

IN BRIEF

- The decade to 2000 was characterised by major changes in NHS oral surgery provision; including a switch from in-patient to day case minor surgery.
- The publication of research and guidelines was followed by reductions in third molar removals in the GDS.
- Numbers of ordinary extractions and hospital waiting times did not change.
- There was a sevenfold increase in GDS claims for extractions of special difficulty in the period 1980–2000.
- After 1998 there was a major decline in the use of GAs in the GDS but no indications of a similar trend for minor surgery in the HDS.

Trends in oral surgery in England and Wales 1991–2000

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Objective To investigate trends in oral surgery in England and Wales 1991–2000.

Methods Oral surgery procedure data were derived from Dental Practice Board and Department of Health Hospital Episode Statistics.

Results There was a 6% increase in minor oral surgery (MOS) procedures, including ordinary extractions, extractions of special difficulty, apicectomies and third molar removals, carried out in the General Dental Services (GDS) but the number of third molars removed fell by 32% after 1997. General anaesthetics (GA) administered in the GDS fell by 77% and the number of sedations rose 54% after 1998. There was concentration of minor oral surgery in practices: in the year 2000, 88% of practitioners carried out less than five third molar removals. In the Hospital Dental Service (HDS) there was a 98% increase in day surgery, and a 53% decrease in ordinary admissions for minor oral surgery. HDS waiting times remained constant over the ten year period.

Conclusions The principal trends were substantial decreases in apicectomies, third molar removals after 1997 and GAs after 1998; increases in extractions of special difficulty and concentration of MOS in the GDS. Numbers of ordinary extractions did not change. In the HDS there was a large shift from in-patient to daycase provision which has facilitated expansion of maxillofacial surgery. This is an important example of NHS reconfiguration. Perhaps the most important implication of these changes concerns the place of MOS in vocational training.

Trends in oral surgical practice in England and Wales have been documented since 1979. Shepherd and Jones¹ found that between 1979 and 1984 the number of surgical extractions performed in the General Dental Service (GDS) more than doubled and that the number of 'discharges and deaths' in the Hospital Dental Service (HDS) increased by about 40%. It was hypothesised that these increases were caused by an increase in the prevalence of impacted teeth consequent upon lower rates of tooth loss, the introduction of panoramic radiographs which increased detection of unerupted teeth and preference of patients for 'free' hospital treatment as opposed to care in the GDS where direct charges are levied.

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Thomas *et al.*² studied provision of oral surgery services in England and Wales between 1984 and 1991 and found that both in-patient throughput and 'discharges and deaths' in HDS oral surgery had increased whereas numbers of people waiting for in-patient surgery had decreased. This suggested that although demand still exceeded the supply of oral surgery the efficiency of service provision had improved.

One oral surgical procedure that has received much attention over the past decade has been third molar removal: there has been particular focus on improving the rationality of surgery. Particular issues have included indications for removal,³ post-operative complications,⁴ surgeons' perception of need for surgery,⁵ patients' perception of outcomes⁶ and, possibly most importantly, decision analyses.^{7–9} The evidence emanating from this research was the basis of the first technology appraisal carried out by the National Institute for Clinical Excellence (NICE).¹⁰

OBJECTIVES

The objectives in this third investigation of trends in oral surgery in England and Wales were:

- To investigate trends in minor oral surgery in primary and secondary care, including in relation to anaesthetic provision, 1991–2000.
- To test the hypothesis that this period has seen a concentration of minor oral surgery (surgical dentistry) in emerging specialist practices.

METHODS

General Dental Service (England and Wales)

The frequencies of oral surgical procedures were derived from the *Digest of Statistics (1991–2000)* produced by the Dental Practice Board (DPB).¹¹ The following procedures were studied: the numbers in parentheses are DPB codes:

- Apicectomies: incisors and canines (1521); pre-molars (1522); buccal root molar (1523); all other roots (1531); retro root fill (1541).
- Extractions: 1 tooth – 17+ teeth (2101, 5201).
- Extractions of special difficulty: buried root soft tissue (2201, 5211); bone removal – incisor and canine (2202, 5212); other not 3rd (2203, 5213).
- Impacted third molars: impacted 3rd not divided (2204, 5214); impacted 3rd requiring division (2205, 5215).
- General anaesthetics and sedations (24,25,54)

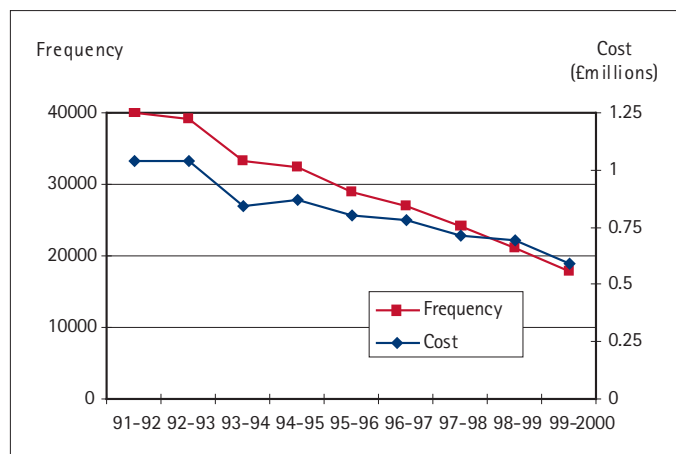


Fig. 1 GDS (England and Wales) – number and cost of apicectomies

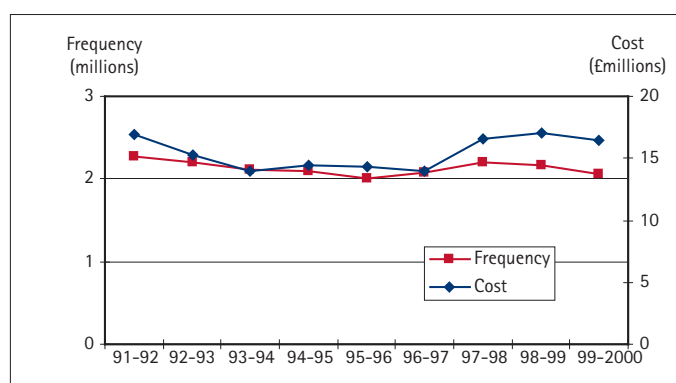


Fig. 2 GDS (England and Wales) – number and cost of ordinary extractions of permanent teeth

