1990

THEN

and

2000

NOW

The 2000 Report of the National Confidential Enquiry into Perioperative Deaths

Data collection period
1 April 1998 to 31 March 1999

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The analysis of data from anaesthetic and surgical questionnaires is not included in full in this report. A supplement containing additional data, and copies of the questionnaires, is available free of charge from the NCEPOD office.

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Foreword

The recent Department of Health report on learning from adverse events, 'An Organisation with a Memory'[1], commented upon the serious difficulty in establishing the rate of change when good practice recommendations are made by National Confidential Enquiries. This report, therefore, covering a period of almost ten years enables us to evaluate some of the changes that have occurred, but possibly more particularly to highlight the issues where changes have been less than adequate and certainly the rate of change has been unacceptably slow.

If there is a single issue that has bedevilled the activities of NCEPOD throughout this period, it has been that of clinicians' access to data from within the medical records departments of their hospitals. The treatment of notes of deceased patients remains a cause of concern since access to these records is essential if data submitted to NCEPOD is to be timely and meaningful. This report also covers the year in which mandation to participate in clinical governance activities was first introduced. Part of that compliance must involve a hospital's ability to provide facilities for clinical staff to assess their overall activity within the spirit of accountability; fundamental to this is access to good records.

Surgical activity since 1990 has changed significantly with a greater number of patients being admitted as emergencies, for which no obvious reason has been found, and who are both older and more severely ill. Although an increase in critical care facilities has been provided during this period, this report demonstrates that 40% of the hospitals from which deaths were reported, still have no high dependency facilities. Repeated NCEPOD reports have stressed the need for an improvement in critical care at all levels and our previous report 'Extremes of Age'[2] emphasised the need for such facilities to be available to support the older patient at time of emergency. It is well recognised that this lack of facilities is linked to an inadequate availability of key nursing staff but, even taking account of that, there can be no explanation for why some Trusts give priority in this area whilst others apparently do not. We would make a plea at this time of increasing attention on quality of care for an urgent recruitment drive for nursing staff specialised in critical care activities, and for Trusts to recognise the importance of providing adequately for both high dependency and intensive care unit facilities.

Concern is clearly demonstrated within this report about the number of procedures being carried out by non-consultant career grade staff who may by definition not be in an educational environment. There is a concern that our comments on the lack of supervision of senior house officers has now transferred itself to lack of supervision of non-consultant career grades, who themselves may have had an inadequate training. With the enormous rise in the number of non-consultant career grade appointments by comparison with those at consultant level, the potential for a person in these grades to be working independently has to be recognised and compensated for by an adequate increase in consultant staffing.

Audit activities at local level appear to have moved in one of two directions. There has either been a very significant increase in activity so that audit departments are now flooded with requests which they are unable to meet or, alternatively, they have gone into a state of decline through lack of support for unfocussed audit activities. It is difficult to see why the audit of perioperative deaths has declined to the level that it has, but the fact that as few as 13% of deaths may be audited in some specialties may be linked to the decrease in postmortem activity, both of which have to be deplored. In the light of the openness and accountability under the banner of clinical governance, audit of all activities on a daily basis should become a normal event. It would seem essential, therefore, for all clinicians to be taking due notice of this fundamental requirement and turning their attention to accountability on a daily basis. Without this it is very difficult to see how a spirit of openness and credibility can be expected with the public who are served.

The importance of this report demonstrates a change in the attitude towards NCEPOD by the profession. Whereas a decade ago NCEPOD was obsessed with the rates and causes of death, the situation now is very much one in which the quality of care is the main thrust of the Enquiry. Alongside this change has been the recognition within the profession of the value of NCEPOD. Despite the occasional adverse comment, the overall response from the profession has been one which demonstrates a very positive change in attitude and a recognition of responsibility and greater accountability for an individual's own activity. There is no doubt that extension and further improvements will all demand an increase in resource to support the clinicians. That resource takes the form of increases in workforce, facilities and finance. It is hoped that the next ten years will see many of these issues addressed, with improvement of quality the consequential outcome.

John Ll Williams
Chairman

INTRODUCTION

THEN …

John Lunn

Readers will recall the fact that the first enquiry carried out by NCEPOD[3] was concerned with children aged ten years or less. This sample was selected for several reasons, not least of which was the fact that it was anticipated that there would be few deaths in this age group and thus the work would not be too onerous for the first attempt by the new organisation.

When we came to select the sample for the second year we were particularly keen not to overburden specific groups of clinicians, which had been inevitable in our first sample. The choice of a random selection would tend to lessen this and children were actually excluded from the sample of deaths. The 20% random selection of deaths within 30 days of a surgical operation which was used in 1990[4] was intended thus to allow our sample to be unbiased and to reflect all surgery. A good, if not the desirable 100%, response rate was required to this end; this was not achieved since merely 73% of surgeons' and 66% of anaesthetists' questionnaires were included in the final analysis. This was a disappointing result and immediately raised doubts. Confident extrapolation to all surgery and anaesthesia was not really justified although our misgivings about this aspect were suppressed. One cause of delay, and the difference between the two disciplines' return rates, was the method of distribution of the questionnaires; at that time anaesthetists' questionnaires were sent to them via the surgeon. Any response by NCEPOD was inevitably slow and it was two years before our collection system could be completely changed. Anaesthetists were, wherever possible, mailed directly with the eventual result that both disciplines now return in the region of 80% of questionnaires. The customary working arrangements of departments of anaesthetics, and record systems of hospitals, do not allow convenient identification of anaesthetists, as distinct from surgeons, in relation to postoperative deaths. The good offices of tutors of the Royal College of Anaesthetists have improved matters considerably although there is still some improvement possible.

The closer the compliance rate approaches 100% the more confident the reader may be about the general applicability of any conclusions to the population. It should be remembered that NCEPOD was still not accepted by all clinicians and it was perhaps naive of the coordinators then to expect sufficiently good response rates to enable valid conclusions to be drawn from a random sample. Nevertheless, we did.

The occurrence of death is an unarguable event; albeit after operation it is relatively uncommon. Investigation of events before the death enabled the identification of factors that might, if not present or corrected, have averted the death.

NCEPOD was then still obsessed with rates and causes of death. Neither of these aspects features dominantly in recent enquiries. Thus the notion of obtaining information to enable direct comparisons between the management of those who died with that of those who survived surgery (index or survivor cases) has, at least for the time being, not been pursued.

The tally of 'finished consultant episodes' (FCEs) is not the same as the number of operations. Annual totals of operations performed is the crucial denominator. Death is a unique event so it is the number of patients who die (within thirty days of a surgical operation) which is the important statistic to enable calculation of rates of death. Neither of these summations was made by the Department of Health in a timely fashion so we were unable to verify our data with independent figures and no calculation of rates was possible. Thus NCEPOD now unashamedly considers the quality of care as exemplified in that of those patients who die. As data collection systems, such as that providing statistics for the NHS Performance Indicators, become more robust, we hope this information will be available to support NCEPOD.

It is worth pointing out, however, that the use of death as a sentinel event could be applied in other spheres than surgery; both the clinical coordinators in 1990 foresaw the possibility that any death could serve as a trigger for investigation of the efficacy of any public service for that individual before their death. That ambition has yet to be achieved although several more confidential enquiries about death now exist.

The clinical coordinators in 1990 recognised the value, not only to the public, but also to the profession, of open discussion of outcomes of surgical operations, even if these were negative. There is no doubt that at that time the coordinators were still struggling to convince their colleagues that there was nothing 'subversive' or 'anti the medical profession' in this endeavour. My friend and colleague, the late Brendan Devlin, was personally involved in this debate, particularly with

surgeons, but we both remained optimistic, or at least hopeful, that voluntary cooperation would be sufficient to avoid what was otherwise likely - coercion. However, cooperation by clinicians with NCEPOD when voluntary was far from total. Had cooperation been less grudgingly given then, clinicians today might not be compelled by government to participate. The messages promulgated by the early reports were often described as 'disturbing'; they were perceived as new then, but now they are merely repetitive.

One of the primary aims of the confidential enquiries into perioperative deaths was to reassure patients that surgeons and anaesthetists were examining their own practice in order to improve deficiencies in the care given to patients. This is still the aim. There was public disquiet because of some of the early findings but the politicians' response was limp and much of the profession remained lukewarm in its reaction. Small wonder then that so few of the deficiencies in hospitals have been rectified. Nevertheless, the hope, and indeed expectation, of the two clinical coordinators in 1990 was that our enquiry would be effective in helping doctors modernise and improve care of patients.

The up-to-date facts are presented here but should not again be ignored. It is a new generation of clinicians who must take up the challenge; could the public now support the doctors in their attempts to improve the NHS?

… and Now

Stuart Ingram and Ron Hoile

The selection of a randomised 10% sample of all deaths in 1998/99 was intended to enable comparison to be made with the randomised 20% sample examined in 1990, almost ten years ago. It was proposed to look at the ways in which delivery of care given to patients had altered. Dr Lunn has set out some of the aspirations of the original authors of the Enquiry back in 1990. What then has been achieved over the intervening period?

In today's National Health Service central 'initiatives' come thick and fast, and always with an impossibly short timeframe but, if the experience of NCEPOD is a barometer, real change is somewhat slower. The medical profession has made considerable changes in order to improve the delivery of care to patients and many of the recommendations previously made have been addressed. For instance, consultant input is now very high (and has risen since 1990 for many specialties), both anaesthetists and surgeons have demonstrated a willingness to subspecialise within their own specialty, there are fewer instances of trainee grades operating inappropriately and critical care services have improved. All these changes in practice have taken place despite an increasing workload (compared to 1990) due to a burgeoning number of unplanned emergencies and an increasingly older and sicker patient population.

It is the economic resourcing of healthcare that is most commonly quoted by clinicians as the stumbling block for further change. However, there is also a large human resource working in healthcare and obstacles to change can also be attitudinal. We believe that future change will depend on money, manpower, mentality and mentoring.

Money

The current debate on health care expenditure, and the additional funds it is producing, will undoubtedly help to overcome some of the shortcomings highlighted in this report. But as money becomes available, will it necessarily be spent where it is most needed? We have previously stressed the importance of high dependency unit (HDU) critical care facilities in the management of surgical patients. Why is it, therefore, that some hospitals have these facilities and others do not, yet both are undertaking similar complex cases? Is the reason always regional variation in funding or is it the priority that individual hospitals give to different aspects of their activities? As clinicians, it is our experience that too often it is those with the loudest voice, or alternatively those placed closest to the Chief Executive's ear, who see their priorities met first. An HDU should, however, now be at the top of the list of priorities in any hospital that does not already have one. Improvement in the organisation and management of patients' medical records should be close behind.

Manpower

If the current trend towards specialisation within anaesthesia and surgery is to continue, then more doctors are needed. In order to provide specialist emergency rotas large numbers of consultants and trainees will be required. For instance, for a district general hospital to provide cover for children, anaesthetists with a regular practice in paediatric anaesthesia will need to be on-call. This should be together with surgeons in all the surgical specialties, who not only have a regular children's practice but have also attended regular refresher courses in paediatric surgery as it affects their practice. There would ideally, just within general surgery, need to be separate rotas for vascular, upper gastrointestinal, colorectal and endocrine surgery. These would involve large increases in consultant numbers. Such subdivisions may seem Utopian and unachievable but there is evidence that they are necessary and public opinion may demand them. Alongside this expansion there will need to be sufficient training posts and less reliance on service delivery by NCCGs, who may simply have replaced the untrained junior doctors of previous reports.

In addition, there is a need for more specialised nursing care (particularly within the hoped-for HDUs and certain specialties such as otorhinolaryngology). There is no doubt that outcomes improve for patients when specialist nurses work within specialist units (rather than being widespread throughout a generality of surgical beds).

It is to be hoped that an NCEPOD report in a further ten years could show that there were no shortages of staff and that the appropriately trained nurses, anaesthetists and surgeons treated all patients.

Mentality

It is impossible at the present time to consider how surgical and anaesthetic practice can be improved without having constantly in mind the stream of recent well-publicised cases of medical incompetence. Reporters at the door of the General Medical Council describing another series of damaged patients have become a regular feature of our television screens. In the cases reviewed by

NCEPOD such extreme failure is not seen, but there are identified aspects of practice which may indicate why such incompetence has sometimes gone on unchecked. Occasionally there is the overt hostility to the sense of inquisition that the arrival of an NCEPOD questionnaire engenders. This is evidenced by written comments on the futility and idiocy of the whole exercise that sometimes turn up on returned questionnaires. We would not suggest that NCEPOD is not itself open to criticism, but the nature of some written comments from clinicians suggests a sense of their personal worth based mainly on arrogance.

The self assessment that is afforded by reviewing a case to complete an NCEPOD questionnaire must in itself be of benefit and this too is sometimes noted in written comments on the questionnaire. An element of peer review and feedback to individual clinicians could enhance this aspect of the exercise and has been considered as part of developing the Enquiry. However, the lack of systematic audit of so many of the deaths that occur in surgical and anaesthetic practice must be addressed. Poor surgery and anaesthesia does not inevitably result in the death of a patient, excellent care elsewhere can compensate over time for many of these acute inadequacies, but death represents a defined end point on which audit can be based. As the coordinators and advisors at NCEPOD know, it affords an opportunity to look at many aspects of practice; performed at local level and without the anonymity of the national enquiry, much could be revealed.

Mentoring

Many of the deaths that we have reviewed over the years may have occurred because there was a failure to seek an opinion from someone more experienced or senior by the anaesthetist or surgeon. The days have gone when a consultant needed to stand alone and prove his/her mettle by struggling through no matter what. We should be encouraging joint care (sadly lacking at present), internal referral for difficult cases, teamwork and the pairing of younger, less-experienced consultants with a more experienced and wiser colleague. This would create an atmosphere of mutual learning, support and appraisal whilst benefiting patients and their outcomes.

The work done by NCEPOD, since John Lunn and Brendan Devlin first introduced the concept, has created a world first in terms of a review of the delivery of anaesthetic and surgical care to patients. The collection of the raw data about surgical deaths remains incomplete and the method of feedback to professional colleagues, their teams and managers (who must provide the services we rely upon) are crude and impersonal. Clinical governance is now established and there is further change afoot which should bring more accurate, standardised data, openness and personal feedback to clinicians. Surgeons and anaesthetists should welcome and actively participate in any system that improves data collection. These changes should enable NCEPOD to continue informing the professions of their performance whilst basing comment and recommendations on more reliable evidence.

RECOMMENDATIONS

- Trusts and hospitals must establish systems to ensure that all patients' **medical records** are always available to clinicians. The inability to trace the notes, or parts thereof, of patients who have died, thus preventing surgeons and anaesthetists from completing returns to NCEPOD, is unacceptable (page 14).

- In two of every five hospitals in which patients die following surgery there is no **high dependency unit** (HDU). Although the provision of essential critical care facilities has increased greatly since 1990, the absence of an HDU in an acute surgical hospital is detrimental to patient care. It places unreasonable pressure on surgeons and anaesthetists in their decision making and impedes a flexible and graduated use of expensive critical care resources (page 40).

- The urgent and emergency workload in anaesthesia being undertaken by **non-consultant career grade (NCCG) doctors** is of considerable concern. These NCCGs are mainly staff grade anaesthetists, many of whom do not possess the Fellowship in Anaesthesia, and who are not receiving adequate consultant support. There are indications that the problem of unsupervised SHO anaesthetists, identified in previous NCEPOD reports, is being replaced by one of inadequately qualified, unsupervised NCCGs (page 51).

- Despite the resources that have flowed into **audit** activities over recent years, anaesthetists reviewed less than a third of perioperative deaths at local meetings; this percentage has remained unchanged since 1990. Surgeons overall now review three-quarters of deaths at local audit meetings, but there are wide variations between the surgical specialties, from a minimum of 13% to a maximum of 82%. It is sometimes stated that studying expected perioperative deaths, most often in old and very ill patients, contributes little. The experience of NCEPOD in examining these deaths nationally does not support this contention; there is much that can be learnt from their careful examination. It is a professional responsibility to examine one's practice and seek ways to improve surgical and anaesthetic management. Clinicians must strive to achieve an audit record for all deaths if professional education, credibility and public support are to be maintained (pages 39 and 72-73).

1 General Data

Compiled by: F Whimster

1. General Data

Introduction

Key Point

- *The period covered by this report was one of transition between voluntary and mandatory participation as clinical governance systems were being introduced.*

The data presented in this report relate to deaths occurring between 1 April 1998 and 31 March 1999. The period during which questionnaires were despatched ran through until 31 August 1999 with the final deadline for return being 31 December 1999. These dates are of particular significance as this year has been one of transition between voluntary participation in NCEPOD and the requirements of clinical governance, introduced in April 1999. The protocol shown in Appendix D is that which has been adopted since the introduction of clinical governance; it must be remembered, however, that the data presented in this report spanned the crossover from a system of voluntary to mandatory participation.

The concept of clinical governance was first described in 'The new NHS Modern Dependable'[5] and this was elaborated on in 'A First Class Service'[6] which stated that "*all relevant hospital doctors and other health professionals will be required to participate in the work of the National Confidential Enquiries. Results from their findings will be fed into appropriate NICE guidance and standard setting and will be an important part of ensuring effective clinical governance locally which is to be independently scrutinised by the Commission for Health Improvement (CHI)*". Further guidance was then given in 'Clinical Governance: Quality in the new NHS'[7] which stated that "*NHS Trusts have a responsibility for ensuring that all hospital doctors take part in national clinical audits and confidential enquiries*".

To assist Trusts in fulfilling their obligations, NCEPOD has introduced systems to ensure Trust Medical Directors and NCEPOD Local Reporters are aware of those to whom questionnaires have been sent. From April 1999, NCEPOD began copying the covering letters addressed to clinicians to Medical Directors and Local Reporters. In addition, a report was sent to each Trust in late 1999 indicating their response rate in order that outstanding questionnaires could be chased up before the deadline. There were, however, significant numbers of cases where all correspondence with the clinician had occurred before the introduction of clinical governance and in these instances no names were revealed.

The sample reviewed in detail during this period was a random 10% of the total deaths reported. The selection of this group has enabled NCEPOD to make direct comparisons with data collected in 1990 (1 January – 31 December) and published in 1992[4] when a similar randomised group was reviewed. The anaesthetic, surgical and pathology sections of this report will use the 1990 data as a comparative group. Similar comparisons have been made wherever possible in this general data section although differences in NHS regional structures and systems of data collection and analysis mean that these comparisons should be viewed with some caution.

In addition, direct comparisons have been made with the data published in last year's report 'Extremes of Age'[2] in an attempt to show the early effects of the introduction of clinical governance.

Data collection

Data was requested from all NHS hospitals in England, Wales, Northern Ireland, Guernsey, Jersey, Isle of Man and the Defence Secondary Care Agency. In addition, the majority of hospitals in the independent sector contributed data. Data was not collected from Scotland where the Scottish Audit of Surgical Mortality (SASM) performs a similar function.

Deaths occurring in hospital, between 1 April 1998 and 31 March 1999, and within 30 days of a surgical procedure, were reported to NCEPOD by the designated Local Reporter for each hospital (Appendix E). A few reports of deaths occurring at home were also received.

General data analysis

Key Points

- *The provision of adequate information systems to support clinical activity is a fundamental cornerstone of clinical governance which the NHS can no longer ignore.*
- *Local Reporters must be given support, in terms of time and resources, to enable them to report all relevant deaths in a complete and timely fashion.*
- *NHS Trusts should review their systems for identifying NCEPOD cases and Hospital Episode Statistics and understand the reasons if differences in the data sets are identified.*

Figure 1.1 shows that a total of 21 253 reports were received. Of these, 1421 were excluded from further analysis: 1015 were deemed inappropriate according to the NCEPOD protocol (Table 1.1 and Appendix D), 361 were received after the deadline of 31 August 1999 and 45 remained incomplete despite all efforts to identify missing information. It is interesting to note that although the total number of deaths reported in this period showed an increase of 506 over that for the previous year, the number of cases that could be included rose by only 189.

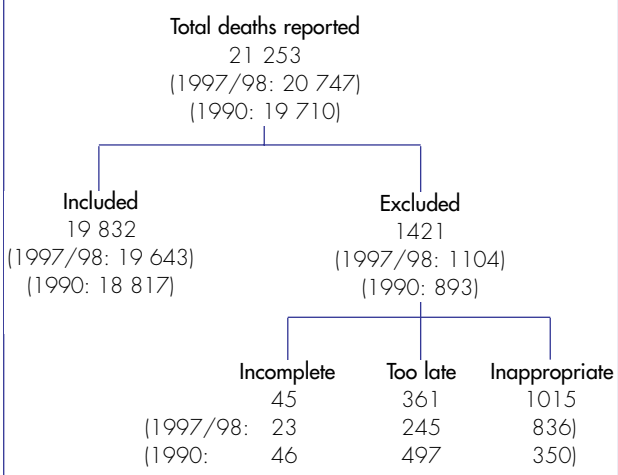
These figures do not include inappropriate reports returned in computer printout format. Some hospital information systems cannot easily filter out inappropriate reports, such as deaths following procedures by physicians, or deaths following procedures excluded by NCEPOD.

Table 1.1 shows that there have been changes since 1990 including an increase in reported procedures performed by a non-surgeon from ten in 1990 to 235 in 1998/99. These were performed by physicians, cardiologists and radiologists; the majority of procedures were endoscopies.

A total of 485 duplicate reports were received in 1998/99 representing an increase of approximately 80% over the previous year's figures, and a vastly differing situation to that in 1990 when only six duplicate reports were noted. Duplicate reporting was spread throughout the regions and most probably represents an effort on behalf of Trusts to ensure they are fulfilling their clinical governance requirements and not under-reporting. Whilst representing an additional administrative burden for NCEPOD this is clearly preferable to cases being missed and it is hoped that as Trusts' reporting systems become stabilised such duplication may decrease.

The number of cases reported from non-participating independent hospitals has decreased from 14 (1997/98) to four as the number of hospitals who formally participate in the Enquiry has increased.

Figure 1.1: Total deaths reported



A regional breakdown of the remaining 19 832 deaths is shown in Table 1.2. Comparison with the figures shown for 1990 should be treated with caution due to the effect of alterations in the regional structure of the NHS, hospital mergers/closures and a lack of denominator data to indicate possible changes in the total number of operations performed. Regional boundaries were changed once again in April 1999, but the current data have been shown according to the regional structure in place at the time death occurred. As data from 1990 have not been retained other than in printed form it is impossible to attribute cases precisely to their current regions; the basis on which these figures have been estimated is shown in the right hand column of the table.

Table 1.1: Inappropriate reports received and excluded			
Reason for exclusion	1998/99	1997/98	1990
Death occurred more than 30 days after operation	230	220	327
Procedure not performed by a surgeon	235	221	10
Duplicate report	485	271	6
No surgical procedure performed or procedure excluded by NCEPOD criteria	59	106	4
Procedure performed in non-participating independent hospital	4	14	2
Maternal death	1	2	0
Procedure performed overseas	1	0	0
Patient still alive	0	2	1
Total	**1015**	**836**	**350**

Table 1.2: Deaths reported to NCEPOD by region				
1998/99 regions	1998/99	1997/98	1990	1990 regions
Anglia & Oxford	1913	1720	1367	East Anglia + Oxford
North Thames	2268	2252	2554	NE Thames + NW Thames + Special Health Authorities
North West	2726	2698	2736	Mersey + North Western
Northern & Yorkshire	2881	3018	2464	Northern + Yorkshire
South & West	2340	2288	1997	South Western + Wessex
South Thames	1960	2202	2457	SE Thames + SW Thames
Trent	2237	2301	1722	Trent
West Midlands	1638	1559	1826	West Midlands
Wales	1299	915	1102	Wales
Northern Ireland	346	462	316	Northern Ireland
Guernsey	16	15	39	Guernsey
Jersey	14	28	22	Jersey
Isle of Man	16	16	25	Isle of Man
Defence Secondary Care Agency	2	5	60	Defence Medical Services
Independent sector	176	164	130	Independent sector
Total	**19 832**	**19 643**	**18 817**	

Table 1.2 shows that in the majority of regions the number of deaths reported has remained constant or increased between 1997/98 and 1998/99, with an increase likely to indicate improved systems of local reporting, possibly as a direct result of clinical governance activities. It is notable, however, that Northern & Yorkshire, South Thames, Trent, Northern Ireland and Jersey all show a reduction in the number of deaths reported.

