which have resulted from the British expert working parties' reports, one of the major changes to have occurred is a substantial reduction in the number of dental surgeries providing anaesthetic services. The main reason being the high cost required to equip such locations to an adequate standard. Ironically, many healthcare regions have now established fully equipped and staffed dental surgeries within the hospital, and closed community clinics! If office-based anaesthesia is to succeed in the USA, it must be for the correct reasons and not simply to save money.

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