The hypothesis that there was a concentration of minor oral surgery (MOS) services in the GDS in this period was tested by investigating changes in the proportion of practitioners and practices carrying out third molar removal. An increase in the proportion of practitioners and practices carrying out less than 5 procedures per year and an increase in those carrying out more than 100 procedures per year implies a concentration of services in these practices. However, it was not possible to identify ‘specialist practices’ from data supplied by the DPB or to investigate trends in private provision.

Hospital Dental Service (England and Wales)

Hospital Episode Statistics (HES) developed by the Department of Health,¹² were the sources of information regarding oral surgical procedures performed in the NHS in England. Health Solutions Wales, linked to the Welsh Assembly, supplied the equivalent data for Wales between 1992–1998 since it did not open until 1992. There were three units of measurement: the number of finished consultant episodes (FCEs), average waiting times in days (available in England only) and frequency of administration of the various anaesthetic modalities (available in Wales only). HES in England did not include information regarding anaesthetic modality.

Finished consultant episodes are defined by the DOH as ‘a period of patient care under one consultant within one healthcare provider’.¹² This definition takes into account patients who consult more than once during one year. This measure of activity has both advantages and disadvantages.¹³ The various oral surgical procedures were defined using OPCS4 codes:¹⁴

- Surgical removal of tooth (3rd molars): impacted wisdom tooth (F09.1); wisdom tooth nec (F09.3).
- Surgical removal of tooth (other): impacted tooth nec (F09.2); tooth nec (F09.4); retained root of tooth (F09.5); other specified (F09.8); unspecified (F09.9).

- Simple extraction of tooth: full dental clearance (F10.1); upper dental clearance (F10.2); lower dental clearance (F10.3); extraction of multiple teeth nec (F10.4); other specified (F10.8); unspecified (F10.9).
- Apicectomy of tooth (F12.1).
- Surgical exposure of tooth (F14.5).
- Excision of dental lesion of jaw: enucleation of dental cyst of jaw (F18.1); marsupialisation of dental lesion of jaw (F18.2).

Private Provision

Attempts were made to collect meaningful data from the private sector but this was not possible because of the lack of data in the public domain. One major company, PPP Healthcare, provided data on the numbers of third molar removals and these were analysed to investigate trends for the private sector.

RESULTS

GDS data revealed that the annual number of apicectomies fell by 56% over the study period (Fig. 1), that numbers of ordinary extractions remained at an almost constant level (Fig. 2) and that extractions of special difficulty increased by 112% (Fig. 3). Whereas the decline in the number of apicectomies represents a decrease in annual cost to the taxpayer of about £450k (Fig. 1), the cost of extractions of special difficulty between March 1991–March 2000 increased more than two-fold to £17.26 million (Fig. 3) with year on year increases of over £1 million.

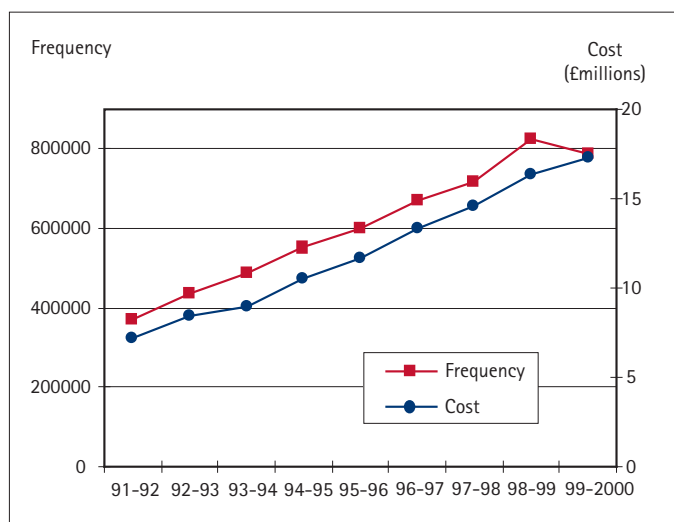


Fig. 3 GDS (England and Wales) – number and cost of extractions of special difficulty

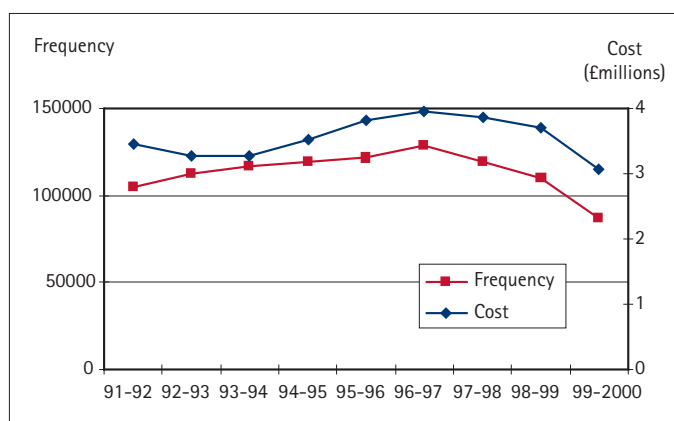


Fig. 4 GDS (England and Wales) – frequency and cost of impacted third molar extractions