New systems of quarterly feedback to Trusts (via Medical Directors and Local Reporters) introduced by NCEPOD in April 2000 will indicate both reporting and returning rates, with corresponding figures for the previous two years for comparison. We hope that this will prompt Trusts to look carefully at their local systems to ensure that full reporting can occur; we are well aware of the enormous difficulties and pressures placed upon Local Reporters, all of whom have multiple other duties to perform, and would urge Trusts to ensure that Local Reporters are given all the support they need to fulfil this function.

NCEPOD has also asked all Medical Directors to look at the systems used to collect and collate the data submitted as Hospital Episode Statistics (HES) to the Department of Health. These data are used by the Department of Health for a number of purposes including the calculation of the new NHS Performance Indicators. Although direct comparison between the number of deaths reported to NCEPOD and those shown in Performance Indicators cannot be made, due to differences in inclusion criteria, NCEPOD has been puzzled by the often large differences between the two data sets, both at an individual Trust level and for perioperative deaths overall. It would be expected that if such differences were due only to the different inclusion criteria then a pattern would emerge; since Performance Indicator data, for example, include a wider range of procedures and those performed by non-surgeons, it would be expected that most Trusts would show larger figures in Performance Indicator tables than in NCEPOD returns. This is not by any means the case; for some Trusts the figures are almost identical whilst in many others wide variations are not uncommon and may be larger for either data set. NCEPOD urges Trusts to examine how these two sets of data are being compiled and to understand the reasons if differences are identified.

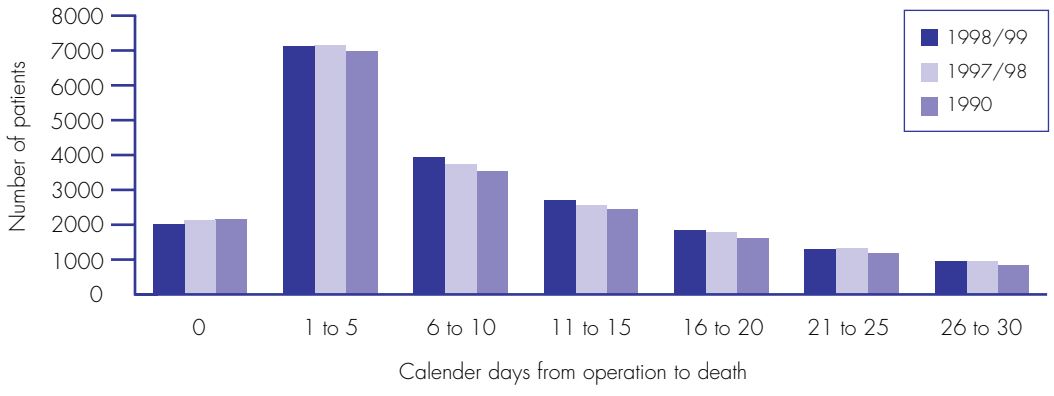
The Performance Indicators for 1998/99[8] give a total of 32 956 deaths in hospital within 30 days of an operative procedure (24 920 after emergency surgery and 8036 after non-emergency surgery). The denominator data used in the Performance Indicators, based on all patients undergoing eligible procedures, show that a total of 2.3 million procedures were undertaken (644 463 emergencies and 1.7 million non-emergencies). This indicates an approximate mortality rate of 1.4% (3.9% after emergency surgery or 0.5% after non-emergency surgery).

Figure 1.2 shows the distribution of the number of calendar days between operation (day 0) and death, with almost half of deaths occurring within the first five days. This distribution has remained remarkably unchanged over the years.

Figure 1.3 shows the distribution of age at time of death, which is broadly similar to 1990 but with a notable increase in the number of elderly patients. The figures for 1997/98 are not shown as the data retained after publication of the report gives age groups which are not directly comparable (i.e. 0-9, 10-19 years etc); the pattern, however, is no different from that seen in the current data set.

The distribution between the sexes is unchanged; in 1990, 53% (9885/18 817) of patients were male compared to 52% (10 277/19 832) in the current group.

Figure 1.2: Calendar days from operation to death



The number of days taken for Local Reporters to inform NCEPOD of deaths is shown in Table 1.3. This data is not available for 1990. Local Reporters are volunteers nominated by their Trust/hospital to collate this data and use a variety of different collection methods. It is of concern that the percentage of deaths being reported in less than 30 days has fallen whilst those taking in excess of six months has risen. Figure 1.1 also illustrates this problem, indicating that 361 reports of deaths were received too late (i.e. after 31st August 1999) for inclusion; this is an increase on the 245 notifications received too late in 1998, although an improvement on the situation in 1990 (497 cases).

Table 1.3: Calendar days between death and receipt of report by NCEPOD

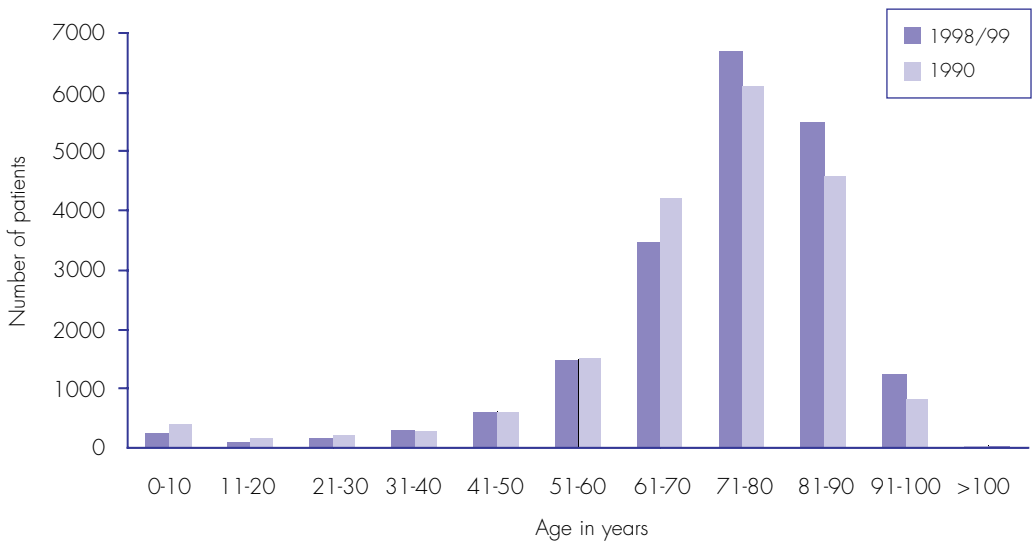
Calendar days (i.e not 24-hour periods)	Number of deaths reported			
	1998/99		1997/98	
1-29	4137	21%	4587	23%
30-59	4398	22%	4245	22%
60-89	3033	15%	3182	16%
90-119	2134	11%	2301	12%
120-149	1724	7%	1721	9%
150-179	1099	6%	1170	6%
180+	3307	17%	2437	12%
Total	19 832		19 643	

If there is a six-month delay before NCEPOD becomes aware of a death, then there is, of necessity, a considerable time lapse between death and receipt of a questionnaire by a clinician. This is particularly problematical for anaesthetists, since Local Reporters are often unable to provide the name of the relevant consultant. This then needs to be ascertained from correspondence with the local anaesthetic College tutor. The earlier questionnaires can be despatched to clinicians, the more likely it is that the medical records will be available, the case clearly remembered and the relevant clinicians (especially junior staff) still working at the same hospital. In addition, it allows more time for questionnaires to be completed and returned by the annual deadline of 31 December.

The following comment from a consultant anaesthetist graphically illustrates this problem:

"This GA took place 17 months ago – it is difficult to be certain about some of the details at that distance in time, even when case discussed with anaesthetist directly concerned (who, under other circumstances, might not even have been available)". Date of operation: 16/6/98, date of death: 5/7/98. Local report form received on 24/8/99. Letter sent to tutor on 27/9/99. Reminder sent to tutor on 2/11/99. Tutor reply received and anaesthetic questionnaire sent on 23/11/99. Anaesthetic questionnaire returned on 6/12/99.

Figure 1.3: Age at time of death



The following quote from a Local Reporter asked to ascertain the name of the surgeon and anaesthetist for a particular case illustrates the system problems in some hospitals:

"It's taken me three weeks to find this information. Notes are lost. Theatre information system here is awful – hand written register with patients not always in the correct book, or even listed under the correct surgeon. So much for NCEPOD recommendations!"

One has to agree with his concluding statement and ask why, once again, NCEPOD has had to raise this issue in this year's report. The provision of adequate information systems to support clinical activity is a fundamental cornerstone of clinical governance which the NHS can no longer ignore. NCEPOD is reliant upon the efforts of Local Reporters to obtain this most basic of information on patients who have died; it is unacceptable that they are required to fulfil this now obligatory requirement without adequate resources in terms of time and information systems.

Sample data analysis

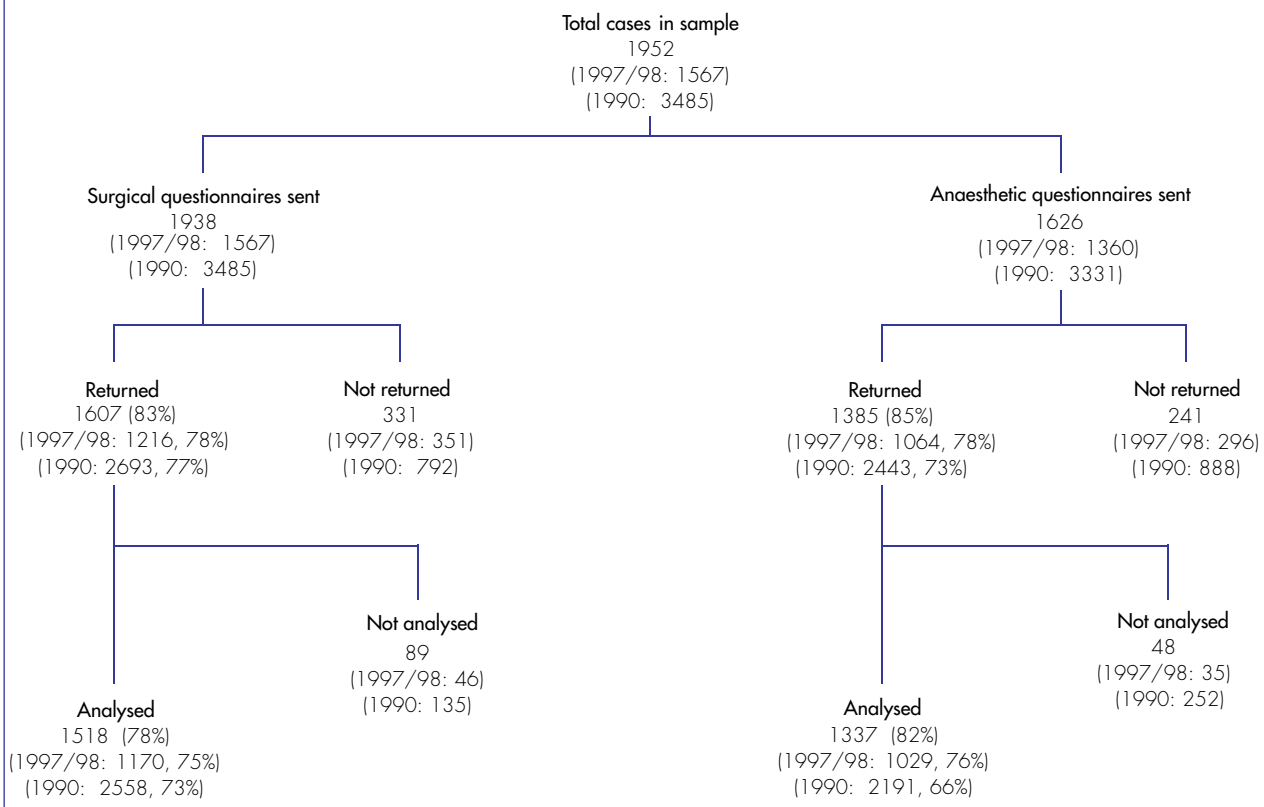
Key Points

- *The return rates of 83% for surgeons and 85% for anaesthetists are the highest ever recorded by NCEPOD.*
- *Ninety percent of participating clinicians were asked to complete no more than two questionnaires.*
- *Return rates in the independent sector were comparatively poor; if the independent sector wish to apply the principles of clinical governance to their practice they will need to improve their compliance rates.*

The sample selected for review in 1998/99 was a randomised 10% of the total deaths reported, with cases for inclusion being identified by the NCEPOD computer system on entering basic case details onto the main database. This sample was chosen to allow direct comparison with the data collected in 1990, which represented a random 20% of the total deaths reported. The number of cases reviewed is, therefore, smaller but randomised selection makes direct comparison possible. A randomised sample also has the advantage, particularly with the introduction of mandatory participation, of ensuring that no clinicians feel that they, or their specialty, are being unfairly burdened. The reduction in the sample from 20% to 10% was also made in order not to overburden already busy clinical staff.

Questionnaires were sent to a total of 1298 different consultant surgeons and 1089 different consultant anaesthetists. The majority (66% of surgeons and 67% of anaesthetists) received only one questionnaire in the year. Those receiving two questionnaires for completion comprised 24% of surgeons and 23% of anaesthetists. The remaining 10% of surgeons received between three and seven questionnaires; the remaining 10% of anaesthetists received between three and eleven questionnaires. It is important to stress that forms are sent to consultants, but relate to cases conducted not only by themselves but also by a range of non-consultant or locum staff. This is particularly the case for anaesthetists, where it is common for all forms relating to cases conducted by non-consultants to be sent to a single designated consultant who has taken responsibility for the completion of NCEPOD returns. These figures do not, therefore, reflect poor practice.

Figure 1.4: Distribution, return and analysis of questionnaires



In relation to the 1998/99 sample, 14 surgical questionnaires were not sent as NCEPOD had already been notified that the consultant had left the Trust/hospital.

In the 326 cases where no anaesthetic questionnaire was sent this was either because the procedure was performed without an anaesthetist present (120), the name of the appropriate consultant was unobtainable or notified too late (200), or because NCEPOD had been notified that the appropriate consultant had left the Trust/hospital (6).

One thousand six hundred and seven surgical questionnaires (1607/1938, 83%) and 1385 anaesthetic questionnaires (1385/1626, 85%) were returned (Figure 1.4). It is commendable, and perhaps an indication of the early effects of clinical governance, that these are the highest return rates ever achieved by the Enquiry.

Table 1.4: Reasons for exclusion of surgical questionnaires from analysis

Reason for exclusion	1998/99	1997/98	1990
Questionnaire completed for earlier operation	54	17	0
Questionnaire received too late	32	11	128
Questionnaire incomplete	3	16	7
Questionnaire related to excluded procedure	0	2	0
Total	89	46	135

Table 1.5: Reasons for exclusion of anaesthetic questionnaires from analysis			
Reason for exclusion	1998/99	1997/98	1990
Questionnaire completed for earlier operation	18	10	0
Questionnaire received too late	26	10	251
Questionnaire incomplete	4	12	1
Questionnaire related to excluded procedure	0	1	0
No anaesthetic given	0	2	0
Total	48	35	252

Eighty-nine surgical questionnaires were excluded from analysis for the reasons given in Table 1.4. Similar exclusions occurred for 48 anaesthetic questionnaires (Table 1.5). Comparison with cases excluded in 1997/98 and 1990 are included in the tables.

These reasons warrant further review since it is a waste of valuable time, particularly on behalf of the clinician completing the questionnaire, if it subsequently has to be excluded. The 1998/99 period has seen a large increase in the number of questionnaires completed for an earlier operation, rather than the final procedure before death. This is particularly the case for surgical questionnaires. Unfortunately, since no paper records are retained by NCEPOD after publication of a report, it is impossible to revisit in detail the 17 surgical and 10 anaesthetic questionnaires completed for previous operations in 1997/98. Those having to be excluded for this reason in 1998/99 have been reviewed and fall primarily into two categories:

- those where the clinician completed the questionnaire for the procedure requested by NCEPOD (i.e. according to the information provided by the Local Reporter) but where the questionnaire itself, or accompanying documentation, shows this not to have been the final procedure.

- those where the clinician has completed the questionnaire in relation to a different and earlier procedure to that requested by NCEPOD; this usually relates to a more major operation.

The former group is probably unavoidable. The latter indicate a misunderstanding of the NCEPOD protocol and an erroneous belief that NCEPOD is interested primarily in the cause of death. The questionnaire clearly states that *"this questionnaire should be completed with reference to the final operation before death of the patient specified. If you feel that this was not the main operation in the period before the patient's death, please give additional information."* It is possible that, with the increasing pressures of clinical governance, a number of consultants are completing the questionnaire for a previous procedure which they consider is more relevant to the cause of death. In order to avoid wasted time and effort we would stress once again that it is the *final procedure* before death that is of relevance to NCEPOD, even if this was relatively minor and unrelated to the cause of death. If in doubt, clinicians are always welcome to ring the NCEPOD offices for clarification before completing the questionnaire.

The increase in questionnaires returned too late over the last two years is probably due to a combination of pressure to conform to clinical governance requirements and the problems caused by delayed reporting of deaths and availability of medical records, highlighted elsewhere in this section. This is, however, very clearly an improvement on the situation in 1990, primarily due to changes in systems for distributing questionnaires – in 1990, all questionnaires were sent to consultant surgeons, who were asked to pass on the anaesthetic form to the relevant anaesthetist.

Recent improvements to systems at NCEPOD should result in fewer questionnaires completed for previous operations and those returned incomplete; questionnaires will be reviewed by administrative staff well before the deadline for return and, if found to be unusable for these reasons, will be sent back to the consultant for correction.

Table 1.6: Regional return rates

AQ= Anaesthetic Questionnaire SQ = Surgical Questionnaire	Return Rate						
	1998/99		1997/98		1990		
Current Regions	SQ	AQ	SQ	AQ	Old Regions	SQ	AQ
Anglia & Oxford	83%	90%	89%	86%	East Anglia	76%	71%
					Oxford	76%	70%
North Thames	77%	77%	73%	80%	NE Thames	64%	47%
					NW Thames	82%	72%
					Special Health Authorities	50-100%	33-100%
North West	79%	83%	77%	81%	Mersey	76%	70%
					North Western	69%	62%
Northern & Yorkshire	85%	90%	83%	76%	Northern	78%	72%
					Yorkshire	74%	71%
South & West	91%	92%	85%	82%	South Western	70%	66%
					Wessex	75%	68%
South Thames	83%	84%	76%	76%	SE Thames	72%	61%
					SW Thames	79%	72%
Trent	88%	84%	75%	72%	Trent	74%	69%
West Midlands	80%	88%	67%	77%	West Midlands	73%	65%
Wales	76%	77%	61%	68%	Wales	72%	64%
Northern Ireland	94%	94%	73%	72%	Northern Ireland	88%	65%
Guernsey	100%	100%	100%	100%	Guernsey	100%	85%
Jersey	-	-	100%	50%	Jersey	100%	100%
Isle of Man	100%	100%	100%	50%	Isle of Man	50%	-
Defence Secondary Care Agency	-	-	-	-	Defence Medical Services	100%	82%
Independent sector	67%	64%	80%	100%	Independent sector	72%	88%

Table 1.6 shows the return rates by region and it is impressive to note that, without exception, those in the NHS have improved their return rates since 1990. Very few regions now have return rates under 80%, with the exceptions being the anaesthetists and surgeons of North Thames, the surgeons of North West and the anaesthetists and surgeons of Wales.

The early effects of clinical governance can be seen in that virtually all regions have been able to demonstrate improvement on their 1997/98 return rates; notable exceptions are the surgeons of Anglia & Oxford and anaesthetists of North Thames. Individual Trusts will continue to be kept regularly informed of their return rates as described previously and we hope that the small number of Trusts where return rates are not improving will take note and respond to the reasons given by their clinical staff for inability to complete a questionnaire.

By far the most poor in respect of their return rates are the hospitals in the independent sector, where rates have not only fallen since the previous period but are lower than in 1990. If the independent sector wishes to apply the principles of clinical governance to their practice, as they have clearly indicated, then they will need to improve their compliance rates dramatically.

The quarterly reports now being sent to individual Trusts and hospitals include not only the names of those who have questionnaires outstanding, but also an indication of any reason given for an inability to complete the questionnaire. The reasons commonly given for non-return are discussed below and we are optimistic that by providing feedback to Trusts and hospitals they will be able to introduce systems able to support their clinicians in complying with the requirement of participation in the Enquiry.

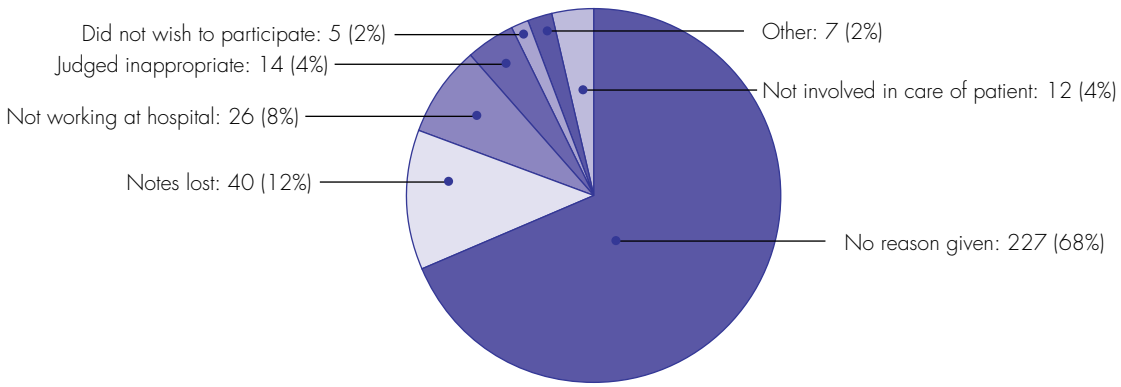
Reasons for non-return of questionnaires

Key Point

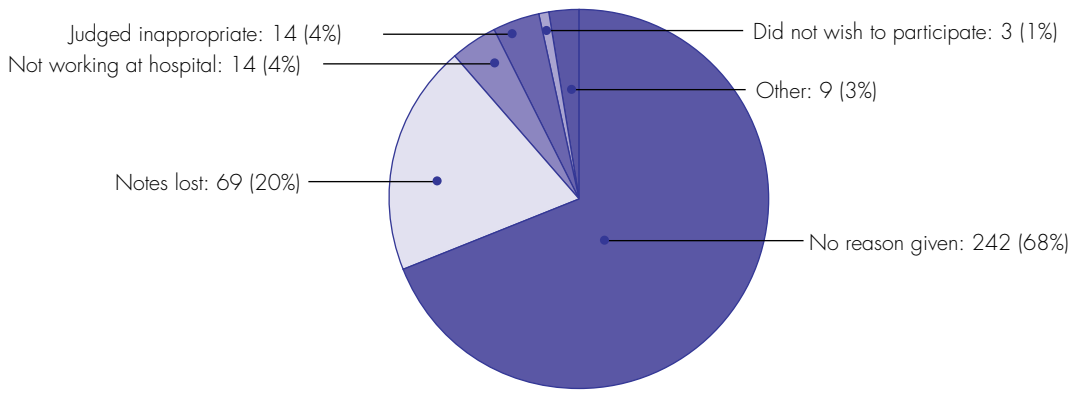
- *The vast majority of clinicians willingly cooperate and complete NCEPOD questionnaires in good time. It is no longer acceptable for a few individuals to state that they do not wish to participate or consider the case inappropriate for NCEPOD review.*

The introduction of clinical governance and mandatory participation has placed a particular emphasis on the need to know why clinicians are unable to return a questionnaire if this is the case. The level of detail shown in Figures 1.5 and 1.6 was not recorded in 1990, when participation was voluntary.

Figure 1.5: Reasons for non-return of surgical questionnaires

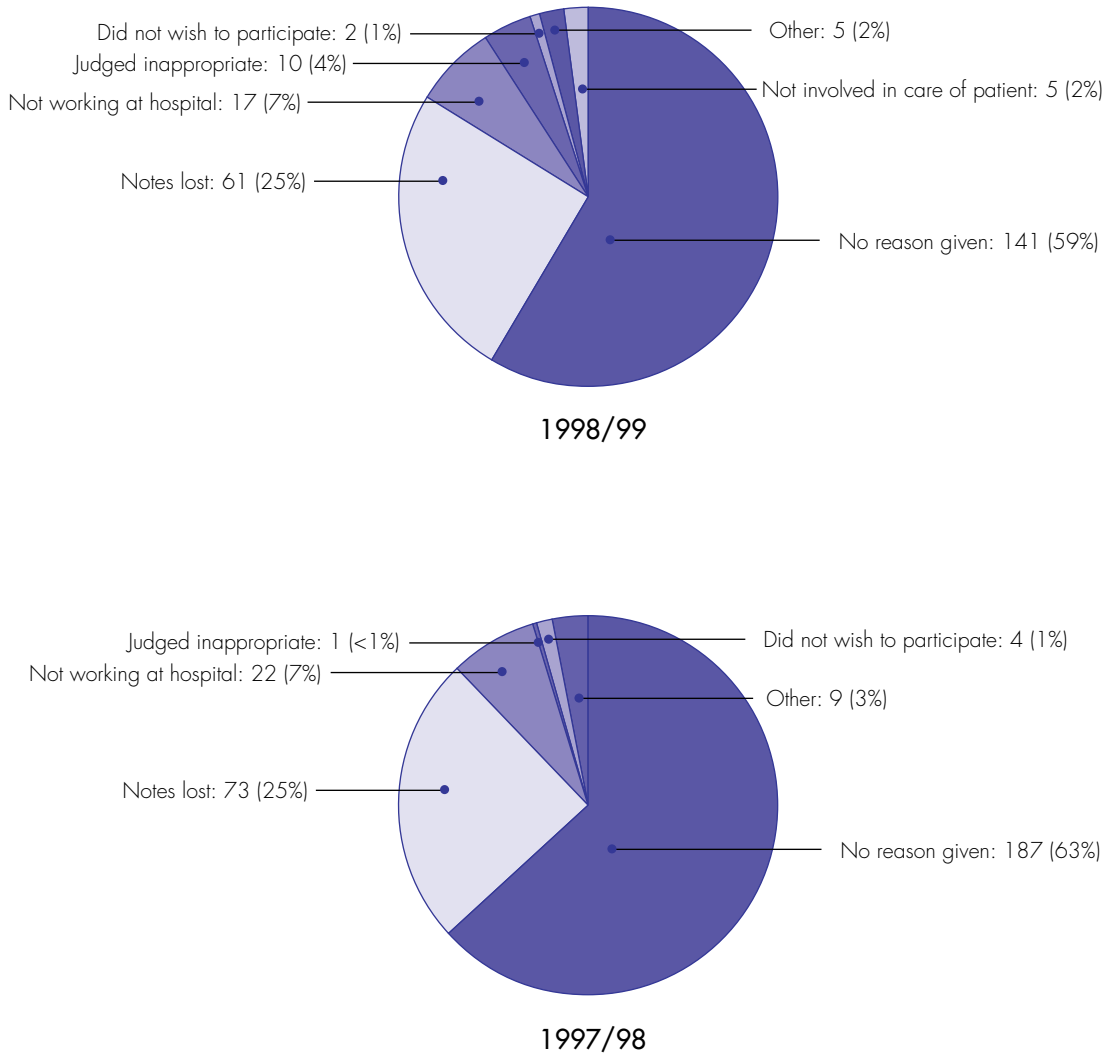


1998/99



1997/98

Figure 1.6: Reasons for non-return of anaesthetic questionnaires



The figures for the last two years show little or no change in the high percentage of cases where no reason is offered for non-return of a questionnaire. Regular feedback to Trusts and hospitals indicating any valid reasons for non-return will, of course, highlight those cases where no contact has been made with NCEPOD to explain the inability to complete the questionnaire. We would hope and expect to see this group diminish in size as the new feedback system becomes established.

There are other small percentages shown in these figures, which should disappear if Trusts take their clinical governance responsibilities seriously; namely, those who state that they 'do not wish to participate' or that, in their opinion, the case is 'inappropriate' for review.

The vast majority of clinicians willingly cooperate and complete the NCEPOD questionnaires they receive in good time. It is no longer acceptable for a few individuals to make statements such as the selection shown here:

"There were no technical problems with the conduct of anaesthesia or surgery…. I do not feel that completion of an NCEPOD form is relevant in this case as the procedure performed was not relevant to the outcome."

"The tracheostomy was performed as a routine aspect of intensive therapy management and had nothing to do with the outcome in this patient. I do not feel that it is relevant to complete an NCEPOD form in this circumstance."

"The operation that you refer to was conducted by a consultant surgeon in the presence of a consultant anaesthetist, there were no problems with the conduct of that operation from either surgical or anaesthetic perspective, but death was inevitable."

"The 'operation' to which you refer was performed in desperation during a cardiac arrest and I do not feel that it is relevant to complete an NCEPOD form for this." A second request to complete the form was made by the NCEPOD Chief Executive and the following was received in response: *"I have reviewed this patient's notes again and I feel that it is not appropriate to fill in the NCEPOD questionnaire in respect of the emergency reopening of the chest following cardiac arrest as many of the questions are inappropriate."*

"I do not feel it appropriate to complete this form in respect of the minor procedure which happened to precede death."

"This utterly futile audit has taken 1-2 hours of my valuable time. I completely resent this."

"My fee for attempting to fill in this form and recovering the notes of a patient I had no dealings with whatsoever is £50, or perhaps I am contracted to perform this task as a hobby in my spare time." A comment written on a very poorly completed questionnaire received from a consultant anaesthetist, who indicated he was the duty consultant at the time a member of the junior staff, whose grade and qualifications he professed not to know, gave the anaesthetic at 01.30.

Lost medical records

Key Points

- *Trusts should establish systems to ensure that 'NCEPOD case notes' are retrieved and passed from surgeon to anaesthetist.*
- *Medical records departments should ensure adequate tracer systems are in place in relation to the records of deceased patients.*

The final group needing particular attention is that where clinicians stated that they were unable to complete the questionnaire as the notes were lost or otherwise unavailable. Although some improvement has been seen in relation to surgical questionnaires (1998/99: 12%; 1997/98: 20%) the situation for anaesthetists has remained unchanged with 25% indicating that the notes were not available.

Virtually every report published by NCEPOD has made references to inadequacies in medical records departments:

- *"Hospital notes about dead patients tend to be given a low priority by records staff."* [4]
- *"Managers should urgently review the storage and retrieval of medical notes."* [9]
- *"Managers need to improve the services provided by medical records departments so that notes are available when required."* [10]
- *"Systems should be implemented by Trusts to improve the retention and availability of all notes and records of clinical activity."* [11]
- *"Clinical records and data collection still need to be improved."* [12]
- *"Action is required to improve hospital record systems; this is within the remit of clinical governance."* [2]

In 1990, it was reported that in 90/3485 (3%) cases the notes were 'lost'. This compares with 93/1952 (5%) in the 1998/99 period. It appears, therefore, that despite repeated recommendations no change has occurred and in fact the situation has deteriorated. A more detailed review of those cases where NCEPOD was told that the notes were unavailable during 1998/99 was therefore conducted.

The figures in Table 1.7 relate to the 84 cases where both an anaesthetic and a surgical questionnaire were sent.

The 60 cases where one questionnaire had been received and the other had not, because of unavailability of the records were reviewed in further detail, as summarised in Table 1.8.

Table 1.7: Cases where medical records were lost/unavailable	
Situation	Number
Anaesthetist stated notes lost/unavailable; surgical questionnaire returned	43
Surgeon stated notes lost/unavailable; anaesthetic questionnaire returned	17
Surgeon and anaesthetist stated notes lost/unavailable	8
One clinician stated notes lost/unavailable, no response from other; neither questionnaire returned	11
One clinician stated notes lost/unavailable, other gave a different reason; neither questionnaire returned	5
Total	84

Table 1.8: Cases where one questionnaire was received	
Cases with one questionnaire	Number
Returned questionnaire included photocopies from medical records	52
Returned questionnaire did not include photocopies but indicated medical records were available	7
Returned questionnaire did not include photocopies and impossible to know if medical records were available	1
Total	60

It is therefore clear that in all cases (with one possible exception) the notes were not 'lost' but had been retrieved by the other consultant required to complete a questionnaire relating to the same case. This explains the much greater number of anaesthetists (43) than surgeons (17) stating that they could not trace the records since the frequent need to ascertain the name of the appropriate consultant anaesthetist from the clinical tutor means that anaesthetic questionnaires are very often sent out later than corresponding surgical questionnaires. In this group of 60 cases, in 15 instances the questionnaires were despatched on the same day, in 44 cases the surgical questionnaire was sent first and in only one case was the anaesthetic questionnaire the first to be posted.

The number of questionnaires unable to be completed due to 'lost' notes could therefore be virtually eliminated by the use of three simple strategies:

- Trusts/hospitals should establish systems to ensure that all 'NCEPOD case notes' are retrieved and passed from surgeon to anaesthetist.

- If clinicians are informed by medical records departments that the notes are lost/missing, they should first enquire of their surgical/anaesthetic colleagues who may well have the records (this applies particularly to anaesthetists who would be well advised to scour the desks of their surgical colleagues).

- Medical records departments should ensure that adequate tracer systems are in place in relation to the medical records of deceased patients.

None of these recommendations is complex; much emphasis has been placed on the improvements that will occur when patient records are stored electronically. The following quote should perhaps serve as a word of caution to those believing this will be a panacea:

"Notes filed at random. Since 'everything is computerised' much is inaccessible. The form is my best effort."

2 Anaesthesia

Compiled by: A J G Gray, G S Ingram and K M Sherry

2. Anaesthesia

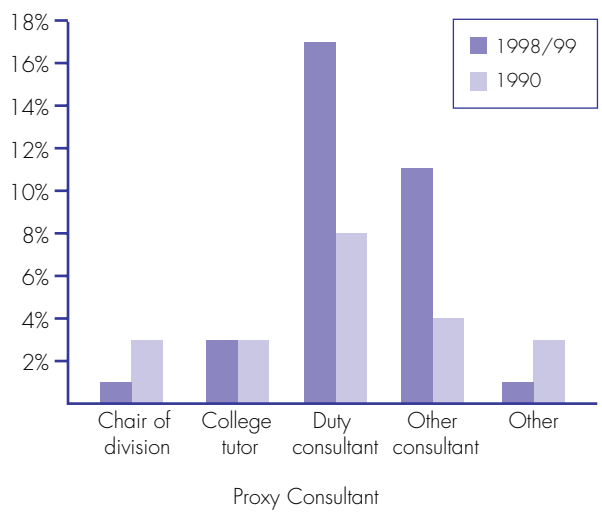
Introduction

Each year the National Confidential Enquiry into Perioperative Deaths (NCEPOD) has monitored the number of questionnaires completed by anaesthetists not directly involved with the anaesthetic, but who have responded on behalf of another. This is most often for cases performed by trainees but includes some for consultants no longer working at the hospital. NCEPOD recognises the extra work this entails and is grateful to those who undertake it.

In 1990, 20% of questionnaires were completed by those not directly involved with the case, in 1998/99 this had risen to 33%.

The return rate for anaesthetic questionnaires in 1990 was 73% and increased to 85% in 1998/99. The increase in questionnaires completed by those not directly involved with the case is probably due to the increased return rate. In most cases it is the duty consultant who undertakes the extra work (Figure 2.1).

Figure 2.1: Anaesthetists completing questionnaires but not directly involved with the case



Review of 1998/99 anaesthetic data and comparisons with 1990

Emergency operating theatres

Key Point

- *All hospitals admitting acute surgical cases should have sufficient daytime emergency operating lists that are appropriately funded and covered by senior anaesthetic and surgical staff.*

The NCEPOD report of 1990 recommended that essential services (including staffed emergency operating rooms, recovery rooms, high dependency units and intensive care units) must be provided on a single site wherever emergency/acute surgical care is delivered[4]. This recommendation was repeated in the NCEPOD reports of 1993/94[11] and 1995/96[13].

In the 1999 report, NCEPOD recommended that there should be sufficient, fully-staffed, daytime theatre and recovery facilities to ensure that no elderly patient requiring an urgent operation waits for more than 24 hours once fit for surgery. This includes weekends[2].

In 1990 there was no enquiry into the provision of daytime emergency operating rooms for urgent surgery. At that time a dedicated daytime emergency operating room was a recent concept and not generally available. In 1998/99 NCEPOD asked about the provision within the hospital of daytime 'emergency' lists for urgent general surgical and for urgent trauma or orthopaedic cases (Table 2.1).

We surmise that there has been a great increase in the availability of emergency daytime operating theatres since 1990. This response to the NCEPOD recommendation is encouraging since the opportunity for good quality care is greater during the day and the burden on junior hospital staff of out of hours operating is reduced.

In future reports questions on emergency operating lists will form part of core data collected by NCEPOD.

Table 2.1: Availability of scheduled daytime emergency lists for urgent cases				
Daytime emergency lists	General surgery		Trauma/orthopaedic	
Available	1005	75%	1152	86%
Not available	320	24%	168	13%
Not answered	12	1%	17	1%
Total	1337		1337	

Table 2.2: Grade of anaesthetist providing cover for emergency lists most of the time				
Grade	General surgery		Trauma/orthopaedic	
Consultant	482	48%	687	60%
Other grades	482	48%	423	37%
Consultant and other grades equally	16	2%	24	2%
Not answered	25	2%	18	1%
Total	1005		1152	

Patients undergoing urgent operations are more likely to be of poor physical status than those admitted for elective or scheduled operations. Recognising the increased operative risk of these patients, who may benefit from an experienced anaesthetist, all hospitals admitting acute surgical cases should have sufficient daytime emergency operating lists that are appropriately funded and covered by senior anaesthetic and surgical staff.

Patient profile

Key Point

- *The profile of patients who die within 30 days of an operation has changed since the report of 1990. Patients are more likely to be older, have undergone an urgent operation, be of poorer physical status and have a coexisting cardiovascular or neurological disorder.*

Age

Table 2.3: Age of patient at time of final operation				
Age in years	1998/99		1990	
0 - 10	15		excluded from sample	
11 - 19	4	5%		5%
20 - 29	15			
30 - 39	15			
40 - 49	31			
50 - 59	82	6%		7%
60 - 69	208	16%		23%
70 - 79	472	36%		33%
80 - 89	379	29%		26%
90 - 99	112	8%		6%
100+	4	<1%		<1%
Total	1337 (1322 excluding those 10 years or less)			

The sample in 1990 excluded children of ten years or less and so the percentages for 1998/99 shown in Table 2.3 have been calculated excluding those patients less than ten years of age.

Figure 2.2: Age of patient at time of final operation

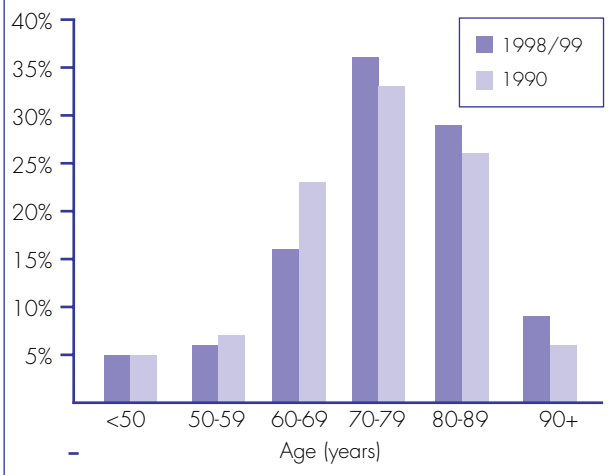
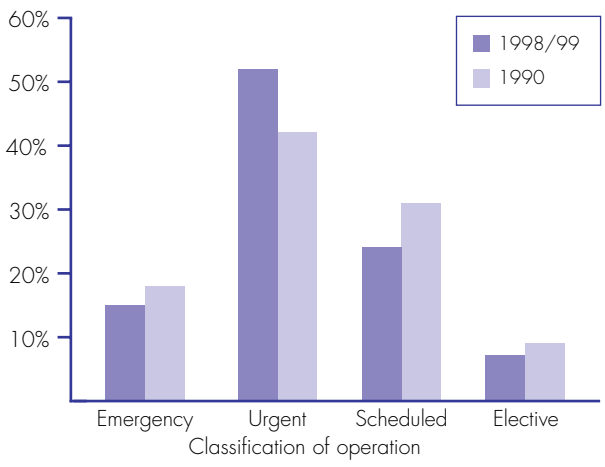


Figure 2.3: Classification of the urgency of the final operation



There appears to be a trend towards an increased patient age. In 1990, 65% of patients were 70 years or older and this increased to 73% in 1998/99. This possibly reflects an older surgical population.

Operations

The 1990 report did not analyse the type of operation and so direct comparisons cannot be made.

Table 2.4: Type of operation
(1518 surgical questionnaires in 1998/99)

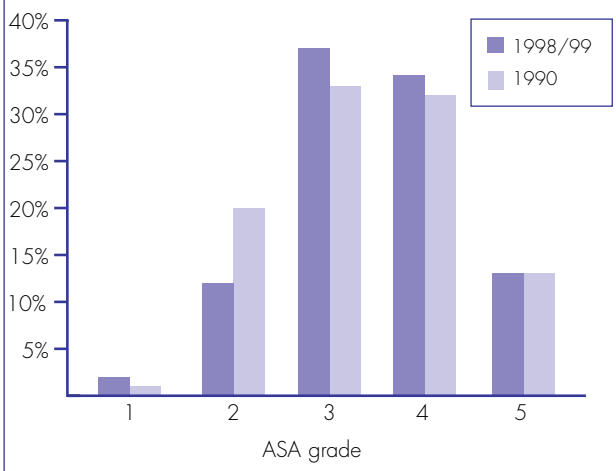
Type of operation	Number	
General surgery	639	42%
Orthopaedic	341	22%
Vascular	206	14%
Cardiothoracic	101	7%
Urology	73	5%
Neurosurgery	68	4%
Gynaecology	22	1%
Otorhinolaryngology	22	1%
Paediatric	18	1%
Plastic	15	1%
Ophthalmology	8	<1%
Oral/maxillofacial	5	<1%
Total	**1518**	

Sixty-nine percent of the general surgery, 81% of orthopaedic, 65% of vascular and 50% of cardiothoracic operations were classified as emergency or urgent.

In 1990, 60% of operations were classified as emergency or urgent; this increased to 67% in 1998/99. The increase was due to more patients having urgent operations (Figure 2.3).

ASA status

Figure 2.4: ASA status



In 1998/99, 84% of patients were ASA 3 or poorer compared with 78% in 1990. For a discussion of ASA classification see page 54.

Coexisting medical disorders

Table 2.5: Coexisting medical disorders at the time of the final operation
(1998/99: 1337 cases; answers may be multiple)

Coexisting disorder	1998/99		1990
None	77	6%	11%
Cardiac	888	66%	54%
Respiratory	496	37%	33%
Neurological	444	33%	18%
Alimentary	214	16%	19%
Renal	193	14%	10%
Endocrine	236	18%	13%
Sepsis	173	13%	*
Musculoskeletal	125	9%	12%
Haematological	139	10%	11%
Hepatic	70	5%	*
Other	184	14%	17%
Not answered	21	2%	2%

* *Not a separate category in 1990 question*

The percentage of patients with coexisting medical disorders increased from 89% in 1990 to 94% in 1998/99. There was an increase in the percentage of patients with cardiac disorders from 54% to 66% and an increase in the percentage of patients with neurological disorders from 18% to 33%.

In the 1998/99 sample cardiac disorders were mainly ischaemic heart disease. Seventeen percent of patients had angina, 27% had suffered a previous myocardial infarction and 18% had atrial fibrillation; overall 42% of patients had one or more of these three conditions. Twenty-eight percent of patients had hypertension and 7% had valvular heart disease.

Respiratory disorders included 18% of patients with chronic obstructive pulmonary disease and 11% had an active chest infection.

Neurological disorders included 11% of patients with a previous cerebrovascular accident and 10% had dementia.

Review of the questionnaires suggested that renal impairment and sepsis were under reported. It is of concern if these conditions are not recognised preoperatively as both are implicated in postoperative complications and death. (See also comment on preoperative creatinine on page 26).

Diabetes mellitus

In this sample a subsection on diabetes was included in the questionnaire. Eleven percent of patients had pre-existing diabetes mellitus.

Table 2.6: Type of diabetes mellitus

Type	Number
Diet controlled diabetes mellitus	34
Tablet dependent diabetes mellitus	68
Insulin dependent diabetes mellitus	44
Not answered	2
Total	**148**

Operative management

Seventy-seven diabetic patients had their blood sugar estimated at some time during the operation, 62 did not and in nine cases this question was either not answered or not known. Of the 62 diabetic patients who did not have their blood sugar estimated during the operation, 12 were insulin dependent diabetics. Often blood sugar was not estimated during the operation when patients had non-insulin dependent diabetes with normal preoperative blood sugar or insulin dependent diabetes with normal preoperative blood sugar undergoing a short procedure.

Table 2.7: Examples where blood sugar estimation was not performed during the operation					
Age (years)	Normal diabetic control	Coexisting disorders	Operation	Preoperative blood sugar	Peroperative insulin
53	Insulin	Alcoholic cirrhosis, pancreatic abscess	Partial pancreatectomy	10.9 mmol/l	GKI* infusion
73	Insulin	Diabetic retinopathy, ischaemic foot	Through knee amputation	12.7 mmol/l	None
61	Tablet	COPD, IHD, septic foot, PVD	Above knee amputation	5.3 mmol/l	Insulin infusion
78	Insulin	IHD, COPD, critically ischaemic leg	Gritti Stokes amputation	3.8 mmol/l	None
74	Tablet	Ruptured iliac artery	Laparotomy for iliofemoral graft	15.2 mmol/l	None
50	Tablet	Acute pancreatitis, shock, morbid obesity	Laparotomy	10.2 mmol/l	None
81	Insulin	IHD, septic foot	Below knee amputation	4.0 mmol/l	None
86	Diet	IHD, PVD	Laparotomy and resection of ischaemic bowel	17.8 mmol/l	None

* *GKI = glucose, potassium and insulin.*

In some of the cases in Table 2.7 blood sugar estimation during the operation could be considered unnecessary, in others it was clearly indicated.

Postoperative management

Of the patients with diabetes mellitus 102/148 (70%) had insulin prescribed postoperatively.