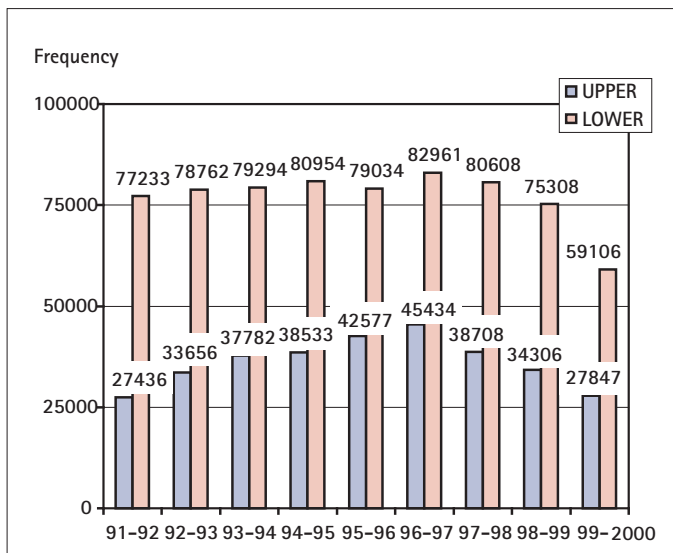


Fig. 5 GDS (England and Wales) – impacted third molar extractions: comparison between upper and lower third molars

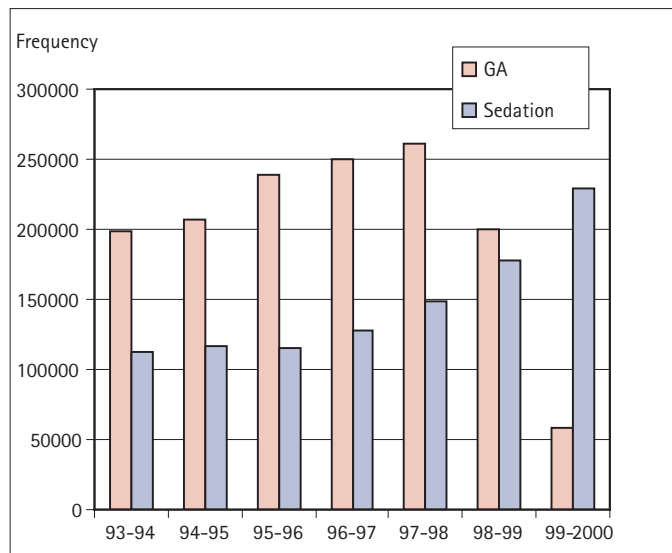


Fig. 7 GDS (England and Wales) – number of general anaesthetics and sedations

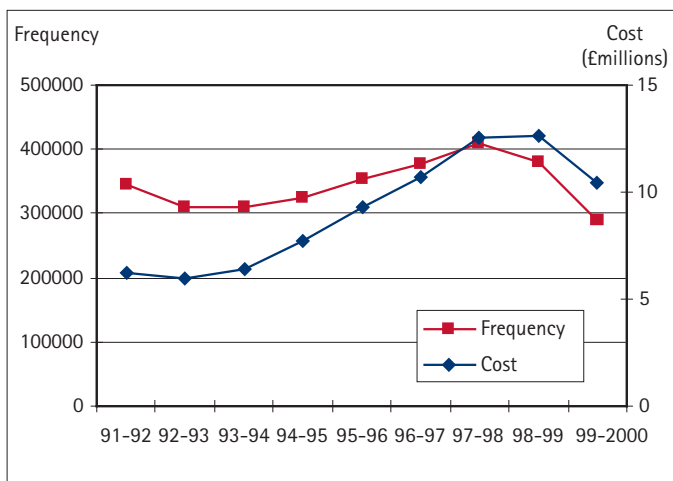


Fig. 6 GDS (England and Wales) – number and cost of general anaesthetics and sedations

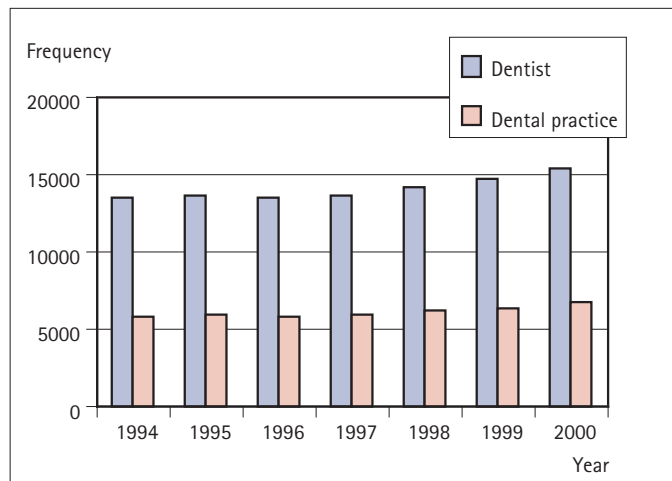


Fig. 8 GDS (England and Wales) – number of dentists and dental practices claiming for 0-5 third molar removals per year

The number of impacted third molar extractions in the GDS increased steadily until 1997, after which there was a 32% decrease to 2000 (Figs 4,5). Figure 5 shows that this trend applied as much to upper as lower third molars although, overall, twice as many impacted lower third molars were removed as impacted upper third molars.

The total number of general anaesthetics (GAs) and sedations administered rose by approximately 20% until 1998, but subsequently decreased by about 30% to 2000. The cost to the taxpayer of these procedures rose by almost 200% from 1991 but reduced after 1997 by 17% (Fig. 6). DPB data allow analysis of GAs and sedations administered as separate groups since 1993 (Fig. 7). There was a steady increase in numbers of GAs and sedations until 1998, followed by a very substantial reduction in frequency of GAs from 260,763 in 1998 to 59,004 in 2000, a reduction of 77.4%. The number of sedations, however, increased markedly from 148,568 in 1998 to 228,946 in 2000, a 54% increase.

The provision of MOS measured in terms of removal of wisdom teeth became more concentrated in a relatively small number of practices (Figs 8,9) by a smaller proportion of practitioners. In the year 2000, 87.5% of practitioners carried out very small numbers of third molar removals (<5/year). The number of practitioners who removed more than 100 third molars/year increased by about 60%, from 0.3% of the total number of practitioners in 1994 to 0.5% in

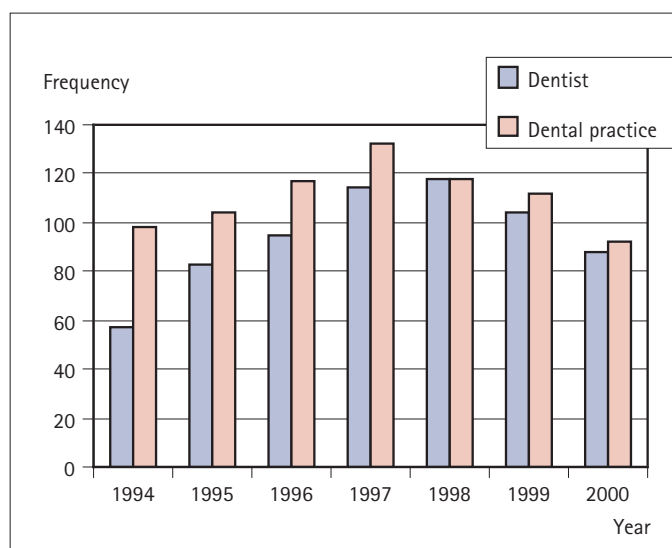


Fig. 9 GDS (England and Wales) – number of dentists and dental practices claiming for >100 third molar removals per year

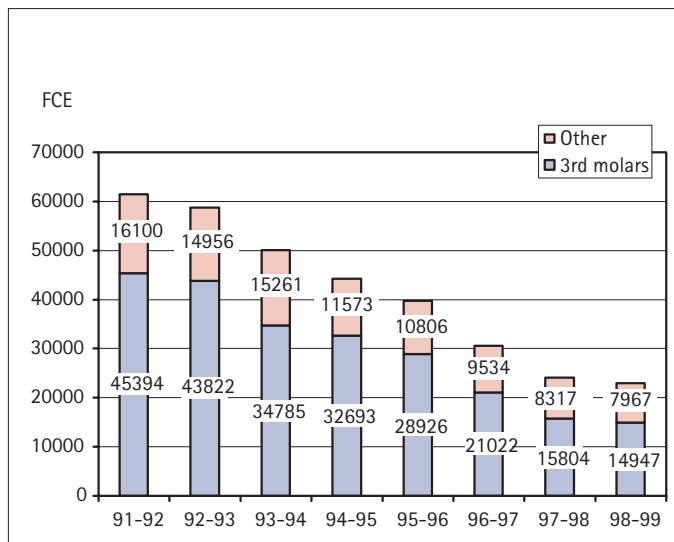


Fig. 10 HDS (England and Wales) – surgical removal of tooth (ordinary admission). Note: Data from 1991-92 are for England only

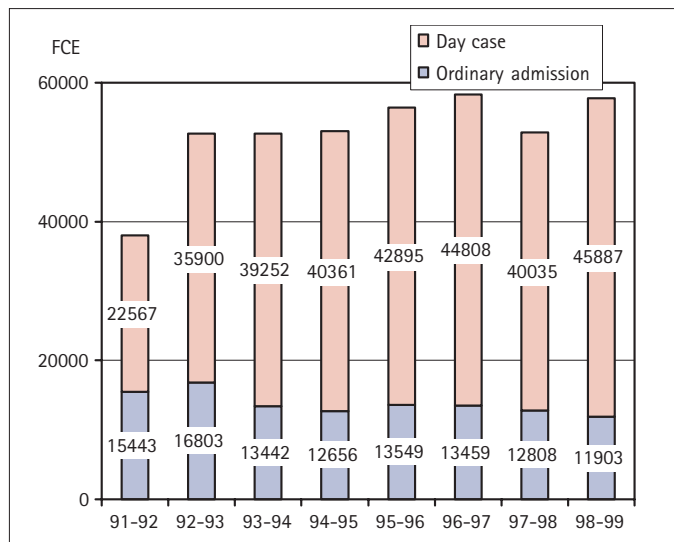


Fig. 13 HDS (England and Wales) – simple extraction of tooth. Note: Data from 1991-92 are for England only

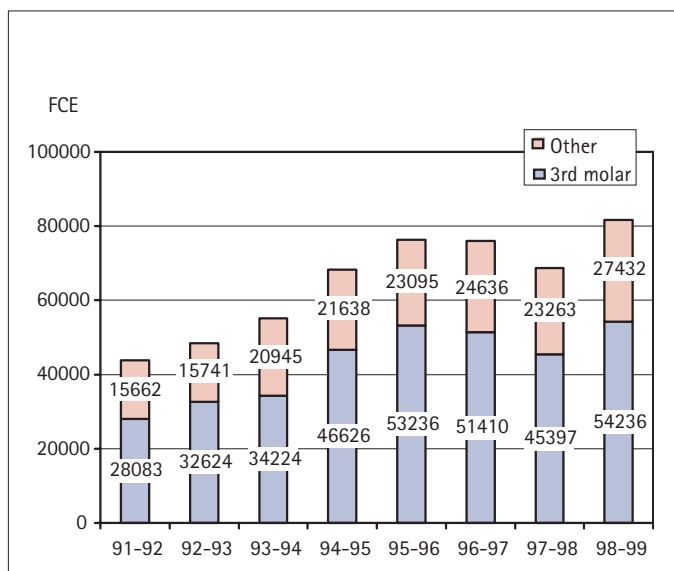


Fig. 11 HDS (England and Wales) – surgical removal of tooth (day case). Note: Data from 1991-92 are for England only