Table 2.8: Route(s) for insulin given in the first 48 hours *(102 cases; answers may be multiple)*	
Route	Number
Intravenous sliding scale	73
Glucose, potassium and insulin infusion	19
Subcutaneous sliding scale	6
Subcutaneous fixed dose	4
Other	2

Table 2.9: Specialty of the clinician supervising postoperative diabetic management		
Specialty	Number	
Surgeon	75	51%
Anaesthetist	39	26%
Physician	16	11%
Other	12	8%
Not answered/not known	6	4%
Total	**148**	

Table 2.10: Grade of the supervising clinician		
Grade	Number	
Trainee	80	54%
Consultant	53	36%
Other grade	5	3%
Not answered/not known	10	7%
Total	**148**	

It is primarily surgical trainees who supervise the diabetic management of patients after operation. The high incidence of insulin used postoperatively, and the fact that it is usually given by intravenous sliding scale, suggests that most patients with diabetes are being monitored and managed actively in the immediate postoperative period.

Preoperative preparation

Key Points

- *Patients of poor physical status may require an emergency medical opinion in the perioperative period. There should be the organisational structure within all acute surgical hospitals for prompt medical referral and treatment.*
- *One hundred and sixty-three operations were delayed for non-clinical reasons, 45 (28%) of which were due to insufficient emergency theatre time. Local audit/clinical governance leads need to be involved in monitoring non-medical reasons for delays in the timing of operations in order to assess the requirements for critical care facilities.*

Weight

The percentage of patients who had their weight recorded was unchanged at 37% in 1998/99 compared with 40% in 1990.

Preoperative intravenous fluid

The percentage of patients who received intravenous fluid therapy in the 12 hours before induction increased from 56% of patients in 1990 to 69% in 1998/99. Over this time there was an increase of seven percent (60% to 67%) in the number of patients undergoing urgent or emergency surgery (Figure 2.3) and of 6% (78% to 84%) in the patients of ASA 3 or poorer (Figure 2.4). Nevertheless, these changes indicating a sicker population are unlikely to account totally for the increase in preoperative use of intravenous fluids. The increase in preoperative intravenous fluids is more likely to reflect an increasing recognition of the high incidence of preoperative dehydration in urgent and emergency cases and their need for active resuscitation.

Delays before operation

Medical reasons

Three hundred and four (23%) patients had their operation delayed in order to improve their medical status.

Table 2.11: System(s) needing attention before operation
(304 cases; answers may be multiple)

System	Number	
Cardiac	176	58%
Metabolic	110	36%
Respiratory	94	31%
Haematological	78	26%
Not answered	23	

Case 1 • *An 81-year-old ASA 3 patient was admitted as an emergency with a prolapsed ileostomy that required revision. She also had severe ischaemic and valvular heart disease and was in heart failure. Postoperatively she returned to the ward where she developed cardiac arrhythmia, severe pulmonary oedema and pneumonia and died on day four.*

Case 2 • *A 76-year-old ASA 3 patient with a rectosigmoid carcinoma was admitted for a scheduled anterior resection. He had known ischaemic heart disease and untreated hypertension. His preoperative arterial pressure was 230/85 mmHg. On the first postoperative day he developed left shoulder tip pain in conjunction with ST segment changes on his ECG, and was referred to a cardiologist. The cardiologist had not reviewed him when he was found dead in bed 24 hours later.*

Neither of these patients received a medical opinion.

Patients of poor physical status may require an emergency medical opinion in the perioperative period. There should be the organisational structure within all acute surgical hospitals for prompt medical referral and treatment.

Non-medical reasons

One hundred and sixty-three (12%) operations were delayed for other reasons.

Forty-five patients had their operation delayed because there was insufficient emergency theatre time. NCEPOD has identified that most patients are admitted into hospitals with daytime emergency operating lists (Table 2.1). Are there sufficient sessions available within all hospitals? Other organisational delays included full ICU beds (11) and because a suitably experienced surgeon was not immediately available (6).

Locally, non-medical reasons for delay in the timing of operations need to be monitored in order to assess the demands on the service provision.

If deficits are detected, more consultant-staffed emergency lists or critical care beds may be deemed to be required. Local audit/clinical governance leads need to be involved in this monitoring process.

Premedication

There has been a change in the practice of prescribing premedicant drugs. In 1990, 39% of patients received a premedication compared with 15% in 1998/99. In 1990, 21% of the sample received a benzodiazepine premedication, the remaining 18% being mostly intramuscular. NCEPOD now monitors only the route of administration and in 1998/99, 11% of the sample received an oral premedication and 2% intramuscular.

Table 2.12: Route of administration of premedicant drugs
(207 cases; answers may be multiple)

Route	Number
Oral	153
IM	25
PR	2
Other	42
Not answered	4

Preoperative investigations

Table 2.13: Preoperative investigations (including tests carried out in a referral hospital and available before the operation)
(1998/99: 1337 cases; answers may be multiple)

Investigation		1998/99		1990
None		12	1%	1%
Haemoglobin		1301	97%	97%
Packed cell volume		935	70%	80%
White cell count		1265	95%	93%
Platelets		1237	93%	*
Sickle cell test		22	2%	2%
Blood group +/- cross match		1027	77%	*
Coagulation screen		654	49%	*
Plasma electrolytes	Na	1276	95%	95%
	K	1272	95%	92%
	Cl	337	25%	55%
	HCO_3	494	37%	61%
Blood urea		1222	91%	92%
Creatinine		1237	93%	73%
Serum albumin		765	57%	47%
Bilirubin (total)		702	53%	43%
Glucose		747	56%	52%
Amylase		200	15%	*
Urinalysis (ward or lab)		298	22%	50%
Blood gas analysis	Inspired oxygen	288	22%	18%
	pH	319	24%	
	pCO_2	318	24%	
	pO_2	317	24%	
Chest X-ray		917	69%	80%
Electrocardiography		1126	84%	82%
Respiratory function tests		86	6%	6%
Special cardiac investigations (e.g. echocardiography)		174	13%	**
CT scan/ultrasound/MRI/NMR		232	17%	*
Special neurological investigations (e.g. imaging)		30	2%	3%
Special vascular investigations (e.g. angiography)		88	7%	*
Others relevant to anaesthesia		48	4%	17%
Not answered		8	<1%	<1%

* *Not a separate category in 1990 question.*

** *In 1990 there were two questions: preoperative echocardiography was performed in 4% and special cardiac investigation in 5%. As patients may have had one or both investigations the total percentage for comparison with 1998/99 is not known.*

There has been no change in preoperative haemoglobin measurement. In 1998/99 haemoglobin results were reported in 1265 cases. Haemoglobin was <10 gm/dl in 19% of patients, 10 – 14.9 gm/dl in 73% and 15 gm/dl or more in 8%; a high percentage of abnormal results.

There has been an increase in preoperative serum creatinine measurement, presumably recognising the importance of perioperative renal dysfunction. Preoperative creatinine values in 1998/99 were reported in 1196 cases. Creatinine was <140 micromol/l in 74% of patients, 140 – 199 micromol/l in 14% and 200 micromol/l or more in 12%. A total of 26% therefore had preoperative creatinine of 140 micromol/l or more.

There has been an apparent decrease in preoperative urinalysis. However, this may be due to results being disregarded as they are often recorded in the nursing notes and are seldom of interest to anaesthetists[14].

There appears to have been a true increase in special cardiac investigations. This is most likely to be due to developments in echocardiography services. Cardiac disease is a major contributor to postoperative death. This non-invasive assessment, which can give a more comprehensive assessment of cardiovascular reserve preoperatively, should be available and used more widely.

There has been a decrease in preoperative chest radiography. This is perhaps secondary to the statement by the Royal College of Radiologists in 1982 that routine preoperative chest X-ray was no longer justified[15] and the requirement for a preoperative chest X-ray is now more often determined on an individual case basis. It cannot be estimated whether 69% is an appropriate rate for preoperative chest X-ray investigation for this sample. However, the population suggests that preoperative chest X-rays may often have been indicated; many patients were emergency admissions with coexisting disorders, and the abnormality yield and influence on patient management increases with age and poorer ASA status[14].

The anaesthetists

Key Points

- *There has been a 7% increase (52% to 59%) in anaesthetics given by consultants and a similar reduction in those given by registrars.*
- *The number of anaesthetics given by those without an anaesthetic qualification was 6% in 1990 and 7% in 1998/99.*
- *When anaesthetics were given by those below consultant grade, in 65% of cases more senior advice was not sought.*

There has been a small increase in the communication between surgeons and anaesthetists. The anaesthetist was consulted, as distinct from informed, before the operation for 56% of patients in 1998/99 compared with 51% in 1990.

The practice of preoperative anaesthetic assessment is unchanged. In this sample an anaesthetist visited 96% of patients before their final operation, compared with 92% in 1990, and this was mostly on the ward. The anaesthetist who made the preoperative assessment was also present at the operation for 92% of patients, compared with 94% in 1990.

Table 2.14: Site of preoperative assessment

Site	Number	
Ward	1037	81%
ICU/HDU	171	13%
Accident & Emergency department	44	3%
Outpatient department	4	<1%
Other	17	1%
Not answered/not known	11	1%
Total	1284	

Table 2.15: Grade of the most senior anaesthetist present at the start of the operation			
Grade	1998/99		1990
Consultant	788	59%	52%
Associate specialist	41	3%	2%
Staff grade	77	6%	<1%
SpR - Accred/CCST, 3 or 4	174	13%	Senior registrar 10%
SpR 1 or 2	77	6%	Registrar 16%
SHO	151	11%	15%
Other (trainee)	8	<1%	-
Other (non-trainee)	17	1%	4%
Not answered/not known	4	<1%	<1%
Total	1337		

The increase in the percentage of consultant anaesthetists present at the start of the anaesthetic is primarily due to an increase in consultant numbers. It may also reflect consultant participation in the staffing of emergency general surgical and trauma operating lists that tend to have more patients of poorer physical status and higher operative mortality than elective surgical operating lists.

Over the past ten years there has been an increase in the percentage of non-consultant career grade anaesthetists as the most senior anaesthetist present for the operation, and a 5% increase in staff grade anaesthetists that almost exactly matches the decrease in SHO anaesthetists. The increase in non-consultant career grade anaesthetists is a result of changes in anaesthetic staffing. There has been a removal of the ceiling on staff grade appointments since 1997, reduced length of training for trainees within the Calman training scheme since 1996 and reductions in junior doctors' hours of work. Non-consultant career grades, particularly staff grade anaesthetists, now more often take part in the 'on call' rota at nights and weekends. For further discussion of non-consultant career grade anaesthetists see page 51.

Figure 2.5: Grade of the most senior anaesthetist present at the start of the operation

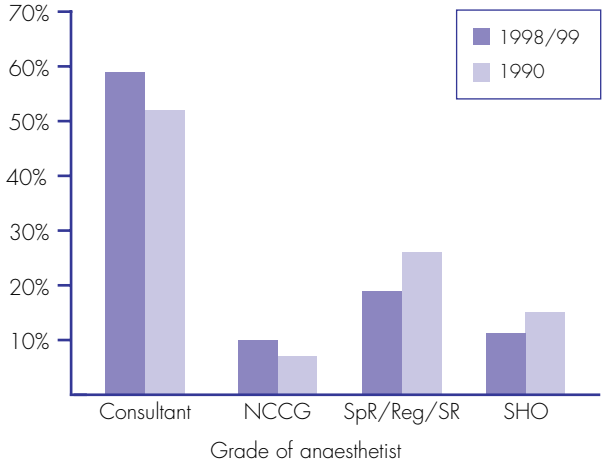


Table 2.16: Anaesthetic qualifications held at the time of the operation *(1337 cases; answers may be multiple)*			
Qualification	1998/99		1990
None	89	7%	6%
Fellowship (Royal College, College or Faculty)	1026	77%	66%
DA (or 'old' Part 1 FRCA)	267		
'Old' Part 2 FRCA (physiology/pharmacology)	129		
'New' Part 1 FRCA	61		
Other	83		
Not answered/not known	32		

Table 2.17: Availability of consultant help for non-consultant anaesthetists	
Availability of consultant	Number
A consultant came to theatre before the end of the anaesthetic	40
A consultant was available in the operating suite but not directly involved	182
A consultant was available in the hospital but not present in the operating suite	77
A consultant was available by telephone	219
Other	5
Not answered/not known	26
Total	**549**

There has been a 4% reduction (15% to 11%) in the number of cases where an SHO is the most senior anaesthetist (Table 2.15). However, Table 2.16 shows that there has been no reduction in the percentage of anaesthetists without an anaesthetic qualification (6% in 1990 and 7% in 1998/99). This is disappointing and implies little improvement in supervision of the most junior anaesthetists. The training and supervision of SHO anaesthetists is discussed on page 46.

In 1990, 21% of anaesthetists sought advice at some time from another anaesthetist who was not present during the anaesthetic. This had decreased to 15% (200 cases) in 1998/99. In 1998/99 there were fewer responses of 'not answered' or 'not known', 4% compared with 11% in 1990, and perhaps this indicates that trainees now document more clearly when advice is sought.

Forty-three (22%) of those who sought advice were established consultant anaesthetists and they generally consulted with intensive care doctors about admission into critical care units. Despite this, 545 patients (41% of the sample) were anaesthetised by those below consultant grade and for 353 of these (65%) more senior advice was not sought. In 1990, 59% of cases performed by those below consultant grade were undertaken without advice from a more senior anaesthetist.

The numbers shown in Table 2.18 are examined in greater detail on page 48.

Table 2.18: Timing of requests for advice by non-consultant anaesthetists			
Grade	Before operation	During operation	After operation
NCCG	27	2	1
SpR	55	10	7
SHO	44	3	6
Total	**126**	**15**	**14**

Table 2.19: Grade of anaesthetist from whom advice was sought *(1990: 467 cases; answers may be multiple)*			
Grade	1998/99		1990
Consultant	128	64%	64%
SpR - Accred/CCST, 3 or 4	8	4%	Senior registrar 18%
SpR 2/year not stated	10	5%	Registrar 22%
Other	3	2%	6%
Not answered	51	26%*	<1%
Total	**200**		

* *The 26% of cases where this question was not answered make comparison with 1990 difficult.*

The anaesthetic

Anaesthetic records

Key Points

- *In 3% of cases there was no anaesthetic record in the notes.*
- *Improvements in information technology can make retrieval of patient information more, rather than less, difficult.*

Three percent of questionnaires reported that there was no preoperative assessment and anaesthetic record in the patient's notes. It is very disappointing that there has been no improvement at all since1990 when 3% of cases also had no anaesthetic record in the notes.

In some such cases the anaesthetic chart may never have been completed, indicating poor medical record keeping. In others the anaesthetic chart may have been wrongly filed or lost after the operation. Proper preoperative assessment and record keeping is essential to good anaesthetic practice[16]. Comment has been made in the general data section (page 14) about problems with lost notes. There was a particular problem during cardiac anaesthesia when often there was no recording of events, physiological variables or drugs given during the period of cardiopulmonary bypass.

There were further problems caused by the introduction of information technology. Many anaesthetic machines and monitors now provide automated charting or paper printouts, which are very helpful at the time of the anaesthetic. On occasions, anaesthetists who used such equipment reported that when they came to review the patient's records to complete the NCEPOD questionnaire, no printout could be found in the notes, and it was either very difficult or impossible to retrieve the missing electronic data. It is highly unsatisfactory that information about the management of an anaesthetic can be lost in this way despite a supposed improvement in anaesthetic technology. Trusts and hospitals must ensure that it is always possible to provide a paper copy of the anaesthetic record at any time.

Retention of the anaesthetic record is vital; it should be available for reference should the patient require another anaesthetic, or if the anaesthetist has to defend his/her actions against complaints or litigation.

Intravenous fluids

Key Point

- *Improvement in the management of major blood loss is required.*

Table 2.20: Crystalloids administered during operation
(1998/99: 1273 cases; answers may be multiple)

Crystalloid	1998/99		1990
Dextrose 5%	33	3%	7%
Dextrose 4% saline 0.18%	88	7%	14%
Dextrose 10%	12	1%	2%
Saline 0.9%	437	34%	28%
Hartmann's (compound sodium lactate)	803	63%	62%
$NaHCO_3$	24	2%	*
Other	13	1%	6%

* *Not a separate category in 1990 question*

Figure 2.6: Use of crystalloids during operation

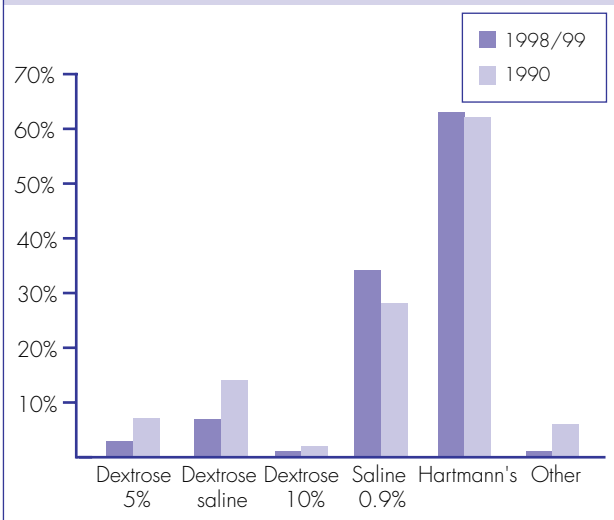


Figure 2.7: Use of colloids during operation

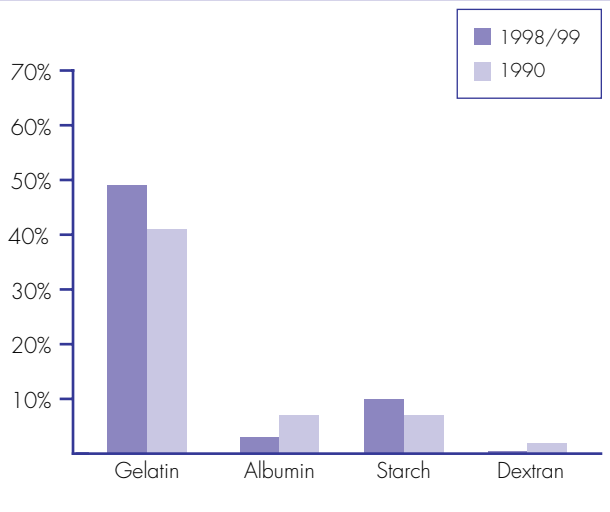


Table 2.21: Colloids administered during operation
(1998/99: 1273 cases; answers may be multiple)

Colloid	1998/99		1990
Modified gelatin	623	49%	41%
Human albumin solution	42	3%	7%
Starch (HES)	123	10%	7%
Dextran	4	<1%	2

Ninety-five percent of patients received intravenous fluids during their operation. This is little changed from the 1990 figure of 92%, but there have been changes in the type of fluids administered.

There has been a decrease in the use of solutions containing dextrose and an increase in the use of saline and Hartmann's solutions as shown in Figure 2.6.

The use of gelatins and starch has increased whilst that of albumin and dextran has decreased as shown in Figure 2.7.

Blood products

Blood transfusion practice is difficult to compare with 1990 because of differences in the wording of questions and changes in blood components.

Table 2.22: Use of blood products during operation
(1273 cases; answers may be multiple)

Blood product	Number	
Red cells	377	30%
Platelets	74	6%
Fresh frozen plasma	148	12%
Other components	33	3%

In the 1998/99 sample, 62 (5%) patients lost 3000 ml or more of blood at operation, either measured or estimated. Only 21 received a platelet transfusion, and 20 received neither platelets nor fresh frozen plasma. One patient was a Jehovah's witness.

The NCEPOD report of 1993/94[11] recommended local protocols for the management of major perioperative blood loss, but improvement is still required.

CASE 3 • *An 87-year-old patient presented with a leaking abdominal aortic aneurysm. He was anaesthetised by an SHO with more than two years' experience who did not seek advice. The patient lost 8700 mls of blood in theatre but was not given any platelets or clotting factors. On arrival in the intensive care unit his platelet count was 43x10⁹.litre and his partial thromboplastin time was greater than 250 seconds. He died two days later.*

Induction and monitoring

Key Points

- *The overall standard of monitoring was good.*
- *Some anaesthetists were unable to monitor expired carbon dioxide in all locations because of a lack of equipment.*

The questionnaires show that the anaesthetic room was not used in 29% of cases, presumably because the patient was in poor condition or about to undergo major surgery, or both. It was noted in the 1990 report that the anaesthetic room was not used in 17% of cases. This may be because the patients in this sample were more sick than those in 1990.

Table 2.23 and Figure 2.8 show that there has been an increase in monitoring of all types since 1990. This is especially noticeable for oxygen and expired carbon dioxide analysers, presumably because the introduction by the Association of Anaesthetists of Great Britain and Ireland (AAGBI) of minimum monitoring standards[17] influenced trusts to invest in monitors. The use of invasive cardiovascular monitoring has also increased. This change in practice is welcome and has been advocated by NCEPOD in the past[11,18]. Monitoring of neuromuscular blockade continues to be uncommon.

Problems with monitoring

Ninety-one questionnaires reported that there were problems with monitoring. In 17 the problem was the unavailability of capnography, especially in the anaesthetic room. This issue was highlighted by the Royal College of Anaesthetists, which stated that *"if tracheal intubation is performed in the anaesthetic room then capnography must be used immediately the tracheal tube is inserted"*[19].

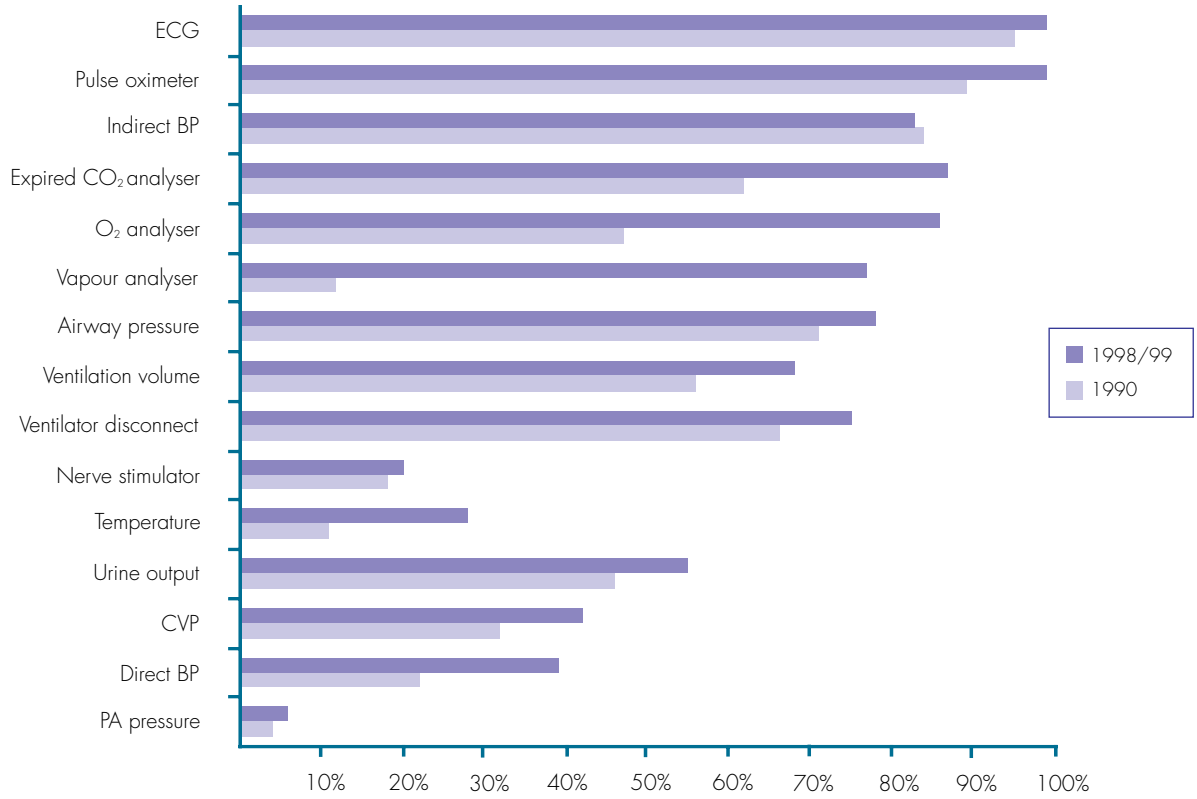
Other concerns were problems due to poor peripheral perfusion, and technical difficulties siting arterial and central lines.