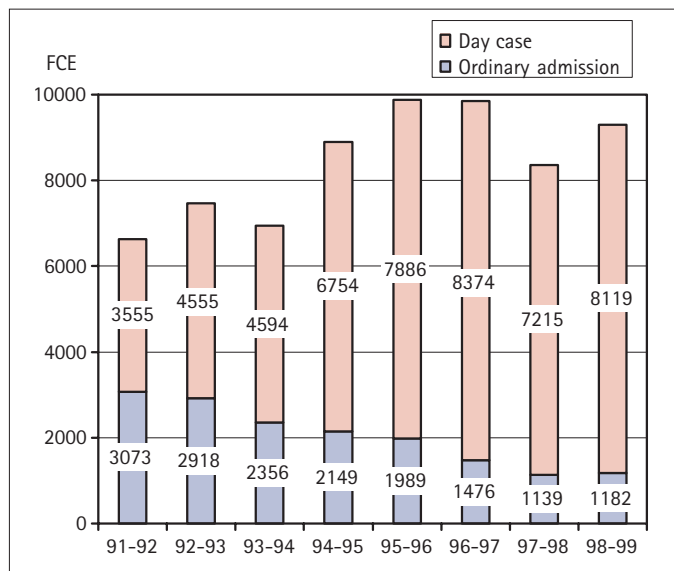


Fig. 14 HDS (England and Wales) – apicectomy. Note: Data from 1991-92 are for England only

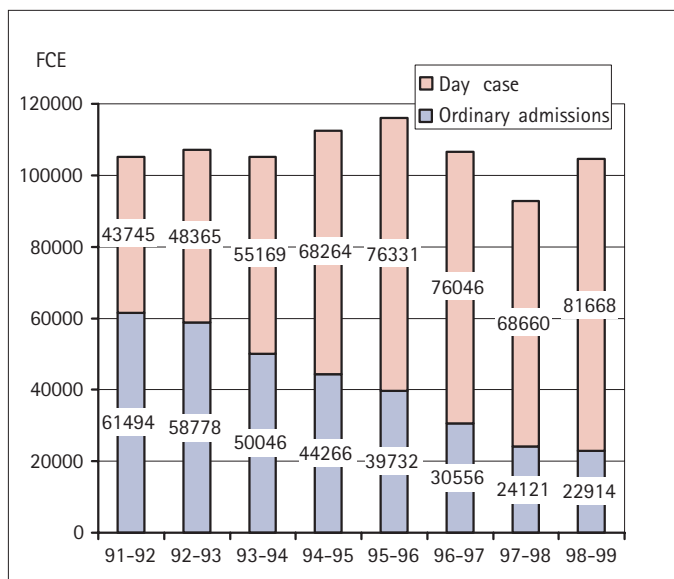


Fig. 12 HDS (England and Wales) – surgical removal of tooth (ordinary admission and day case). Note: Data from 1991-92 are for England only

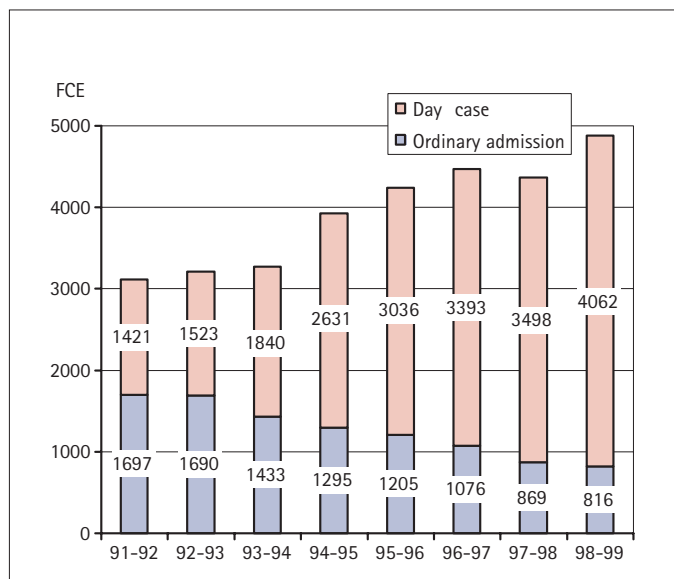


Fig. 15 HDS (England and Wales) – surgical exposure of the tooth. Note: Data from 1991-92 are for England only

2000. Peak activity among these practitioners occurred in 1997 and numbers of third molar removals per practitioner fell sharply afterwards; a finding which is consistent with the overall trend in the GDS.

In the Hospital Dental Service (HDS) the most striking changes included the reduction in number of ordinary admissions for minor oral surgery from 61,494 cases in 1991–1992 to 22,914 cases in 1998–1999, a reduction of 63% (Fig. 10). Numbers of oral surgery day cases increased over the decade, particularly the surgical removal of teeth (Fig. 11,12), simple extractions (Fig. 13), apicectomies (Fig. 14), surgical exposure of teeth (Fig. 15) and excision of dental lesions of the jaw (Fig. 16). However, in contrast, MOS carried out on an in-patient basis decreased (Figs 10–17). For surgical removal of teeth, prior to 1993, the majority of GA extractions were carried out as ordinary admissions but since 1993 the majority of surgical extractions have been carried out on a day case basis. The proportion of minor oral surgery cases carried out as day cases increased from 46% in 1991–1992 to 78% in 1998–1999 (Fig. 17). Throughout this time, and for both ordinary admissions and day cases, third molars accounted for approximately 65–75% of all surgical cases (Figs 10,11). There was little evidence of change in the proportions of anaesthetic types used for minor oral surgery in the HDS (Figs 18,19); the proportion of local anaesthetic (LA) cases were fairly constant over the decade in the HDS in Wales.

Waiting times for oral surgery procedures in the HDS remained roughly constant (Figs 20,21). Waiting time for surgical removal of teeth has consistently been longer for the removal of third molars than for the removal of other teeth.

The majority of HDS MOS procedures in Wales were carried out under GA (Figs 18,19): there was little evidence to suggest that there was a shift from GA to LA over the period of the study, though the proportion of procedures performed on a day case basis increased (Figs 17–19).

In the private sector (PPP Healthcare) the frequency of third molar removals fell by 21% from 5,632 cases in 1993 to 4,441 cases in 1999. Trends mirrored those evident in the GDS after 1996 (Fig. 22).

Trends over the 20-year period 1980–2000

During the period 1974–1984, there was an increase in apicectomies in the GDS by 106% (from about 22,000 to a peak of about 45,000) but in the period 1984–1990 the numbers decreased by 8% (from 45,390 to 41,770) and then decreased a further 56% (from 39,997 in 1991 to 17,738 in 2000). In contrast, the number of ordinary extractions decreased in the period 1974–1984 by 40% (from 8.25 million in 1974 to 5 million teeth in 1984) then decreased by 10% from 1984–1990 (to 4.5 million in 1990) and have since remained largely unchanged. However, the number of extractions of special difficulty increased by 113% (from 107,000 in 1974 to 227,000 in 1984), increased a further 20% to 1990 (to 327,990) and again increased by 112% from 1990 to 2000 (to 786,460). There has been a sevenfold increase in claims for extractions of special difficulty in the last 20 years in the GDS.

This period has seen a very substantial expansion in provision of hospital day case MOS. In the 1980–1984 period less than 5% of all HDS, GA procedures were performed as day cases whereas in 2000, 78% of all HDS procedures were performed on a day case basis. In the period 1980–1984 there was a 32% increase in in-patient throughput as measured by discharges and deaths in oral and maxillofacial surgery and a 66% increase in numbers of patients waiting for in-patient surgery. In the period 1984–1991 there was a further 10% increase in in-patient throughput but a 13% reduction in numbers of in-patients waiting. In-patient waiting times appear to have changed very little since.

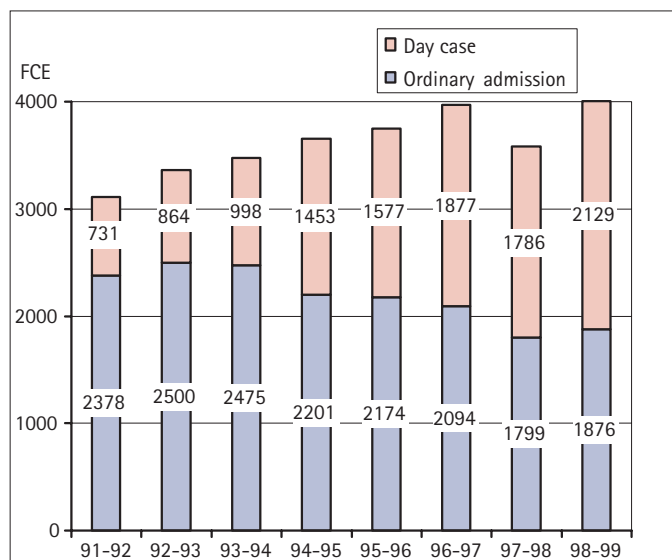


Fig. 16 HDS (England and Wales) – excision of dental lesion of jaw (enucleation of dental cyst of jaw; marsupialisation of dental lesion of jaw).
Note: Data from 1991–92 are for England only.

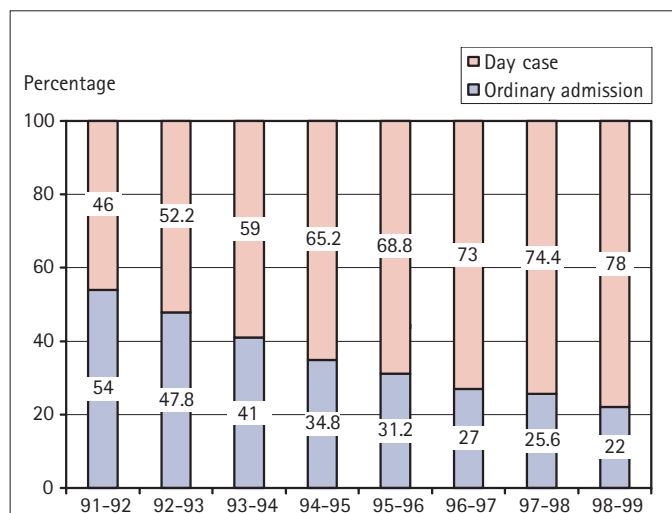


Fig. 17 HDS (England and Wales) – proportion of minor oral surgery cases treated as daycases and ordinary admissions.
Note: Data from 1991–92 are for England only.

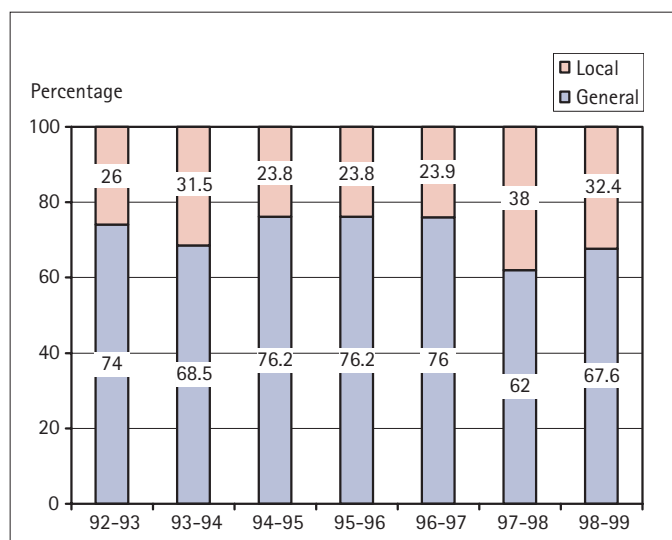


Fig. 18 HDS (Wales) – proportion of anaesthetic types for third molar surgical removals