Table 2.23: Monitoring devices used during management of the anaesthetic
(1998/99: 1337 cases; answers may be multiple)

Monitoring	1998/99		1990
ECG	1319	99%	95%
Pulse oximeter	1324	99%	89%
Indirect BP	1114	83%	84%
Expired CO_2 analyser	1163	87%	62%
O_2 analyser	1153	86%	47%
Inspired anaesthetic vapour analyser	1029	77%	12%
Airway pressure gauge	1048	78%	71%
Ventilation volume	914	68%	56%
Ventilator disconnect device	1005	75%	66%
Peripheral nerve stimulator	273	20%	18%
Temperature	376	28%	11%
Urine output	740	55%	46%
CVP	567	42%	32%
Direct arterial pressure (invasive)	518	39%	22%
Pulmonary artery pressure	76	6%	4%
Intracranial pressure	10	1%	*
Cardiac output	43	3%	*

* *Not a separate category in 1990 question*

Figure 2.8: Comparison of the use of monitoring devices



DVT prophylaxis

Table 2.24: Measures taken (before, during or after operation) to prevent venous thrombosis
(1998/99: 1337 cases; answers may be multiple)

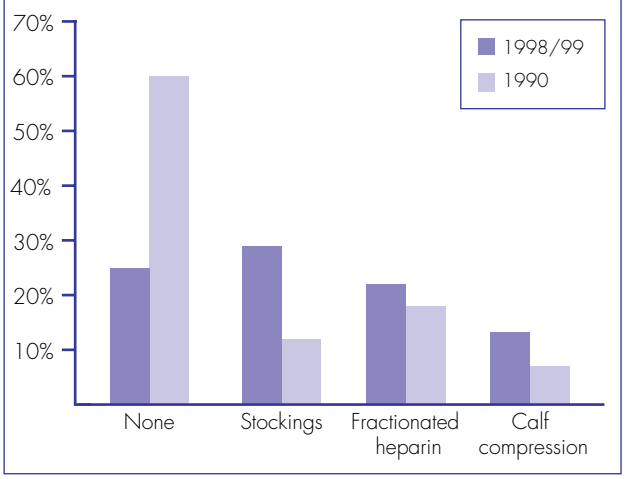
DVT prophylaxis	1998/99		1990
None	343	26%	59%
Stockings	393	29%	12%
Fractionated heparin	299	22%	18%
Low molecular weight heparin	308	23%	*
Warfarin	27	2%	*
Calf compression	172	13%	7%
Dextran	1	<1%	2%
Calf stimulation	14	1%	*
Other	85	6%	2%

* *Not a separate category in 1990 question*

Analysis of the postmortem reports returned to NCEPOD indicated that 6% of patients died from a pulmonary embolus (page 122). It is gratifying that the percentage of cases receiving no prophylaxis has fallen from 59% to 26%. Amongst those receiving no prophylaxis 93 (27%) were classified as emergencies, that is, they needed to go to the operating theatre immediately. Two hundred and fifteen (86%) of the 250 patients who did not require immediate surgery were ASA 3 or worse. These figures imply a failure of good practice rather than a conscious decision not to take such measures; for example, there were 37 scheduled or urgent intra-abdominal operations without any measures taken against deep vein thrombosis.

There is controversy in anaesthetic circles as to where the responsibility lies for ensuring that the patient is receiving prophylaxis against venous thrombosis. Many measures need to be instituted before surgery; surgeons may not wish others to be used for patients undergoing particular operations. Anaesthetists may request that heparin therapy is delayed until central neural blocks have been performed. This is an area for the development of protocols so that whatever the local arrangements may be, every patient receives the correct prophylaxis (see also page 66 and page 94).

Figure 2.9: Venous thrombosis prophylaxis



Maintenance of body temperature

Table 2.25: Measures taken to maintain body temperature
(1337 cases; answers may be multiple)

Measures taken	Number	
None	292	22%
IV fluid warmer	603	45%
Heated mattress	587	44%
Warm air system	385	29%
Other	145	11%

Type of anaesthesia

Key Points

- *There has been a marked increase in the use of regional anaesthesia.*
- *Regional techniques should only be used where appropriate and require careful management.*

Table 2.26: Type of anaesthesia

Technique	1998/99		1990
General alone	834	62%	83%
Local infiltration alone	6	<1%	<1%
Regional alone	69	5%	3%
General and regional	272	20%	7%
General and local infiltration	58	4%	2%
Sedation alone	5	<1%	<1%
Sedation and local infiltration	9	1%	1%
Sedation and regional	81	6%	4%
Not answered	3	<1%	-
Total	1337		

Figure 2.10: Type of anaesthesia

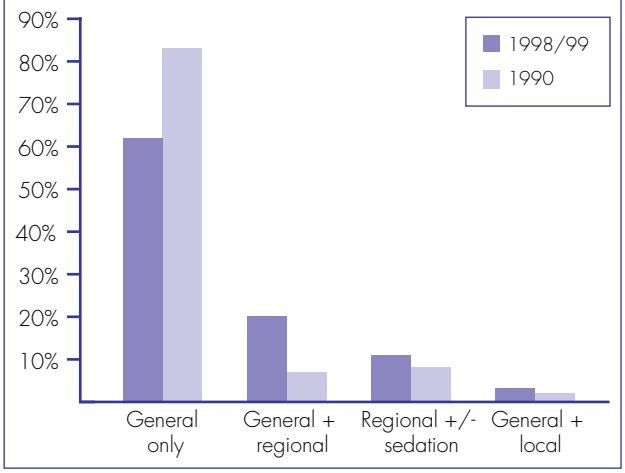


Table 2.26 and Figure 2.10 show that there has been a major increase in the use of regional techniques, mainly accompanying general anaesthesia, but also combined with sedation or the use of regional anaesthesia on its own.

Table 2.27: Airway management during general anaesthesia
(1990: 2018 cases; answers may be multiple)

Airway management	1998/99		1990
Face mask	15	1%	9%
Laryngeal mask airway (LMA)	146	13%	4%
Tracheal intubation	870	75%	87%
Double lumen tube	31	3%	*
Tracheostomy	18	2%	2%
Patient already intubated prior to theatre	75	6%	*
Other	8	1%	2%
Not answered	1	<1%	1%
Total	**1164**		

* *Not a separate category in 1990 question*

The total use of either face mask or LMA is the same for the two periods, with a significant shift away from the use of the face mask towards use of the LMA in 1998/99. Differences in the questions asked in the two reports make it difficult to compare other returns.

The 1998/99 figures highlight how very sick many of these patients were when they came to theatre; 6% were already intubated on arrival in theatre and 13 of the patients with a tracheostomy presumably came from the ICU, since that is where they were seen by the anaesthetist preoperatively.

The figures in Table 2.28 seem to suggest that the use of suxamethonium before maintenance with non-depolarising agents has decreased. However, this question was answered badly. Operations apparently performed using suxamethonium alone included pneumonectomy, anterior resection and aortic valve replacement.

Whilst the figures in Table 2.29 appear to show a considerable decrease in the use of nitrous oxide since 1990 in patients receiving a general anaesthetic, review of anaesthetic records accompanying questionnaires showed this could, in part, be due to poor answering of the question.

Table 2.28: Muscle relaxants used during the anaesthetic
(1998/99: 1164 cases; answers may be multiple)

Muscle relaxant	1998/99		1990
None	158	14%	10%
Depolarising	415	36%	45%
Non-depolarising	928	80%	84%

Thirteen patients received no agents regarded as having anaesthetic properties. In some cases the anaesthetist apparently decided that the patient's condition was so poor that no anaesthetic agent was needed and used opiates alone. In others, the anaesthetist seemed to consider that the use of midazolam would be sufficient to prevent awareness in a patient who received neither nitrous oxide, nor a volatile agent, nor an intravenous anaesthetic agent.

Table 2.29: Maintenance of general anaesthesia
(1998/99: 1164 cases; answers may be multiple)

Anaesthetic agent	1998/99		1990
Nitrous oxide	839	72%	93%
Volatile agent	1043	90%	88%
Propofol infusion	121	10%	9%
Other	134	12%	73%*

* *includes replies stating that narcotic agents were used to maintain anaesthesia*

Table 2.30: Regional anaesthetic techniques
(1998/99: 422 cases; answers may be multiple)

Technique	1998/99		1990
Epidural - caudal	6	1%	4%
- lumbar	86	20%	18%
- thoracic	109	26%	13%
Cranial or peripheral blocks	30	7%	12%
Plexus block	48	11%	4%
Subarachnoid (spinal)	158	37%	51%

Thirty-three percent (141/422) of patients having a regional anaesthetic received a narcotic drug as part of the technique; in 1990 the figure was 16%.

In 1990, 14% (304/2191) of patients had some form of regional anaesthesia, compared to 32% (422/1337) in the 1998/99 sample. There has, therefore, clearly been a significant increase in the number of regional anaesthetic blocks used, of all sorts. There is evidence that the use of regional anaesthesia can improve outcome, but the 1999 NCEPOD report 'Extremes of Age'[2] highlighted the problems that can be seen with these techniques, especially the prevalence of hypotension associated with general and epidural anaesthesia in septic patients. Many of the questionnaires returned in 1998/99 raised the same concerns. Regional techniques were chosen inappropriately given the patient's preoperative condition, and problems that occurred during the anaesthetic were not managed properly. Sometimes, though not always, this was related to the inexperience of the anaesthetist.

CASE 4 • *A 45-year-old patient required laparotomy for intra-abdominal sepsis. His blood pressure was 100/60 mmHg preoperatively, with a tachycardia of 130. He was anaesthetised by a consultant who used a general anaesthetic with placement of an epidural catheter at L1/2, with a total of 16 ml of 0.5% bupivacaine. He received repeated doses of ephedrine and finally an infusion of adrenaline, but continued to be tachycardic and hypotensive with a lowest systolic pressure of 60 mmHg.*

CASE 5 • *A 76-year-old patient with non-insulin dependent diabetes required an urgent distal gastrectomy for bleeding. He was anaesthetised by an SHO 2 who did not seek advice. The preoperative blood pressure was 160/70 mmHg. After induction of general anaesthesia, an epidural catheter was sited at T10/11 and bupivacaine given. The systolic pressure fell to 100 mmHg, when further bupivacaine was given. Despite requiring repeated boluses of methoxamine to maintain the systolic pressure at 80 mmHg the anaesthetist continued to give further bolus injections down the epidural catheter. Postoperatively the patient went to the HDU where inotropic support was started immediately. After five days he returned to the general ward, and died on the eleventh postoperative day.*

CASE 6 • *An 80-year-old patient was anaesthetised by an accredited SpR for a sigmoid colectomy. After induction of general anaesthesia, the anaesthetist attempted to place an epidural catheter. After making a dural tap at T12/L1 and at L1/2, a third attempt was made at L3/4 with the same result. The anaesthetist administered 2 ml 0.5% bupivacaine and 2 mg diamorphine intrathecally. The blood pressure, which had been 110/70 mmHg preoperatively, remained at 90/45 mmHg throughout the operation.*

Sedation

Seven percent (95/1337) of cases in 1998/99 were performed under sedation, compared to 5% (110/2191) in 1990.

Table 2.31: Sedative drugs given (excluding premedication)
(1998/99: 95 cases; answers may be multiple)

Sedative	Number	
Inhalant	4	4%
Narcotic analgesic	11	12%
Benzodiazepine	74	78%
Sub-anaesthetic doses of IV anaesthetic agents	30	32%
Other	8	8%

POSTOPERATIVE CARE

Table 2.32: Destination of patient immediately on leaving the operating room

Destination	1998/99		1990
Recovery area	801	60%	66%
High dependency unit	40	3%	1%
Intensive care unit	395	30%	25%
Specialised nursing area	4	<1%	*
Ward	16	1%	2%
Other	1	<1%	1%
Died in theatre	63	5%	5%
Not answered	17	1%	<1%
Total	1337		

* *Not a separate category in 1990 question*

Early postoperative care is discussed in detail on page 40.

Recovery room

Table 2.33 shows good practice; of the five patients reported as receiving no monitoring, three were dying in the recovery area and receiving palliative care, and one was undergoing insertion of a CVP line.

There have been marked changes in monitoring practice in recovery areas (Table 2.34). Practically all patients now have their oxygen saturation measured, compared with only 52% in 1990. There have also been increases in the proportions who have their temperature monitored and blood pressure measured directly. It is surprising that the ECG was monitored in only 58% of cases in the recovery area when it was monitored in 99% of cases intraoperatively.

Postoperative ventilation

Thirty-one percent (421/1337) of patients received intermittent positive pressure ventilation (IPPV) to their lungs postoperatively, for the reasons shown in Table 2.35.

Six patients were ventilated for a period in the recovery area, then extubated and sent to the ward.

CASE 7 • *A 72-year-old patient was admitted with diverticulitis, and a laparotomy performed. The preoperative blood pressure was 130/80 mmHg. During the operation the systolic blood pressure was 80 mmHg. There was no invasive monitoring. Postoperatively she required ventilation in recovery and was not extubated until two hours after the end of the operation. Despite her poor condition she was returned to the ward where she died two days later from congestive cardiac failure.*

Table 2.33: Use of monitoring devices in the recovery room

Monitoring in recovery room	Number	
Monitors used	746	93%
Monitors not used	5	1%
Not answered	49	6%
Not known	1	<1%
Total	801	

Table 2.34: Recovery room monitoring
(1998/99: 746 cases; answers may be multiple)

Monitoring	1998/99		1990
ECG	436	58%	45%
Pulse oximeter	741	99%	52%
Indirect BP	705	95%	95%
Expired CO_2 analyser	24	3%	1%
O_2 analyser	35	5%	1%
Airway pressure gauge	19	3%	2%
Ventilation volume	15	2%	2%
Ventilator disconnect device	15	2%	1%
Peripheral nerve stimulator	4	1%	1%
Temperature	219	29%	12%
Urine output	220	29%	27%
CVP	86	12%	10%
Direct arterial BP (invasive)	65	9%	3%
Blood gas analysis	29	4%	*
Pulmonary arterial pressure	1	<1%	<1%
Other	17	2%	4%

* *Not a separate category in 1990 question*

Table 2.35: Reasons for postoperative IPPV
(421 cases; answers may be multiple)

Reason	Number	
Routine management	101	24%
Respiratory inadequacy	150	36%
Cardiac inadequacy	109	26%
Control of intracranial pressure or other neurosurgical indications	39	9%
Part of the management of pain	21	5%
Poor general condition of patient	247	59%
To allow recovery of body temperature	57	14%
Other reasons	23	5%

Critical events and complications

Critical events during anaesthesia or recovery

In 1998/99, critical events requiring specific treatment occurred during anaesthesia or the immediate recovery period in 32% (431/1337) of cases, compared to 22% (481/2191) in 1990. These are summarised in Table 2.36.

The classification of adverse events was not the same for the two samples. However, the incidence of many complications seems similar. Reporting of hypoxaemia has increased; this may be due to the greater use of pulse oximeters. Reporting of hypotension and tachycardia, which was not requested in 1990, is common; it was, however, noted in the 1990 report that the majority of events in the grouping 'other' were related to hypotension.

Equipment failure

In 1998/99 there were only six reports of mechanical failure of equipment during anaesthesia or recovery. This is a similar number to that reported in 1990 when eight cases were identified.

Modern anaesthetic equipment, properly checked, seems to be very reliable.

Postoperative complications and events

Of 1274 patients (excluding those who died in the operating theatre) in 1998/99, 401 (31%) received inotropes in the first 48 hours after operation.

The responses summarised in Table 2.37 further reinforce how poor was the physical status of these patients and how great the demands made on acute surgical services.

Table 2.37: Complications or events after the operation
(1998/99: 1274 cases, excluding those who died in the operating theatre; answers may be multiple)

Complication	1998/99		1990
Ventilatory problems	492	39%	34%
Cardiac problems	480	38%	40%
Renal failure	294	23%	18%
Septicaemia	219	17%	12%
Progression of surgical condition	193	15%	*
Haematological disorder	166	13%	*
Central nervous system	152	12%	6%
Electrolyte imbalance	108	8%	*
Hepatic failure	43	3%	3%
Other	79	6%	20%

* *Not a separate category in 1990 question*

Table 2.36: Critical events during anaesthesia or the immediate recovery period
(1998/99: 431 cases; answers may be multiple)

Critical event	1998/99		1990
Airway obstruction	7	2%	2%
Anaphylaxis	1	<1%	<1%
Arrhythmia	71	16%	25%
Bradycardia (to or less than 50% of resting)	36	8%	*
Bronchospasm	5	1%	4%
Cardiac arrest (unintended)	65	15%	21%
Convulsions	1	<1%	<1%
Hyperpyrexia (greater than 40°C or very rapid increase in temperature)	2	<1%	<1%
Hypertension (increase of more than 50% resting systolic)	19	4%	*
Hypotension (decrease of more than 50% resting systolic)	248	58%	*
Hypoxaemia less than 90%	72	17%	6%
Misplaced tracheal tube	2	<1%	1%
Pneumothorax	3	1%	1%
Pulmonary aspiration	9	2%	1%
Pulmonary oedema	26	6%	4%
Respiratory arrest (unintended)	8	2%	4%
Tachycardia (increase of 50% or more)	59	14%	*
Unintentional delayed recovery of consciousness	20	5%	*
Ventilatory inadequacy	40	9%	*
Excessive spread of regional anaesthesia	5	1%	*
Wrong dose or overdose of drug	1	<1%	<1%
Other	34	8%	52%

* *Not a separate category in 1990 question*

Pain relief

There were no questions on acute pain services in the 1990 report so there are no data for comparison.

Eighty-two percent (1092/1337) of cases were performed in hospitals which had an acute pain service.

Table 2.38: Membership of the pain team
(1092 cases; answers may be multiple)

Team members	Number	
Anaesthetic consultant(s)	942	86%
Anaesthetic trainee(s)	448	41%
Specialised pain nurse(s)	953	87%
Pharmacist(s)	165	15%
Other	48	4%

Table 2.39: Availability of the pain service

Availability	Number	
24 hours a day, seven days a week	397	36%
Weekdays, 9 am to 5 pm	566	52%
Limited times	79	7%
Not answered	50	5%
Total	**1092**	

Table 2.40: Ward nursing staff specially trained in epidural and/or PCA analgesia

Nurses trained	Number	
None	78	6%
Some	1024	77%
All	155	12%
Not answered	70	5%
Not known	10	1%
Total	**1337**	

Table 2.41: Analgesia in the first 48 postoperative hours
(1103 cases; answers may be multiple)

Type of analgesic	Number	
Opiate/opioid	995	90%
Local analgesic	177	16%
Non-steroidal analgesic	101	9%
Paracetamol	181	16%
Other	61	6%

Sixty-three percent (841/1337) of patients did not have a pain assessment chart.

Eleven hundred and three patients (87%) received drugs for pain in the first 48 hours after operation. The types of analgesic used are shown in Table 2.41.

Table 2.42: Method or route for postoperative analgesia
(1103 cases; answers may be multiple)

Method/route	Number	
Intramuscular injection	297	27%
Oral	289	26%
Rectal	37	3%
Continuous intravenous infusion	328	30%
Patient-controlled analgesia	158	14%
Continuous epidural infusion	155	14%
Patient-controlled epidural analgesia	20	2%
IV bolus	101	9%
Other	44	4%

There appear to have been a high number of continuous intravenous infusions but nearly all were administered in specialised areas; only twelve were administered on the general ward.

Question 2.1: Did complications occur as a result of these analgesic methods?

		1998/99	1990
Yes	45	4%	3%
No	1049	95%	95%
Not answered	7	1%	2%
Not known	2	<1%	-
Total	1103		

Table 2.43: Other sedatives or hypnotics
(432 cases; answers may be multiple)

Drug	Number
Propofol	216
Midazolam	153
Other benzodiazepine	46
Major tranquillisers (e.g. phenothiazine, butyrophenones)	47
Other	12

Four hundred and thirty-two patients (32%) received other sedatives or hypnotics. The drugs used are shown in Table 2.43.

The number of patients receiving sedatives is not surprising when so many patients were admitted to intensive care or high dependency units.

Key Points

- *Despite the recommendations of the Royal College of Anaesthetists and Association of Anaesthetists, morbidity and mortality meetings are not held in all departments.*
- *Only 28% of cases were discussed at a departmental audit meeting.*

Question 2.2: Do you have morbidity/mortality review meetings in your department?

		1998/99	1990
Yes	1246	93%	93%
No	79	6%	6%
Not answered	12	1%	1%
Total	1337		

If yes, has this case been discussed, or will it be discussed, at your departmental meeting?

		1998/99	1990
Yes	352	28%	31%
No	876	70%	68%
Not answered	14	1%	2%
Not known	4	<1%	-
Total	1246		

Question 2.3: Has a consultant anaesthetist seen and agreed this questionnaire?

		1998/99
Yes	590	44%
No	25	2%
Not applicable*	675	50%
Not answered	47	4%
Total	1337	

* *completed by consultant*

The last decade has seen great emphasis on audit, continuing professional development and clinical governance, from within the profession and without. The Royal College of Anaesthetists and the Association of Anaesthetists have issued guidance[16, 19, 20, 21]. Previous reports by NCEPOD have recommended that anaesthetists discuss all deaths at departmental meetings[2, 18].

At an individual level consultants do seem committed to the process of learning from deaths. As shown in Question 2.3 consultants saw at least 94% of questionnaires before they were returned, either completing the questionnaire themselves, or reviewing the questionnaire when it had been completed by a trainee or non-consultant career grade doctor. This review is a valuable method of appraising the work of non-consultant anaesthetists.

At a departmental level there has been no development or improvement since 1990. It is extraordinary that 6% of departments still do not have morbidity and mortality meetings, exactly the same figure as in 1990. The number of deaths discussed at morbidity and mortality meetings has even decreased slightly, from 31% to 28%.

Successive NCEPOD reports have shown that most deaths occurred in patients who were severely ill and who received care of high quality; however, in some the care given could have been better. NCEPOD can only look at a sample of the perioperative deaths that occur. The report in 1990[4] proposed that *"anaesthetists could perhaps encourage their colleagues (surgeon and pathologist) so that no death is unreported and that for all such deaths questionnaires are completed and considered at local audit meetings"*. This is not happening. Unless every death is reviewed locally, the potential for learning lessons to improve care will not be realised.

CASE 8 • *A 78-year-old patient with previous hypertension and angina was admitted for scheduled repair of a popliteal aneurysm. The preoperative haemoglobin was 15.5 gm/dl. Following blood gas analysis in the recovery ward at 15.00 it was decided he required a blood transfusion. No blood was available and cross-matching was delayed because he had abnormal antibodies. Later that evening the haemoglobin was 7.0 gm/dl, but blood transfusion had still not been started when he suffered a cardiac arrest at 22.00. Resuscitation was unsuccessful. The case was not discussed at an anaesthetic departmental meeting.*

Hospitals must have systems in place to ensure that all perioperative deaths are recorded and that this information is available to anaesthetic (and surgical) departments. In turn, anaesthetic departments must have systems to review all perioperative deaths and the results must be reported to morbidity and mortality meetings. All anaesthetists should attend these departmental meetings, and there should be the opportunity to discuss every case as fully as the circumstances require. Perioperative deaths should be discussed at multidisciplinary meetings whenever possible.