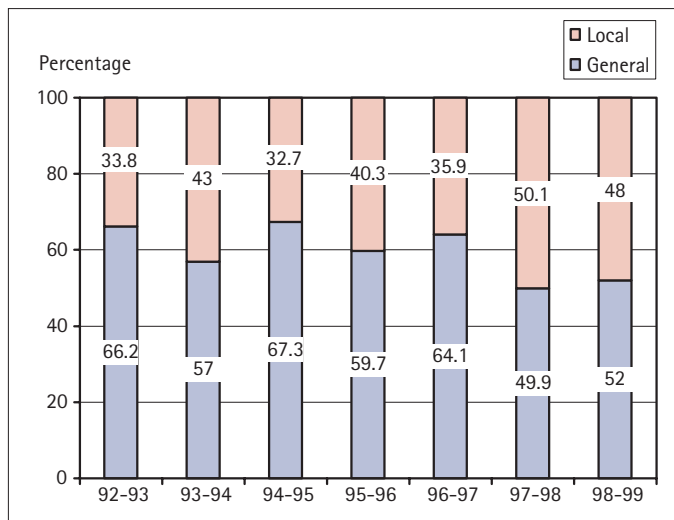


Fig. 19 HDS (Wales) – proportion of anaesthetic types for other surgical removals

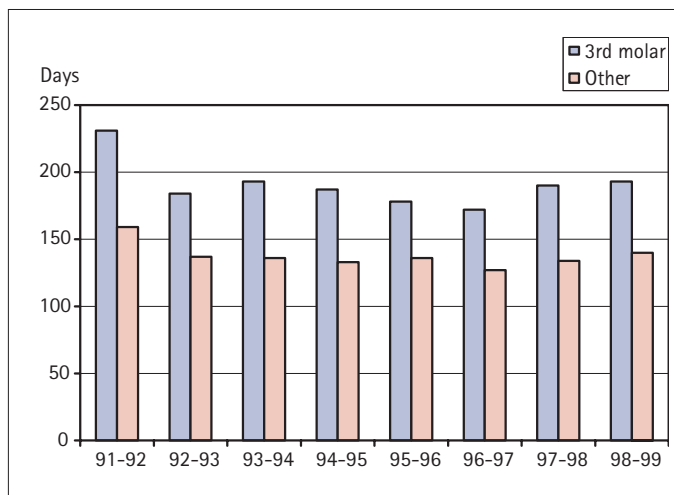


Fig. 20 HDS (England) – average waiting times (days) – surgical removal of tooth (ordinary admission)

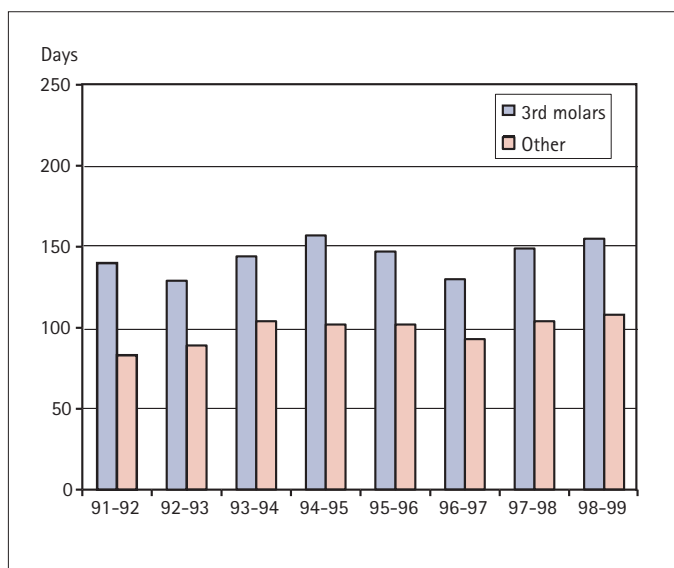


Fig. 21 HDS (England) – average waiting times (days) – surgical removal of tooth (day case)

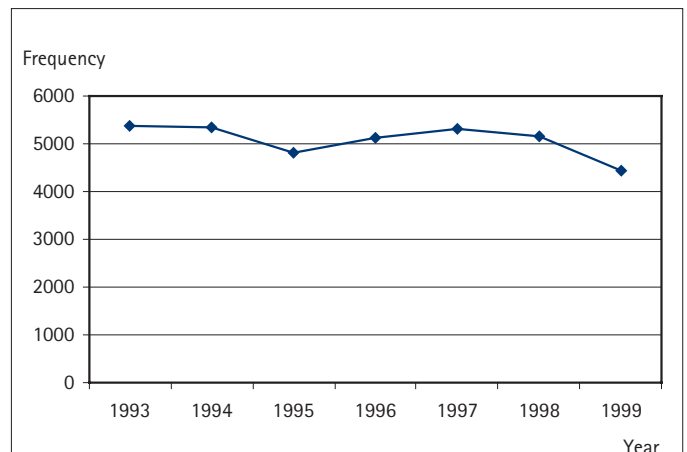


Fig. 22 PPP (England & Wales) – frequency of third molar removals

DISCUSSION

This investigation of oral surgery services in England and Wales from 1991 until 2000 supplements two previous studies of the periods 1979–1984 (Shepherd and Jones¹) and 1984–1991 (Thomas *et al.*²).

General Dental Service

The number and cost of apicectomies peaked in the GDS in 1984 and decreased by about 60% afterwards to a level not seen since before 1974. This may reflect decreased caries rates¹⁵ and less endodontic treatment¹¹ (a reduction of endodontic treatment claims from 1.3 million in 1991–1992 to 1.1 million in 1999–2000). There was a rapid decrease in ordinary extractions to 1984 and a slower decrease to 1990 when a plateau was reached and maintained to 2000. There has been a fairly steady, but overall dramatic increase in extractions of special difficulty over the 20 years which may reflect increased longevity of teeth,¹⁶ or a tendency to consider extractions to be difficult consequent upon progressively less extraction experience.