Specific issues

Early postoperative care

Key Points

- *The 40% of hospitals where surgery is taking place, that at present do not have a high dependency unit (HDU), and in which patients are dying within 30 days of operation, should take urgent action to create this facility.*
- *The current debate on the more flexible and effective use of critical care facilities is of value. It should not be allowed to disguise the fundamental lack of HDU beds in many hospitals.*
- *Critical care facilities demand high levels of resources together with medical and nursing staff. There is no value in creating facilities without addressing these needs. A closed ICU or HDU bed is of no benefit to patients.*
- *A method of defining an individual patient's need for postoperative critical care in an ICU or HDU, based on simple, nationally agreed criteria such as their age, preoperative condition and the complexity of the surgery they are to undergo, is urgently required.*

Previous NCEPOD reports have, on many occasions, raised concerns in relation to the early postoperative care of patients. Deficiencies in the management of intravenous fluids, particularly in the elderly, and the variability in the provision of appropriate arrangements for acute postoperative pain relief, have been highlighted as examples of poor practice[2]. However, in seeking ways to improve care, particularly when, as can be seen in this report, the surgical population that is dying is both older and sicker than that in 1990, this issue needs to be considered from a broader perspective. The facilities available, in terms of adequate numbers of ICU and HDU beds and the availability of resources and sufficient highly skilled staff to run these beds effectively, are paramount in the care of those patients whose postoperative survival is dependent on high quality critical care. Merely to have the appropriate facilities in a hospital is not sufficient. They need also to be available to all those who require them.

Case 9 • *A 78-year-old patient had an anterior resection of the rectum. He had a history of hypertension and ischaemic heart disease and was taking nifedipine, atenolol and GTN. He was assessed as being ASA 3. Although a bed was requested on the HDU, none was available. Therefore, following an uneventful operation, the patient went to the ward after one hour in recovery. Two hours later he was seen by the consultant anaesthetist who had given the anaesthetic and noted to be cold and clammy but alert when roused. At this time the systolic blood pressure was 68 mmHg and the saturation 68% even though the patient was receiving oxygen at 5 l/min via a Hudson mask. A litre of colloid was given but an hour later the patient was continuing to deteriorate. As attempts were made to arrange an ICU bed a bradycardia developed and then cardiac arrest. Resuscitation was unsuccessful.*

The necessity for all patients to go to an appropriately staffed and equipped recovery room during their recovery from anaesthesia is now universally accepted. Should there not be a similar requirement for the availability of high dependency and intensive care based solely on the patient's age, preoperative condition and the complexity of the surgery they are to undergo?

The provision for recovery, high dependency and intensive care

A number of questions relating to this provision were asked in the anaesthetic questionnaire and comparisons with 1990 can be made.

The apparent absence of a recovery area in the hospitals where 45 of the deaths occurred does at first appear alarming (Table 2.44). However, further analysis reveals that 13 of these cases were cardiothoracic. Here the explanation may be that there are no recovery facilities in some specialist units where the practice is to return postoperative patients directly to an ICU or HDU. This view is further supported by no hospital reporting that it had no critical care areas. The remaining 32 questionnaires in which the box was not ticked to record there being a recovery area, may well be examples of inattentive completion. This suggestion is reinforced when these answers are linked with those of a later question asking where the patient went on leaving the operating room. Thirteen patients, who are recorded as having been operated on in a hospital with no recovery area, are recorded in this question as having gone to this non-existent area at the conclusion of their operation.

Table 2.44 shows that in 1998/99 there were HDU facilities in 61% of the hospitals from which questionnaires were returned. This is based on the current 10% sample of all deaths occurring within 30 days of a surgical operation. Can we take this to be an accurate reflection of the provision for high dependency care in acute hospitals, or does the misreporting highlighted above with regard to recovery areas suggest caution? The identity of hospitals returning information is not known to the clinical staff at NCEPOD, and the Chief Executive was therefore asked to analyse the returns against individual hospitals.

Table 2.44: Special care areas in the hospital in which the operation took place
(1998/99: 1337 cases and 1990: 2191 cases; answers may be multiple)
(Percentages are derived solely from those answering this question)

Special care area	1998/99		1990	
Recovery area	1277	97%	1991	95%
High dependency unit	801	61%	407	19%
Intensive care unit	1264	96%	1686	80%
Other	72	5%	35	2%
Not answered	15		88	

The number of hospitals represented by the 1337 anaesthetic questionnaires was 242:

Question 2.4: Do you have an HDU?

Yes	119
No	85
Responses mixed	38
Total	242

In compiling these figures, if all or almost all said 'yes' or 'no' this was deemed to be correct. However, for 38 hospitals the 'yes' and 'no' answers were evenly divided. Therefore, if these are excluded, 204 hospitals remain of which 119 (58%) indicated they have an HDU and 85 (42%) do not.

It can probably be concluded therefore that about 60% of acute hospitals do now have an HDU and that this has grown from about 20% in 1990. This increase can also be demonstrated by charting the response to the question asking if there was an HDU available in the hospital over successive NCEPOD data collection periods, as shown in Figure 2.11.

Figure 2.11: Percentage of patients having an HDU available to them in the hospital in which surgery was performed

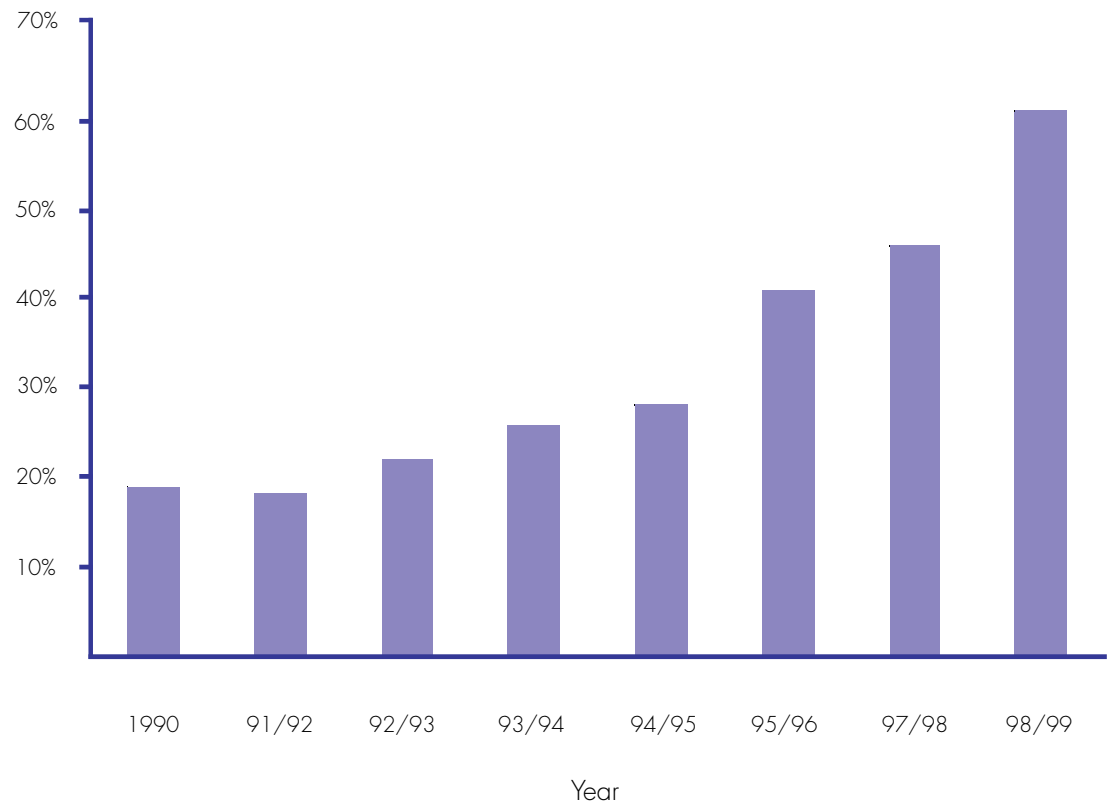


Table 2.45: Destination of the patient on leaving the operating room	
Destination	**Number**
Recovery area or room equipped and staffed for this purpose	801
High dependency unit	40
Intensive care unit	395
Specialised nursing area	4
Ward	16
Other	1
Died in theatre	63
Not answered	17
Total	**1337**

Intensive care facilities are recorded as being present in 96% of the hospitals from which questionnaires were returned. This probably equates to a near universal availability of intensive care facilities in acute hospitals once allowance is made for errors in reporting and the fact that there remain a few small units dealing with limited surgical specialties which only have an HDU.

Further evidence with regard to the adequacy of provision for HDU and ICU beds is given in Table 2.45 and Question 2.5.

In Question 2.5 it can be seen that there were 61 patients, 5% of those who died, who could not be given appropriate postoperative care, for although the facility existed there was no bed available.

Question 2.5: Were you unable at any time to transfer the patient into an ICU, HDU etc?

Yes	61
No	1157
Not answered	110
Not known	9
Total	1337

CASE 10 • *A locum consultant surgeon operated on a 70-year-old ASA 2 patient with a history of diverticular disease and recurrent diverticulitis. The operation, an elective Hartmann's procedure, was difficult as the adhesions were extensive, and took almost four hours. In view of the unanticipated difficulties encountered, the ICU was asked to take the patient, but the unit was full and no bed was available. The patient was noted to be deteriorating on the first postoperative day and this downward course continued. Finally, on the fourth postoperative day, an ICU bed was found and the patient transferred. Despite active treatment the patient died two days later as a result of septicaemia.*

The pressure on the ICU beds was clearly detrimental to the quality of the postoperative care that this patient received. Who should decide when the lack of essential services such as acute care beds makes it inappropriate to undertake an operation?

The comparison with 1990 shown in Table 2.46 is instructive; the proportion of deaths occurring in theatre and recovery remains almost the same, although slightly more are dying in recovery. The proportion dying in ICU has increased, but only slightly. However, looking at the three specialist critical care areas, a change has taken place. The increase in HDU beds has inevitably resulted in more deaths occurring there.

Table 2.46: Place of death				
Place of death	1998/99		1990	
Theatre	64 *	5%	115	5%
Recovery area	26	2%	30	1%
Intensive care unit	393	29%	559	26%
High dependency unit	55	6%	33	2%
Coronary care unit	10			
Specialised nursing area	9			
Ward	721	54%	1369	62%
Home	10		15	
Another hospital	23		41	
Other	12		21	
Not answered	9		8	
Not known	5		-	
Total	1337		2191	

* *There is a difference of one between this figure and that shown in Table 2.32 as one patient went from theatre to recovery to the ward before returning to theatre, where death occurred.*

High dependency units

A high dependency unit (HDU) is an area for patients who require more intensive observation, treatment and nursing care than can be provided on a general ward. It would not normally accept patients requiring mechanical ventilation but could manage those receiving invasive monitoring.

Should we be concerned that in two out of five hospitals where surgery is carried out, and patients die postoperatively, there is no HDU? In its 1997 annual report[22], our sister organisation the Scottish Audit of Surgical Mortality (SASM) recommended that:

"It seems reasonable to say that all hospitals which are big enough to justify having ICU facilities should have designated HDU beds and that hospitals which are not big enough to have ICU beds but which perform emergency or major elective surgery should also have some designated HDU provision. This study shows that this is still not yet happening in a significant number of Scottish hospitals."

The same it seems could be said for the rest of the United Kingdom. NCEPOD has repeatedly made recommendations concerning the need for high dependency beds:

- *"Essential services (including staffed emergency operating rooms, recovery rooms, high dependency units and intensive care units) must be provided on a single site wherever emergency/acute surgical care is delivered."*[4]
- *"Surgeons, gynaecologists and anaesthetists must have immediate access to essential services (recovery rooms, high dependency and intensive care units) if their patients are to survive."*[9]
- *"NCEPOD has again identified the substantial shortfall in critical care services. Any hospital admitting emergency patients, and hospitals admitting complex elective patients, must have adequate facilities for intensive and/or high dependency care at all times."*[10]
- *"Essential services (high dependency and intensive care beds) are still inadequate and resources need to be increased to correct deficiencies."*[12]
- *"All hospitals admitting emergency surgical patients must be of sufficient size to provide 24-hour operating rooms and other critical care services. There should also be sufficient medical staff to perform these functions. These provisions should be continuous throughout the year: trauma and acute surgical emergencies do not recognise weekends or public holidays."*[13]

The continued absence of high dependency beds in 40% of hospitals where surgery is performed and patients die in the postoperative period requires urgent action.

CASE 11 • *An 82-year-old patient fell and sustained a subcapital fracture of his left neck of femur. There were no other injuries. His preoperative assessment notes that he was on atenolol and grades him as ASA 2. The anaesthetist, an SHO apparently in his/her first year and without the Primary FRCA, gave a light general anaesthetic, the patient breathing spontaneously through an LMA. This was supplemented by 'triple block' with 20 ml of 0.5% bupivacaine. Approximately 45 minutes into the anaesthetic it was noted that suction down the LMA revealed 'yellow liquid ?aspiration'. At the same time the saturation was noted to have dropped from 95 to 91%. At the end of the operation at 14.00, and half-an-hour after the apparent aspiration, the anaesthetist notes that the saturation was 100% on 100% oxygen but that it fell to 90% with the patient receiving oxygen via a facemask in recovery. A chest X-ray showed an opaque right side, but there is no record of blood gas measurements being carried out. It was recognised that these findings suggested that aspiration had occurred. The patient was written up for antibiotics and to receive 40% oxygen for 48 hours. Shortly afterwards the patient was seen by another anaesthetist and discussion took place with a consultant microbiologist. The patient was awake, comfortable and pain-free; the saturation was 91%, but shortly after 14.45 saturations of 86% and 83% were recorded. At 15.15 the patient was returned to the ward and at 16.30 was declared dead following unsuccessful attempts at resuscitation.*

Despite the patient's early postoperative death and its association with the aspiration, at postmortem the cause of death was given as ischaemic and valvular heart disease. Although both lungs, and particularly the right, were severely oedematous and congested, it was also recorded that all three coronary vessels were severely atheromatous with almost total occlusion locally.

With the benefit of hindsight it is easy to be critical of this patient's medical care and the apparent misplaced optimism of those making decisions. However, this hospital did not have an HDU. Would the lack of this key facility not have made the decision making very much more difficult?

This heavy demand on critical care beds leads to surgeons and anaesthetists being forced into unsatisfactory compromise.

CASE 12 • *An 83-year-old arteriopath was admitted to a DGH as an emergency and referred to a general surgeon with an interest in vascular surgery. As the patient had severe ischaemic pain in both legs it was decided to carry out an axillobifemoral bypass. The patient was taking frusemide, nifedipine and digoxin, and as a consequence of the cardiac and respiratory problems, was assessed as being ASA 4. The operation, which lasted over five hours, was carried out by the consultant surgeon with an SpR. The anaesthetic was given by a second year SpR who had the FRCA and was on his/her own. The operation was reported to have been uneventful and from recovery the patient returned to the ward. Eight hours later the patient developed severe left ventricular failure and recurrent ischaemia of the right leg. In conjunction with intensive care doctors it was decided not to transfer the patient to the ICU but to adopt a policy of 'aggressive medical management'. This proved unsuccessful and the patient died on the second day following the operation. The SpR who gave the anaesthetic observed that an HDU would have been helpful in managing this case before and after the onset of LVF in view of the decision not to admit to ICU.*

If this hospital is to accept patients for complex vascular surgery, and in particular those in such a poor state of health, does it not have a duty to the population it serves to ensure that the appropriate postoperative facilities are available?

The way forward

Concerns about the organisation, provision and utilisation of critical care services have been reviewed in recent years by a number of groups. In 1999 the Audit Commission[23] completed an extensive study; they recognised the value of HDUs but pointed out the way such beds can be misused if appropriate criteria for admission and discharge are not set. More recently the Department of Health has convened an expert group to review adult critical care services; their report has been recently released[24]. Whilst recognising that the development of additional beds and services was essential, they suggested that the current divisions into high dependency and intensive care beds be replaced by a more flexible classification. They also proposed the linking of critical expertise, both outside individual hospitals on the basis of regional networks, and inside with an involvement from intensive care into the management of the sick patient on the ward. Valuable as these documents are, they cannot be allowed to deflect attention from the current inadequacies. Whether the intermediate level of care between full intensive care and ward care is called 'high dependency' or known by some other name, there can be no question that it is needed.

There has to be an HDU, with resources plus appropriate medical and nursing staff, in all acute hospitals where surgery is carried out. These beds supplement those in the ICU in larger hospitals and provide the sole critical care facility in smaller units. But, rather than considering ICU and HDU provision in isolation, these beds need to be regarded as the basis of a critical care facility that extends from the ward, to the HDU, to the ICU. This is then supported by critical care staff, both medical and nursing, who bring their expertise to all of these areas. This is not a new concept. In January 1996 the Royal College of Anaesthetists and The Royal College of Surgeons of England published a 'Report of the Joint Working Party on Graduated Patient Care'[25].

The recommendations made were summarised as follows:

"Graduated Patient Care is a concept that allows stratification of patients according to clinical dependency into those who:

- *should be admitted to an intensive care unit (ICU) for the management of single or multiple organ failure.*
- *should best be treated in a high dependency unit (HDU).*
- *can be adequately treated on a general surgical ward.*
- *are clinically stable and self-caring and can be managed on a convalescent or hotel unit.*
- *have a long-term disability and require care in a long stay unit.*

Good clinical practice requires that special skills and expensive equipment are concentrated where they are most needed, and where the available skills and technology can be used to the best advantage."

These proposals need to be re-examined in the light of more recent developments so as to ensure the appropriate provision of integrated, cost effective-critical care services.

Training and supervision in the anaesthetic department

Key Points

- *Anaesthetic departments should formulate guidelines relating to appropriate responsibilities for their trainees, particularly senior house officers (SHOs).*
- *Consultants, and trainees who have attained their fellowship examination, should have a clear understanding of their training responsibilities.*

Introduction

In 1990 NCEPOD observed that trainee anaesthetists, particularly senior house officers (SHOs), were anaesthetising patients who required the presence of a more senior anaesthetist[4]. This concern has been reiterated in subsequent reports. In 1998 the Audit Commission[26] highlighted that anaesthetic staff are not always matched to the individual patient's needs.

Since 1990 the percentage of cases where the most senior anaesthetist present was an SHO has decreased from 15% to 11% and the percentage anaesthetised by a non-consultant career grade (NCCG) has increased from 7% to 10%. Amongst NCCG anaesthetists the percentage anaesthetised by a staff grade increased from less than 1% to 6%.

Trainees

In 1994 the Royal College of Anaesthetists set out clear guidance on the levels of supervision appropriate to the experience of trainees in anaesthesia[27]. In 1995 these were followed up in a specific training guide for SHO anaesthetists[28].

The levels of supervision for anaesthetic trainees are defined as:

1. Trainer in the operating theatre or intensive care unit directly supervising or demonstrating techniques.

2. Trainer present in operating theatre suite or intensive care unit, able to assist or to advise.

3. Trainer available within the hospital.

4. Trainer available from outside the hospital as for emergency on-call service.

Trainers

Trainers are generally consultants. Anaesthetic trainees who have obtained the FRCA, who are present in theatre, the intensive care unit or labour wards, may supervise more junior trainees. Non-consultant career grade anaesthetists should not normally be involved in training unless they are in possession of the FRCA. They must be approved for training by the relevant School of Anaesthesia and would not normally be involved in training those who have already attained their FRCA[29, 30].

Guidance

The Royal College of Anaesthetists recommends that during the first year of SHO training a consultant should be available in the operating room during anaesthesia for all patients graded ASA 3 or poorer. An SpR 1 anaesthetist requires supervision at level 1 for cardiac and neurosurgical operations[27].

SHO anaesthetists in their first year of training

Table 2.47: Cases anaesthetised by unsupervised SHO 1 anaesthetists

Age in years	Operation	ASA	From whom advice sought	Before or after operation
69	Above knee amputation	3	Locum registrar	Before
91	Sliding hip screw	3	Consultant	Before
87	Austin Moore	3	SpR 3	Before
91	Sliding hip screw	3	Advice not sought	
88	Laparotomy, colostomy	3	Advice not sought	
67	Repair of perforated DU	3	SpR 2	Before
83	Sliding hip screw	2	Advice not sought	
67	Laparotomy	1	Registrar	Before
74	Femoral embolectomy	3	Consultant	Before
78	Laparotomy	1	Advice not sought	
86	Austin Moore	3	Advice not sought	
76	Laparotomy, colostomy	3	Consultant	Before & after
60	Hartmann's procedure	2	Advice not sought	
57	Hickman line	3	Advice not sought	
63	Laparotomy	3	Consultant	Before
91	Sliding hip screw	3	Advice not sought	
85	Sliding hip screw	3	Advice not sought	
92	Sliding hip screw	3	Consultant	Before
63	Laparotomy, small bowel obstruction	1	Not stated	After
88	Hemiarthroplasty	4	Advice not sought	
86	Sliding hip screw	3	Advice not sought	
88	Laparotomy, small bowel abscess	3	Advice not sought	
77	Sliding hip screw	3	Consultant	Before
79	Exploration brachial artery	2	Advice not sought	
86	Sliding hip screw	2	Advice not sought	
85	Hemiarthroplasty	3	Advice not sought	

There were 26 cases for which a first year SHO was the most senior anaesthetist in the operating theatre (Table 2.47).

It is evident that some of our most junior trainees are anaesthetising patients whose physical status demands a more experienced anaesthetist to be present in the operating theatre.

Eleven (42%) SHO 1 anaesthetists sought advice on the case before the operation and nine of these cases were ASA 3 or poorer; nevertheless, the anaesthetist was alone in the operating theatre. The Royal College of Anaesthetists' guidelines state that a first year SHO should not anaesthetise patients graded ASA 3 or poorer and these trainees, despite seeking advice, were not given appropriate supervision.

In total, 19/26 (73%) patients were graded as ASA 3 or poorer and on ten occasions the trainer was not asked for advice at any time. Thus SHO 1 anaesthetists undertook these ten cases without supervision. Supervision is impossible if the trainer does not know that the trainee is undertaking the case.

Anaesthetists graded three patients who underwent a laparotomy for malignancy and/or bowel obstruction incorrectly as ASA 1. At the start of his/her training an anaesthetist should be taught to assess the patient's physical status and anaesthetic/operative risk.

SHO anaesthetists and hip fracture

The update on the Audit Commission report on the management of hip fracture[31] commented that the number of operations where the anaesthetic was administered by an unsupervised SHO had decreased. Nevertheless, in about a half of the Trusts surveyed unsupervised SHOs were still administering anaesthetics. In total 11% of all patients with a hip fracture received an anaesthetic administered by an unsupervised SHO. In the report, what constituted supervision was not defined.

In this sample we identified 50 patients undergoing an operation for a fractured hip where the most senior anaesthetist was an SHO (Table 2.48).

On at least 66% of occasions when a patient was anaesthetised for an operation on a fractured hip by an SHO, that anaesthetist was unsupervised, as no advice was sought. It seems likely that the trainer was not aware the case was being undertaken. However, when advice was sought the case should be considered as supervised at level 2 or more distant.

Table 2.48: Grade of SHO anaesthetising for fractured hip and advice sought before operation

Grade	Number	Advice sought	Not known/ not answered
SHO 1	13	4	0
SHO 2	16	3	5
SHO >2	21	3	2
Total	**50**	**10**	**7**

Other trainees

For more senior trainees the appropriate level of supervision depends on the trainer having knowledge of the skills of the trainee and evaluating the extent to which this matches the complexity of the individual case.

The trainee must also recognise his/her own experience and limitations.

For 63% of cases the trainee did not ask advice at any time (Table 2.49). It is the responsibility of the trainee to know when to seek advice. It is impossible for appropriate supervision to take place if the consultant or trainer has no knowledge of the case that a trainee is undertaking. Equally important is that appropriate advice is sought pre-emptively, before problems supervene during or after the operation. Good supervision depends on both trainers and trainees maintaining high levels of communication. When advice has been sought then both should agree the appropriate level of supervision.

In some cases the advice sought by trainees was timely, for example cases that were appropriate to the trainee's ability until unforeseeable events supervened. In others, problems could have been anticipated and trainees sought advice too late (Table 2.50).

Table 2.49: Trainees seeking advice

Grade	None sought		Before operation	During operation	After operation	Not answered/ not known	Total
SpR	167	66%	55	10	7	14	253
SHO	87	58%	44	3	6	11	151
Total	**254**	**63%**	**99**	**13**	**13**	**25**	**404**

Table 2.50: Examples where advice was first sought after the start of the operation

Grade of anaesthetist and qualifications	Operation	Physical status	Clinical events
SpR 4	Re-operation coronary artery bypass grafts	66 years, ASA 3 with unstable angina, shortness of breath at rest and diabetes mellitus	Consultant was called when the patient failed to separate from cardiopulmonary bypass
SHO >2 with parts 1&2 FRCA, patient assessed preoperatively by a different SHO 2	Laparotomy, loop colostomy	73 years, ASA 3 with IHD, CCF and hypertension	Given 11 500 ml fluid in theatre and developed acute LVF before a consultant was called
SpR 4	Sliding hip screw	77 years, ASA 3 with chest infection, dementia and alcoholism, had been in hospital for 1 month	Massive PE on the table, consultant informed postoperatively.
SHO 2 with no anaesthetic qualifications	Partial gastrectomy	76 years, ASA 2 with diabetes and a previous CVA	Out-of-hours operation for a GI bleed. GA with epidural, persistent operative hypotension. Discussed with SpR postoperatively
Accredited SpR	Sigmoid colectomy	63 years, ASA 4 with a perforated viscus	Discussed further management with a consultant during the operation
SpR 2 with parts 1&2 FRCA	Sliding hip screw	85 years, ASA 3 with active chest infection, IHD and serum Na^+ 128 mmol/l	Respiratory failure in recovery. Then the case was discussed with a consultant
SHO >2 with part1 FRCA	Femoral hernia repair	89 years, ASA 4 with large bowel obstruction and dehydration	Little information, the patient died in recovery after discussion with another anaesthetist
SHO 2 with no anaesthetic qualifications	Laparotomy, choledochoduodenostomy	81 years, ASA 3 with pneumoconiosis, previous MI, angina, renal impairment and CVA	Discussed the case with a consultant postoperatively, before the patient went to HDU
SpR 4	Incarcerated hernia involving necrotic bowel and bladder	82 years, ASA 4 with COPD, IHD, serum creatinine 856 micromol/l	Changed from a spinal anaesthetic to GA and discussed with a consultant during the operation
Locum SHO with DA	Sliding hip screw	88 years, ASA 3, operation previously delayed for treatment of heart failure and rapid AF. Known IHD, AF, CCF, pulmonary oedema and confusion	Pyrexia and rigors in recovery before advice sought from a consultant.
SpR 2 with FRCA	Laparotomy for incarcerated inguinal hernia repair	84 years, ASA 4 with obstructed inguinal hernia, preoperative Hb 16.1 g/dl, urea 20 mmol/l, creatinine 93 micromol/l and $PaCO_2$ 9.8 kPa	Attempted tracheal extubation, respiratory failure. Reventilation in recovery and consultant informed
SHO >2 with no anaesthetic qualifications	Laparotomy, hemicolectomy and colostomy for perforated diverticulum	80 years, ASA 2 with IHD, ECG ischaemia, anaemia, renal impairment, abdominal sepsis and bowel obstruction	Tracheal extubation and aspiration in theatre, respiratory failure in recovery then advice sought, advisor not specified
Post FRCA research fellow	Revision hip replacement	82 years, ASA 3 with confusion, carcinoma of the breast and bony metastases	Massive bleeding and hypotension. Discussed with a consultant postoperatively. No HDU beds so went to the ward and died after a few hours

Table 2.51: Examples where trainees sought advice preoperatively

Grade of anaesthetist and qualifications	Patient	Operation
SHO >2 with FRCA, discussed with a consultant, continued alone	76 years, ASA 4 with ST segment changes during the first (same day) 5.5 h operation and unstable diabetes	Out-of-hours evening 3 h re-exploration of femoropopliteal and poplitopedal grafts
SHO >2 with no anaesthetic qualifications, discussed with an SpR, continued alone	84 years, ASA 4, IHD, CCF, orthopnoea, electrolyte imbalance and acute renal failure	In-hours, weekday, transurethral resection of a bladder tumour
SHO 2 with part 1 FRCA, discussed with an accredited SpR, continued alone	68 years, ASA 3 with diabetes and pancreatic carcinoma	Out-of-hours night time 3.75 h laparotomy for revision of cholecystenterostomy
SpR 1 with part 1 FRCA, discussed with an ICU consultant who joined later in the case	38 years, ASA 5 with a perforated viscus, septicaemia, acute renal failure and epilepsy	In-hours laparotomy and peritoneal washout
SHO >2 with no qualifications, discussed with a consultant, continued alone	85 years, ASA 4 with bronchopneumonia, hypertension and perforated colonic carcinoma	Out-of-hours evening 3.45 h laparotomy, anterior resection and peritoneal washout
SpR 1 with part 1 FRCA, discussed with a consultant, continued alone	91 years, ASA 3 with a recent (1 week) MI, LVF, arterial desaturation and thyroid disease	In-hours, weekday, hemiarthroplasty for a fractured hip
SHO >2 with part 1 FRCA working with an SHO 1, discussed with a consultant before operation	80 years, ASA 4 with hypertension, renal impairment (creatinine 225 micromol/l,urea 32 mmol/l) hypovolaemia, tachycardia, incarcerated incisional hernia and peritonitis	Out-of-hours 5 h laparotomy, necrotic small bowel resection and incisional hernia repair

Trainees sought advice before the operation in 24% of the cases that they undertook. When advice was sought the patients were often of poor physical status. In some of the examples in Table 2.51 when trainees sought advice the supervision they received was inadequate.

Anaesthetic departments should formulate guidelines relating to appropriate responsibilities for their trainees, particularly SHOs. These should be readily available for reference, circulated to trainees during their induction course and to locum trainees new to the hospital. Consultants and trainees who have attained their fellowship examination should have a clear understanding of their training responsibilities.

Non-consultant career grade anaesthetists

Key Points

- *In 10% of cases a non-consultant career grade (NCCG) was the most senior anaesthetist. The continuing professional development of NCCG anaesthetists needs to be based on nationally prescribed standards and supported locally.*
- *A named consultant and the duty consultant have responsibilities for monitoring and supervising staff grade anaesthetists within their department.*

There has been an expansion of non-consultant career grade (NCCG) anaesthetists and the Royal College of Anaesthetists estimates that there are up to 1500 NCCG anaesthetists currently working within the UK[32].

Definitions[29, 30]

Associate specialist in anaesthesia is a senior hospital post, but the ultimate responsibility for the patients treated by the practitioner rests with the relevant consultant. The post is usually appointed by personal recommendation, without advertisement. Eligibility includes ten years of medical work since attaining a primary medical qualification acceptable to the General Medical Council (GMC), and four years as either a registrar/SpR or staff grade doctor, of which two should have been in anaesthesia. All appointees would normally be expected to possess a higher qualification, e.g. FRCA.

Staff grade in anaesthesia is a permanent career grade post of limited responsibility. The staff grade is accountable to a named consultant, but on a day-to-day basis to the duty consultant. Eligibility includes full registration with the GMC and three years of full time training and service in hospitals recognised by the Royal College of Anaesthetists for training, in SHO grade or higher, or the ability to demonstrate equivalent overseas training. The College recommends that applicants should hold the FRCA or equivalent. Although discretionary, all appointees would normally be expected to possess a postgraduate qualification.

Clinical assistant is a part-time appointment and, since 1989, should not comprise more than 5 NHDs a week. There are no agreed minimum qualifications but with regard to their work, often in isolated units, a minimum of two years of whole time training, the FRCA and updated resuscitation skills are advised.

Non-consultant career grade anaesthetists

In 1990 an NCCG was the most senior anaesthetist in 7% of cases; by 1998/99 this had increased to 10%.

It is obvious from Table 2.52 that non-consultant career grade anaesthetists vary widely in their qualifications. The 'other' qualifications included European and other overseas postgraduate anaesthetic qualifications.

Table 2.52: Highest qualification of NCCG anaesthetists

Grade	None	FRCA	DA/part FRCA	Other/not specified	Total
Associate specialist	2	23	16	0	41
Staff grade	7	25	39	6	77
Clinical assistant	3	1	7	4	15
Trust grade	0	2	0	0	2
Total	12 9%	51 38%	62 46%	10	135

Table 2.53 shows that the majority of the operations managed by NCCG anaesthetists were classified as emergency or urgent.

Table 2.53: Classification of operation where the most senior anaesthetist was an NCCG

Classification	Number	
Emergency	15	11%
Urgent	80	59%
Scheduled	27	20%
Elective	10	7%
Not answered	3	
Total	135	

Staff grade anaesthetists

The most rapidly expanding group of non-consultant career grade anaesthetists is that of staff grade. The 1993/94 NCEPOD report[11] advised that the roles and responsibilities suitable for staff grade anaesthetists needed to be defined and implemented. The Royal College of Anaesthetists considers it essential that those appointed to staff grade posts, where they might be working largely on their own and at times in isolated locations, should at least possess the FRCA or equivalent. Although they may be appointed without possessing the fellowship, in such circumstances they should work as an SHO equivalent and be *closely* supervised by senior staff.

In this sample 6% of anaesthetics were provided by a staff grade, 32% of whom had the fellowship. In 1990, 14 cases (<1%) were anaesthetised by a staff grade, three of whom had the fellowship. Staff grade anaesthetists not in possession of the FRCA are encouraged by the College to be as well-qualified as possible and to work towards attaining postgraduate qualifications. However, to date there have been few courses designed nationally or regionally that provide for this aspect of their professional development.

Staff grade appointments are long-term and the responsibilities appropriate to individual staff grade anaesthetists will change with their professional development and over time. Their appropriate responsibilities should form part of a yearly assessment and be understood by all working within the anaesthetic department.

Table 2.54 details the seven operations where the anaesthetic was provided by a staff grade without anaesthetic qualifications. Six anaesthetists did not seek advice and for the seventh there was no response to this question.

Table 2.54: Cases anaesthetised by staff grade anaesthetists without anaesthetic qualifications

Patient	Operation
72 years, ASA 4 with NIDDM and bowel obstruction	Laparotomy, gastrojejunostomy, ileotransverse bypass
81 years, ASA 4 with IDDM, IHD, PVD, sepsis and intermittent confusion	Right above knee amputation
58 years, ASA 3 with carcinoma of the lung	Laparotomy, division of adhesions, repair of perforation in small bowel
77 years, ASA 2 with AF, hiatus hernia, respiratory arrest following morphine in A&E and WCC 28x10^9/l	Sliding hip screw
63 years, ASA 3 with IHD, occluded aorto bi-iliac graft and ischaemic legs	Laparotomy, division of adhesions, repair of perforation in small bowel
74 years, ASA not specified with liver cirrhosis	Sliding hip screw
79 years, ASA 3 with COPD, CCF and dementia	Revision of a sliding hip screw

Table 2.55: ASA grade of the patients anaesthetised by staff grade anaesthetists without the FRCA						
Advice	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	ASA not specified
Advice *not* sought	1	6	18	11	2	1
Advice sought	0	0	4	1	0	1
Advice not specified	0	1	2	1	0	1
Total	1	7	24	13	2	3

Fifty patients were anaesthetised by staff grade anaesthetists who did not have the anaesthetic fellowship. The physical status of these patients is presented in Table 2.55.

Staff grade anaesthetists without the FRCA anaesthetised 39 patients of ASA 3 or poorer. For 79% (31/39) of these cases a more senior anaesthetist was not consulted.

Table 2.56 shows that three-quarters of the cases managed by staff grade anaesthetists were classified as emergency or urgent.

Table 2.56: Classification of operation where the most senior anaesthetist was a staff grade		
Classification	Number	
Emergency	8	10%
Urgent	49	64%
Scheduled	12	16%
Elective	5	6%
Not answered	3	4%
Total	77	

CASE 13 • *A staff grade anaesthetist, with the DA in 1990, working out-of-hours with a first year SHO anaesthetised an 83-year-old ASA 2 patient with bowel obstruction. No invasive monitoring was used and the patient returned to the general ward at 02.00. The patient was in a 10 litre positive fluid balance when he died on the following day.*

It was inappropriate for this staff grade anaesthetist to be training.

CASE 14 • *Following discussion with a consultant, a staff grade anaesthetist, with the DA and working alone, anaesthetised a 73-year-old patient, ASA not specified, for a laparotomy for small bowel obstruction due to adhesions. The patient had pneumonia, myocardial ischaemia, gross abdominal distension, severe hypotension and confusion. Investigations revealed Hb 18 g/dl, Na^+ 125 mmol/l, urea 42 mmol/l and creatinine 357 micromol/l.*

Was sufficient consultant support given?

It must be questioned whether the work of staff grade anaesthetists is being appropriately monitored and supervised.

Continuing education and professional development

In 1995 the Royal College of Anaesthetists implemented proposals for continuing medical education of all career anaesthetists[33]. At that time the College accepted that the system would need modification. In 2000 the proposals were revised but still grouped all career anaesthetists, consultant and non-consultant, together[34]. We have identified that non-consultant career grade anaesthetists are a rapidly expanding and important group with heterogeneous qualifications and, presumably, responsibilities and experience.

In 10% of cases a non-consultant career grade was the most senior anaesthetist. Nationally they are important to the provision of the anaesthetic service. Their continuing education and professional development requirements may differ from those of consultants and should be subjected to a separate review. It is important to develop national standards for continuing professional development of non-consultant career grade anaesthetists and ensure that these receive support locally.

Towards better use of the ASA classification

Key Point

- *The American Society of Anesthesiologists' (ASA) classification of physical status needs to be applied appropriately. Greater consistency might be achieved by more careful teaching of the classification.*

The American Society of Anesthesiologists' (ASA) scoring system is used for the preoperative assessment of patients' physical status. The wording of the classification was approved by the American Society of Anesthesiologists in 1962[35] and is widely used by both surgeons and anaesthetists. It is a simple five point score:

ASA classification*

1. A normal healthy patient.
2. A patient with mild systemic disease.
3. A patient with severe systemic disease that limits activity, but is not incapacitating.
4. A patient with incapacitating systemic disease that is a constant threat to life.
5. A moribund patient not expected to survive 24 hours with or without an operation.

* *The definitions cited here were those in use during the data collection period. The wording of ASA grades 3-5 was modified, and a sixth grade added, in 1999*[36].

Most anaesthetic records have a place to record the ASA class, and the majority of anaesthetists record the ASA grade as part of their routine preoperative patient assessment. It can be used to communicate the patient's physical status, both within and between specialties, to match the grade of operating surgeon or anaesthetist to the patient's condition and in clinical audit to define the physical status of the patient population. ASA describes the physical status of the patient at the time of anaesthesia; it is not a chronic health score. It is not designed to give an indication of operative risk, nor can it, since it takes no account of the operative procedure. Operative risk is more appropriately assessed by specific scoring systems, such as the Modified Multifactorial Cardiac Risk Index (heart disease and major surgery)[37] or the Uniform Stratification of Risk (adult acquired heart disease and heart surgery)[38].

NCEPOD has routinely collected information on the ASA classification of patients in both the surgical and anaesthetic questionnaires. From the reports it can be seen that most of the patients who die have ASA scores of three or poorer. It has been shown that the ASA classification usefully profiles the overall physical status of a population[39]; however, for an individual patient there is often wide variation in the ASA classification when assessed by different clinicians[4,40].

The ASA definitions do not exclude either medical or surgical conditions, but often the disorder precipitating surgery appears not to be perceived as a systemic disease and is disregarded. The ASA score indicates the patient's physical status at the time of anaesthesia and it is inappropriate to apply it to the patient as they were before a traumatic event that preceded surgery.

When the ASA classification was first used[39] the surgical disorders and trauma were scored and there were no deaths in 16 000 patients who were classified as ASA 1.

In the 1998/99 NCEPOD sample the following cases were all classified as ASA 1:

- A 42-year-old with multiple fractures and a head injury who underwent a craniotomy for evacuation of extradural haematoma.
- A 24-year-old with head and facial injuries (GCS 3), fractured femur and tibia who underwent internal fixation of the long bone fractures.
- A 30-year-old with severe head injury who had an ICP monitor inserted.
- A 75-year-old with a bladder tumour who underwent a radical cystectomy.
- A 69-year-old who had unsuccessful surgery for a ruptured abdominal aortic aneurysm.
- A 63-year-old with a preoperative diagnosis of gastrointestinal or gynaecological malignancy who underwent a laparotomy, hysterectomy, bilateral salpingo-oophorectomy, ileal bypass and omentectomy.
- A 70-year-old with colonic carcinoma who had an AP resection.
- A 63-year-old who underwent a laparotomy and division of adhesions that were causing small bowel obstruction.
- A 74-year-old with NIDDM who had a TURP.
- A 67-year-old with asthma and carcinoma of the lower oesophagus and stomach who underwent a thoracoabdominal oesophagectomy.
- A 91-year-old with a previous myocardial infarction, angina, atrial fibrillation and an irreducible inguinal hernia who had an inguinal hernia repair.
- A 72-year-old with hypertension, depression and NIDDM who had a surgical repair of a fractured patella.

Notably, in these examples, recent trauma and malignancy were not perceived as systemic disorders. If these cases were presented to a group of clinicians it is doubtful that a consensus as to the appropriate ASA grade would be achieved, but clearly none of these patients was ASA 1.

The ASA scoring system has now been in use for many years. It is a simple classification that is widely known by surgeons and anaesthetists, and that is its major strength. In order to use it as a physical status score for individuals and groups it needs to be applied appropriately. Greater consistency might be achieved by more careful teaching of the classification and by discussion of cases within departments aimed at achieving consensus opinion.

3 SURGERY

Compiled by: K G Callum, R W Hoile, I C Martin

3. Surgery

Introduction

The process for the collection of surgical data is described in Appendix D (see page 131). The data relating to the sample cases were reviewed by advisors relevant to the specialty involved; their respective specialist associations and colleges nominated these advisors. The assistance of the advisors (see page v) is gratefully acknowledged.

The intention of this report is to compare, as much as possible, the data from deaths in 1998/99 with that derived from deaths in 1990[4]. The significant information from each specialty within the generality of surgery is presented together with commentary, illustrative case notes and comparative data from 1990 where possible (no data was stored from 1990 other than the printed report) and appropriate. As a result of this approach only relevant tables are included. The full data are available as a supplement from NCEPOD.

NCEPOD received notification of 19 832 deaths occurring during 1998/99 (see general data section). The deaths selected for a more detailed review were a random sample of one in ten cases. The tables and comments that follow summarise data from the 1518 surgical questionnaires reviewed. The surgical questionnaire is reproduced in full in the data supplement.

Review of 1998/99 surgical data and comparisons with 1990

Key Points

- *The sample of patients who died shows that they are older, sicker and more likely to be admitted as an emergency than was the case in 1990.*
- *Delay in referral from medical specialties was a factor in a number of deaths.*
- *Consultant involvement with these ill patients continues to rise.*
- *The provision of ICU beds has improved since 1990 but there is still a lack of HDU facilities.*
- *The use of clinical audit appears to be quite variable between surgical specialties.*
- *There may be a need to check the accuracy of returned questionnaires.*

Hospitals and facilities

Table 3.1: Type of hospital in which the final operation took place

Hospital type	1998/99		1990	
District general (or equivalent)	1045	69%	1993	78%
University/teaching	388	26%	449	18%
Limited surgical specialties	34	2%	66	3%
Community	1	<1%	3	<1%
Independent	13	1%	29	1%
Defence medical services	0	-	11	<1%
Other	0	-	7	<1%
Not answered	37	2%	0	-
Total	**1518**		**2558**	

The comparative figures in Table 3.1 are not dissimilar but the increasing percentage of operations done in university/teaching hospitals might suggest a move towards specialisation or recognition that the more complex procedures require an increased level of backup services. Another explanation is that more hospitals which were 'district generals' are now classified as 'teaching hospitals' although they are essentially the same as before.

Question 3.1: Is a theatre recovery area available in the hospital in which the final operation took place?

	1998/99		1990	
Yes	1492	98%	2330	91%
No	8	<1%	228	9%
Not answered	18	1%	0	-
Total	1518		2558	

If yes, is this available and staffed 24 hours per day, 7 days per week?

	1998/99	
Yes	1160	78%
No	258	17%
Not answered	73	5%
Not known	1	<1%
Total	1492	

There appears to have been an increase in the availability of theatre recovery areas but 17% (258/1492) of these are not available round the clock throughout the week. Deficiencies of provision in this area can affect outcome.

Question 3.2: Is an adult ICU available in the hospital in which the final operation took place?

	1998/99		1990	
Yes	1423	94%	2208	86%
No	52	3%	350	14%
Not answered	43	3%	0	-
Total	1518		2558	

If yes, is this available and staffed 24 hours per day, 7 days per week?

	1998/99	
Yes	1295	91%
No	5	<1%
Not answered	123	9%
Total	1423	

There has clearly been an increase in the provision of adult ICU beds, the majority of which are open 24 hours each day. This change is to be welcomed and can only be a benefit to patient care. The lack of an ICU bed can spell disaster.

CASE 1 • *A 78-year-old patient suffered a perforated duodenal ulcer, which was appropriately repaired. There was no ICU bed available immediately postoperatively. A period of 48 hours passed before the patient was admitted to an ICU by which time he was in heart failure with a possible pulmonary embolus and cerebrovascular problems. He died 16 days after surgery.*

In the case described above, there was an ICU in the hospital but there were no vacant beds. This is a common scenario and reflects the demand that exists for this service.

Question 3.3: Is an adult HDU available in the hospital in which the final operation took place?

	1998/99		1990	
Yes	943	62%	683	27%
No	519	34%	1875	73%
Not answered	56	4%	0	-
Total	1518		2558	

If yes, is this available and staffed 24 hours per day, 7 days per week?

	1998/99	
Yes	836	89%
No	46	5%
Not answered	61	6%
Total	943	

There has been a spectacular increase in the provision of HDU beds when compared to the 1990 data. However, in 1998/99 an HDU bed was available round the clock in only 55% (836/1518) of cases; a considerable margin for improvement still exists. Patients may need to be nursed in general wards when an HDU bed would be more appropriate. When a sick patient is returned to ward care from theatre at night the staffing levels are often lower than during the daytime and there are fewer senior medical staff available. These circumstances can be detrimental to the outcome (see also page 40).