The number of third molar removals in the GDS peaked in 1996–1997 and decreased substantially to 2000. This may have been caused by a reduction in prophylactic removal or to a more medical approach to minor pericoronitis. It is too early to study the impact of the 2000 NICE guidance on the removal of impacted third molars:¹⁰ the decrease found in this study occurred shortly after the publication of relevant research^{3–9,17,18} and publication of the Faculty of Dental Surgery (Royal College of Surgeons of England) Guidelines.¹⁹ Landes²⁰ showed that retention of permanent teeth in children was associated with more third molar removals, so that with continuing improvements in dental health, declining numbers of third molar removals may reach a plateau or even reverse. Importantly however, removal of permanent teeth in the GDS has not decreased since 1990.

Following the emergence of practices modified to provide GA for dental treatment, the number of GAs administered in the GDS increased after 1992. However, the use of GA fell very substantially after the General Dental Council²¹ published guidance in 1998 on the provision of GA for dental treatment, reflecting concern about its use in dental surgeries, particularly with children. The results of this study show that this sharp reduction in number of GAs was accompanied by an increase in use of sedation in the GDS.

The results of this study suggest a gradual concentration of minor oral surgery (surgical dentistry) provision. In 1994, 80% of general dental practitioners carried out less than five surgical removals of third molars per year and in 2000 this proportion had risen to 87.5%. Williams *et al.*²² provided evidence of an association between increasing operating expertise, as determined by the number of primary palate repairs carried out by a surgeon, and better speech outcome in children with cleft palate. If better outcomes

following third molar removals are associated with increased surgical experience, there are implications for vocational and continuing education and training which should build on undergraduate minor oral surgery training. It is possible that patients requiring minor surgery may increasingly be referred for surgical treatment in the private sector (although this is not the case on the basis of private sector data presented here) or to 'specialist practices', as progressively fewer dental practitioners carry out surgical procedures, especially if ordinary extractions are increasingly considered to be difficult. Importantly, the results of this study strongly suggest that many practitioners in the GDS may not be undertaking any minor surgery apart from routine exodontia. Whether it is possible for a practitioner to maintain sufficient surgical skills and resources on the basis of, say, one surgical procedure per year is an important question. This has important implications for the training of vocational trainees who may not be able to build on their minor oral surgery training as undergraduates.

The two previous audits did not assess provision of care according to type of anaesthetic used. However between 1991–2000 there was an increase in use of general anaesthesia and sedation in the GDS until 1997 and a subsequent decrease of 30% to 2000 which comprised a reduction in GAs and an increase in sedations. If this trend continues, there will be a decline of about 90% compared with 1997 in numbers of GAs and an increase of about 60% in sedations administered in the GDS over the next three years. However, the Department of Health in England²⁴ has recommended that GA for dental treatment, whether under NHS or private practice arrangements, should only take place in hospitals with critical care facilities after 31st December 2001.

The numbers of third molars removed in the GDS increased by about 250% from 1984 to 1997 (from 50,550 to 128,392) after which there was a 33% reduction (to 86,953 in 2000). If this latter trend is extrapolated, a 50% reduction in numbers, based on 1997 rates, over the next 3 years is possible. On the basis that about 1 in 20 patients experience labial/lingual paraesthesia and about 1 in 200 patients experience anaesthesia following lower third molar removal, the decrease in third molar removals after 1997 in the GDS in England and Wales may already have resulted in about 1,400 fewer patients with paraesthesia and around 140 fewer patients with anaesthesia. It is possible however, that a more circumspect approach to third molar removal in their second and third decades may result in some patients undergoing third molar removal when they develop pathology later. It is too early to forecast this trend with any certainty.

Hospital Dental Service

There appears to have been little change in the absolute numbers of minor surgical procedures carried out in the HDS but the decline in in-patient minor oral surgery procedures continues, with increased use of daycase general anaesthesia, a trend noted in a previous national audit.² Day case facilities are more cost effective and usually accord with patient preferences.²³ This disinvestment in use of in-patient facilities for minor cases has allowed investment in major cases in many centres without the requirement of more operating lists. This is an important example of reconfiguration in NHS services which should perhaps be more widely recognised in view of the difficulty in managing this process generally.

In-patient waiting times for minor oral surgery procedures have changed little since 1991 implying that services reached a plateau of efficiency given available resources, or that demand stabilised at that time, or there was better management of waiting times. However, waiting times remain longer for surgical removal of third molars than for surgical removal of other teeth, possibly reflecting more urgent need for ordinary extractions in patients with complicating medical conditions.

Although relevant data are sparse there may not have been the same shift from GA to LA with sedation in the HDS as in the

GDS. This may reflect limited LA and sedation resources in the HDS or lack of any powerful reason to change practice in this way, exemplified by GDC action in the GDS/community services.

Private sector

PPP Healthcare data may reflect private sector trends in the hospital service, but they do not necessarily reflect activity in the private sector in primary care. However, decrease in private hospital third molar removal after 1997 fits with contraction in MOS in the GDS which began at about the same time.

Limitations of the study

This is a study based in part on frequency of claims for specified procedures in the GDS which may not reflect levels of activity accurately. Few private sector data were available, neither were complete data on LA and sedation in the HDS. Shifts in activity between private and public sectors could not be compared and since private sector dentistry (but not private sector hospital oral surgery) has expanded during this period, some of the conclusions based on GDS data may not be applicable to non-NHS activity. HDS data may include treatment of patients in the out-patient setting as day case procedures in many hospitals but not in others. The coding of procedures is performed by non-clinical staff, particularly in the HDS, and it relies upon interpretation into set OPCS categories which itself carries inherent inaccuracies.

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