Patient profile

Age and sex

Figure 3.1: Age of patient at time of final operation

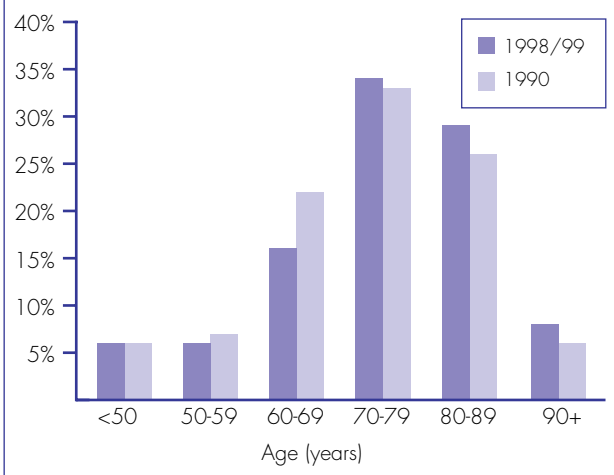


Figure 3.1 shows that there has been a shift in age groups with an increase in older patients in the 1998/99 sample.

There was a similar overall ratio of females to males (1:1.1) compared to the sample of 1990 (1:1.2).

Table 3.2: Sex of patient

Sex	Number
Male	782
Female	736
Total	1518

Admission and operation

Table 3.3: Day of admission

Day	Number
Monday	266
Tuesday	239
Wednesday	219
Thursday	229
Friday	214
Saturday	159
Sunday	179
Not answered	13
Total	1518

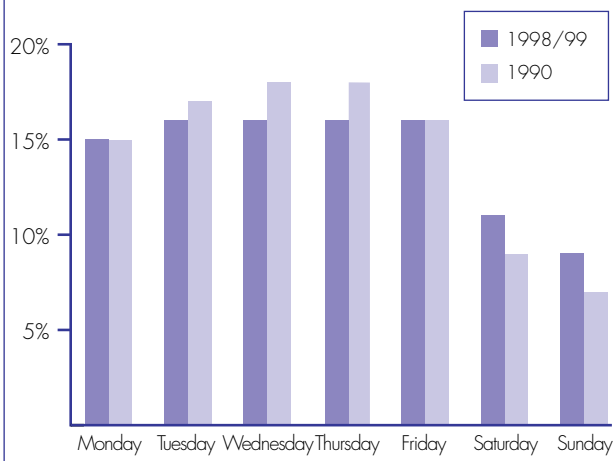
The 1990 data revealed that 78% of surgical admissions took place between Monday and Friday. The current data show a similar percentage with 77% (1167/1518) of admissions occurring during weekdays.

Table 3.4: Admission category

Category	1998/99		1990	
Elective	326	21%	718	28%
Urgent	165	11%	507	20%
Emergency	1020	67%	1326	52%
Not answered	6	<1%	7	<1%
Not known	1	<1%	0	-
Total	1518		2558	

There has been a dramatic rise in the percentage of emergency admissions overall (from 52% in 1990 to 67% in 1998/99. This represents a significant unplanned workload for surgical and anaesthetic departments and also reflects the seriousness of the conditions requiring admission.

Figure 3.2: Distribution of final operations through the week



There has been little change in the pattern of the timing of the final operation.

Transfer, referral and delay

Transfer

Table 3.5: Type of referring hospital (when patient was transferred as an inpatient from another hospital)	
Referring hospital	Number
District general (or equivalent)	121
University/teaching	46
Limited surgical specialties	7
Community	23
Independent	3
Nursing home	10
Not answered	6
Not known	1
Total	217

It seems curious that in 46 cases university/teaching hospitals transferred patients; the reasons given are shown in Table 3.6.

Table 3.6: Reasons for transfer from a teaching hospital	
Reason for transfer	Number
For specialist cardiac surgery	12
For specialist neurosurgery	10
For specialist vascular surgery	4
For specialist burns treatment	2
For specialist urological treatment	2
For specialist paediatric treatment	2
Other	14
Total	46

The comparative figures in Table 3.7 are broadly similar but there appears to be more movement of patients within and between regions. Is this due to problems with the availability of ICU beds?

Table 3.7: Location of the referring hospital				
Location	1998/99		1990	
Same district (or equivalent)	89	41%	153	49%
Same region	86	40%	104	33%
Different region	25	12%	18	6%
Overseas	3	1%	2	1%
Not answered	14	6%	23	7%
Other	0	-	13	4%
Total	217		313	

Question 3.4: Did the patient's condition deteriorate during transfer?

	1998/99		1990	
Yes	15	7%	23	7%
No	191	88%	276	88%
Not answered	7	3%	14	4%
Not known	4	2%	0	-
Total	217		313	

These unstable and ill patients required transfer because of the severity of their condition or the need for specialist treatment. The figure for deterioration during transfer (7%) has not changed over the years. We commended this low figure previously and do so again.

Referral

Sixty-seven percent of all admissions (1010/1518) were admitted directly under the care of the surgeon whose team undertook the final operation. Where internal referrals or transfers occurred the source of referral is shown in Table 3.8.

Table 3.8: Source of referral for internal transfers	
Source	Number
Medical specialty	302
Another surgical specialty	56
Same surgical specialty	69
Other	1
Not answered	6
Total	434

Delays in referral from other specialties, especially medicine, were frequently commented on by the advisors.

CASE 2 • *A 77-year-old patient was admitted to an elderly medicine unit following a domiciliary visit. He suffered from anorexia and weight loss, and it appears that a diagnosis of subacute intestinal obstruction was made. The patient was referred to a surgeon five weeks later when a Picolax bowel preparation caused a perforation of a carcinoma of the descending colon. Despite emergency surgery (Hartmann's procedure) he died from respiratory failure 48 hours later.*

The surgeon wrote: 'He was investigated unsuccessfully on the geriatric medical wards for just over five weeks!! The decision to slavishly pursue a diagnosis by means of colonoscopy or barium enema was, in my view, a major factor in delaying surgical intervention.'

There are examples of similar delays in other sections. Clearly there is a need to involve physicians in surgical audit in order that they understand the implications of their actions and the need for early referral.

Delay

Question 3.5: Did any undesirable delays occur between the decision to operate and the actual date of surgery?

Yes	154
No	1321
Not answered	42
Not known	1
Total	1518

Theatre availability was the most common cause of delay once a decision to operate had been made.

Question 3.6: Had this patient's admission been cancelled by the surgical service on a previous occasion, for any reason other than a clinical one?

Yes	17
No	1437
Not answered	62
Not known	2
Total	1518

Question 3.7: In your opinion did any of these delays affect the outcome?

Yes	17
No	139
Not answered	8
Total	164

This situation is similar to that reported in the 1990 data in that the outcome for approximately 1% of patients who died may have been influenced by delays (in the opinion of the reporting surgeon). Given the increasing load of emergencies within surgery, and the continuing heavy workload in general, it is a credit to the service that the situation has not deteriorated.

The comparisons in Table 3.9 are not entirely accurate, as the data gathered were different between the two samples. Some broad comments are possible however. The striking fact is the similarity of the figures from the two samples, with similar percentages of patients coming from surgical wards, medical wards and proceeding directly to the operating theatre. The site of admission was considered to be inappropriate in 5% of cases compared to 3% in the earlier sample.

Table 3.9: Type of area to which the patient was first admitted in the hospital in which the final operation took place

Area	1998/99		1990	
General surgical ward	520	34%	1494	58%
Surgical specialty ward	498	33%	*	
Mixed medical/surgical ward	*		38	1%
Gynaecology/obstetric ward	16	1%	36	1%
Medical ward	170	11%	402	16%
Elderly medicine ward	39	3%	*	
Admission ward	41	3%	33	1%
A&E ward	68	4%	163	6%
Day unit	7	<1%	3	<1%
HDU	25	2%	28	1%
ICU	63	4%	63	2%
Coronary care unit (CCU)	13	1%	*	
Direct to theatre	39	3%	81	3%
Other	19	1%	173	7%
Not answered	0	-	44	2%
Total	**1518**		**2558**	

* *Not a separate category in 1990 question*

Table 3.10: Specialty of consultant surgeon in charge at time of final operation

Specialty	1998/99		1990	
General	115	8%	1623	63%
General with special interest	642	42%	*	
Orthopaedic	336	22%	414	16%
Cardiac/thoracic/cardiothoracic	108	7%	73	3%
Vascular	99	7%	*	
Urology	71	5%	107	4%
Neurosurgery	69	5%	94	4%
Otorhinolaryngology	19	1%	29	1%
Gynaecology	16	1%	141	6%
Plastic	15	1%	11	<1%
Ophthalmology	8	<1%	6	<1%
Oral & maxillofacial	6	<1%	3	<1%
Paediatric	6	<1%	*	
Transplantation	3	<1%	*	
Accident & Emergency	0	-	6	<1%
Other	2	<1%	0	-
Not answered	3	<1%	51	2%
Total	**1518**		**2558**	

* *Not a separate category in 1990 question*

The vagaries of the sampling process account for some differences in the spread of specialties shown in Table 3.10. There was a preponderance of general surgeons in the 1990 sample whereas in the later sample many surgeons have declared a special interest, thus reflecting the change in surgical practice that is taking place. Allowing for these differences the samples are reasonably comparable. It is also interesting to note the improvement in data provision in the later sample with a minimal number of questionnaires in which this question was not answered.

Question 3.8: Was care undertaken on a formal shared basis?

	1998/99		1990	
Yes	386	25%	609	24%
No	1081	71%	1911	75%
Not answered	50	3%	38	1%
Not known	1	<1%	0	-
Total	1518		2558	

The aim of Question 3.8 was to assess the amount of medical or other specialty input into the care of surgical patients. The question is based on the general belief that, when time allows, advice from doctors other than anaesthetists concerning the management of comorbidities may contribute to a better outcome for the patient. There has been no change between the two samples with approximately a quarter of patients being managed jointly. Where joint care did occur in the latest sample the specialties involved are shown in Table 3.11.

Table 3.11: Specialties involved in shared care of surgical patients
(386 cases; answers may be multiple)

Specialty	Number
Medical specialty	173
Care of the elderly	85
General medicine	73
Other surgeon	69
Paediatric	7
Other	7

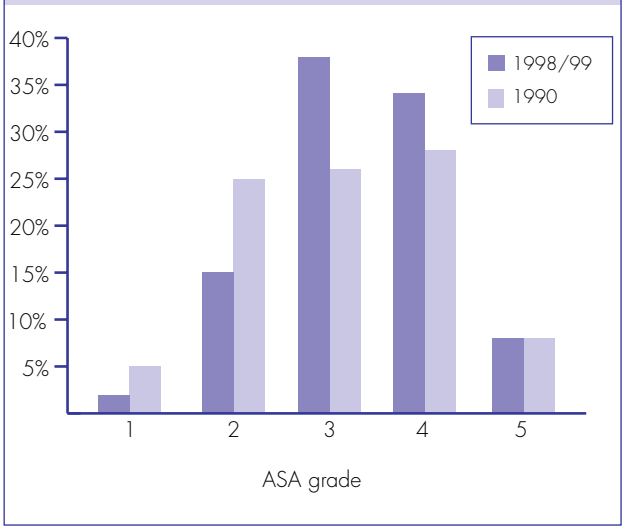
Table 3.12: Grade of the most senior surgeon consulted before the operation	
Grade	Number
Consultant	1399
Associate specialist	15
Staff grade	15
SpR with CCST	11
SpR 4 or greater	33
SpR 3	13
SpR 2	3
SpR 1	3
Visiting SpR	3
Locum appointment (training)	2
Locum appointment (service)	12
Premier SHO	3
SHO 1	1
Not answered	5
Total	1518

The data from the two samples are not comparable, as the nature and nomenclature of training posts in surgery have changed. In the 1990 sample an experienced opinion was sought in 84% of cases. In the latest sample a consultant or specialist registrar with a CCST was consulted in 93% of cases (1410/1518). This represents increasing good practice. However, the 1998/99 data show that a consultant or specialist registrar with a CCST took the consent of the patient in only 36% of cases (553/1518) (see page 74 for section on Consent).

Preoperative status

ASA status

Figure 3.3: ASA status



Surgeons are notoriously poor at assessing ASA class and may apply the criteria retrospectively. Based on the data submitted to NCEPOD, Table 3.13 and Figure 3.3 show an increase in ill patients (ASA 3 & 4) in the 1998/99 sample. This coincides with the increase in emergency admissions, the rising age of the patients and the high percentage of comorbidity present in the 1998/99 sample (85%, 1290/1518 cases).

Table 3.13: ASA status				
ASA status	1998/99		1990	
ASA 1	35	2%	135	5%
ASA 2	223	15%	628	25%
ASA 3	584	38%	669	26%
ASA 4	514	34%	723	28%
ASA 5	122	8%	213	8%
Not answered	32	2%	190	7%
Not known	8	1%	-	-
Total	1518		2558	

Comorbidity

The main comorbidities identified are shown in Table 3.14.

This pattern of coexisting pathology is identical to that seen in the 1998/99 sample. The influence that these diseases had on the final outcome and the therapeutic manouevres taken to improve the patient's condition will be discussed in the individual sections if appropriate.

Table 3.14: Coexisting medical disorders *(1290 cases; answers may be multiple)*	
Coexisting disorders	Number
Cardiac	684
Respiratory	461
Renal	246
Malignancy	239
Neurological	238
Vascular	180
Diabetes	148
Sepsis	142
Gastrointestinal	140
Haematological	135
Musculoskeletal	134
Psychiatric	96
Other endocrine	89
Alcohol related	41
Drug addiction	6
Other	11

Table 3.15: Anticipated risk of death related to the proposed operation				
Risk of death	1998/99		1990	
Not expected	184	12%	355	14%
Small but significant risk	320	21%	626	24%
Definite risk	876	58%	1286	50%
Expected	122	8%	222	9%
Not answered	16	1%	69	3%
Total	1518		2558	

Table 3.15 shows a small increase in those patients who were assessed by the surgeon as being at a definite risk of death; this correlates with other indications that the surgical workload is increasing in severity and risk.

Thromboembolic prophylaxis

Question 3.9: Do you have a protocol based on THRIFT for thromboembolic prophylaxis?

Yes	994
No	448
Not answered	75
Not known	1
Total	1518

Despite the awareness of the dangers of postoperative thromboembolism and recommendations from groups such as THRIFT (Thromboembolic Risk Factors Consensus Group)[41, 42] and NCEPOD[9], there was a low use of prophylactic protocols. Thirty percent (448/1518) of the patients may not have received prophylaxis in the absence of a protocol. There were at least 43 deaths associated with pulmonary embolism and a large number of cardiac events which might have been embolic but for which there is no postmortem examination proof.

When a protocol was in operation, patients were assessed for risk as shown in Table 3.16.

Table 3.16: Thromboembolic risk	
Risk category	Number
High	494
Medium	361
Low	115
Not answered	22
Not known	2
Total	994

At least 106 patients (7%, 106/1518) received no prophylaxis whatsoever.

The operation

Table 3.17: Classification of operation				
Classification	1998/99		1990	
Emergency	266	18%	455	18%
Urgent	738	49%	1044	41%
Scheduled	395	26%	825	32%
Elective	109	7%	226	9%
Not answered	10	<1%	8	<1%
Total	1518		2558	

These figures indicate a small increase in urgent operations, which mirrors the rise in emergency admissions.

Table 3.18: Overall consultant involvement	
Consultant involvement	Number
Operating	797
Present in theatre	171
Not in theatre, but immediately available	101
Consulted before operation	375
No consultant involvement	74
Total	1518

In only 5% of cases was there no consultant involvement. Consultant availability is desirable, if only to delegate appropriately. When an experienced and competent trainee is operating the consultant continues to carry responsibility and must be able to provide cover and supervision (or must have nominated a colleague).

The surgeon

Table 3.19: Most senior surgeon present in the operating room

Grade	Number
Consultant	963
Associate specialist	41
Staff grade	83
Clinical assistant/hospital practitioner	5
SpR with CCST	62
SpR 4 or greater	144
SpR 3	68
SpR 2	50
SpR 1	16
Visiting SpR	22
Locum appointment (training)	9
Locum appointment (service)*	20
Premier SHO	21
SHO 2	9
SHO 1	1
Not answered	2
Not known	2
Total	**1518**

* *Includes 5 locum (service) consultants*

Table 3.20: Most senior operating surgeon

Grade	Number
Consultant	792
Associate specialist	40
Staff grade	90
Clinical assistant/hospital practitioner	6
SpR with CCST	63
SpR 4 or greater	184
SpR 3	100
SpR 2	62
SpR 1	35
Visiting SpR	33
Locum appointment (training)	12
Locum appointment (service)*	22
Premier SHO	43
SHO 2	20
SHO 1	1
Pre-registration house officer	1
Not answered	12
Not known	2
Total	**1518**

* *Includes 5 locum (service) consultants*

Consultants operated on 52% (792/1518) of patients. This is identical to the involvement of consultant surgeons in 1990 (52%, 1341/2558). These figures show a minimal improvement on the original CEPOD report[43] where it was reported that 47% of procedures were performed by consultants.

The fall in numbers operated on by registrars has been compensated for by an increase in the activities of NCCG surgeons.

Figure 3.4: Grade of operating surgeon

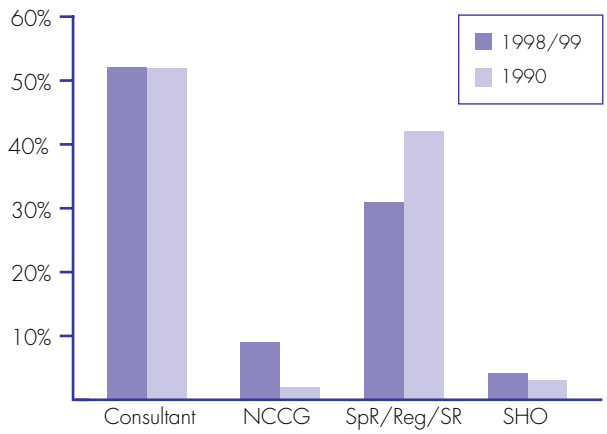


Table 3.21: Most senior surgeon involved in any way (including preoperative consultation) where no consultant involvement was detailed	
Grade	Number
Associate specialist	14
Staff grade	11
SpR with CCST	9
SpR 4 or greater	23
SpR 3	5
SpR 2	4
SpR 1	1
Visiting SpR (or year not known)	3
Locum appointment (training)	1
Locum appointment (service)	2
Premier SHO	1
Total	74

None of the patients treated by the surgeons in Table 3.21 was moribund (ASA 5) at the time of surgery and many of the procedures were appropriate for the level of expertise available. Where cases were thought to be inappropriate, comments have been made in the specialty sections.

Question 3.10: If the most senior operator was not a consultant, was a more senior surgeon immediately available, i.e. in the operating room/suite?

Yes	357
No	319
Not answered	40
Not known	5
Total	721

Table 3.22: Higher diploma(s) in surgery held at the time of operation *(1518 cases; answers may be multiple)*	
Diploma	Number
None	30
Part 1 Fellowship	155
Part 2 or Membership	133
Fellowship	1156
Part 3 Intercollegiate Assessment	266
MS/MD*	530
Other	11

* *The wording of the question makes it impossible to identify how many of these were awarded by qualifying exam and how many by submission of a thesis.*

Of the 30 cases shown in Table 3.23 it seems unlikely that certain grades would not have a higher degree; it is more likely that the individual filling in the questionnaire could not be bothered to supply accurate information. However, if the statements are true, then there would appear to be a problem in orthopaedic and general surgery. In these specialties individuals without a higher diploma appear to hold quite senior posts, including training posts. How likely is this?

Table 3.23: Procedures, grade of most senior operating surgeon and specialty of surgeon in charge for cases where no higher diploma(s) indicated

Most senior operating surgeon	Specialty of surgeon in charge	Special interests	Procedure
Consultant	General	Upper GI/HPD	OGD
Consultant	Orthopaedic		Posterolateral spinal cord decompression & posterior fixation of spine
Consultant	Vascular		Above knee amputation
Consultant	Neurosurgery		Percutaneous CT guided spinal needle biopsy
Associate specialist	Orthopaedic		Hemiarthroplasty
Associate specialist	Orthopaedic		Insertion of two cannulated hip screws
Staff grade	Orthopaedic		Hemiarthroplasty
Staff grade	General		Laparotomy & gastrotomy
Staff grade	Orthopaedic		Internal fixation fractured femoral neck
Staff grade	Orthopaedic		Repair soft tissue injury to calf
Staff grade	General	Upper GI	Laparotomy, peritoneal lavage, ileostomy and mucous fistula
Staff grade	General	Vascular	Bilateral Gritti-Stokes amputation
Staff grade	Orthopaedic		Cemented Thompson hemiarthroplasty
Staff grade	Orthopaedic		Debridement & split skin grafting ankle
Staff grade	Orthopaedic		Internal fixation (sliding hip screw)
Staff grade	Orthopaedic		Thompson hemiarthroplasty
Staff grade	Orthopaedic		Total hip replacement
SpR 4+	General	Gastroenterology	Laparotomy & oversewing of perforated gastric ulcer
SpR 3	Orthopaedic		Internal fixation (sliding hip screw)
SpR 3	General	Vascular	Hartmann's procedure & caecostomy (multiple peritoneal seedlings present in pelvis)
Visiting SpR	Orthopaedic		Open reduction and internal fixation using sliding hip screw
Premier SHO	General	Vascular	Below knee amputation
Premier SHO	Otorhinolaryngology		Incision and drainage of retropharyngeal abscess
SHO 2	General	Breast and endocrine	Insertion of intercostal drain
Locum SpR	General		Hysteroscopy & endometrial biopsy
SHO 2	Orthopaedic		Internal fixation (sliding hip screw)
SHO 2	Orthopaedic		Cemented total hip replacement
SHO 2	General	Vascular	Amputation 5th toe
SHO 2	General	Breast surgery	Insertion of subclavian central venous catheter
House officer	General	Colorectal	Drainage of ascites on ward

Local anaesthesia and sedation

Table 3.24: Procedures performed solely under local anaesthetic and/or sedation administered by the surgeon

Procedure	Number
OGD	20
Femoral embolectomy/thrombectomy/endarterectomy	11
Flexible sigmoidoscopy/colonoscopy	5
Biopsy of skin nodule	5
PEG insertion	4
Incision & drainage of abscess	3
Lens extraction & intraocular prosthesis insertion	3
Drainage of ascites	3
Lymph node biopsy	3
Percutaneous needle biopsy	2
Suturing laceration	2
Insertion or unblocking oesophageal stent	2
Insertion of biliary stent	2
Burr holes	2
Miscellaneous	22
Total	**89**

Question 3.11: Was the procedure performed solely under local anaesthetic and/or sedation administered by the surgeon?

Yes	89
No	1335
Not answered	93
Not known	1
Total	1518

Endoscopies and femoral embolectomies were the most common procedures as they were in the 1990 report. Amongst the 'miscellaneous' procedures there were two major operations (a below knee amputation and a Thompson's hemiarthroplasty) for which it is unlikely that the surgeon *administered* the local anaesthesia. These were most probably performed under some form of regional anaesthesia. This is another example of failure to read the question and provide accurate, believable answers.

Table 3.25 shows that whilst the use of pulse oximetry has increased, other forms of monitoring are used less frequently than previously and a slightly higher percentage of patients had no monitoring whatsoever. In 1993 a working party commissioned by the Royal College of Surgeons of England published a report on sedation administered by non-anaesthetists[44]. This report pointed out to surgeons that the adoption of monitoring standards would increase patient safety. It recommended that the use of oximetry should be standard practice in all circumstances where patients are receiving intravenous sedation administered by surgeons. These recommendations are frequently being ignored.

Table 3.25: Monitoring during procedures performed solely under local anaesthetic and/or sedation by the surgeon

Monitoring	1998/99 (89 cases)		1990 (163 cases)	
Blood pressure	59	66%	128	79%
Pulse	66	74%	143	88%
ECG	23	26%	70	43%
Pulse oximetry	63	71%	72	44%
Other	3	3%	7	4%
None	9	10%	9	6%

Postoperative care

Table 3.26: Destination of the patient immediately after leaving the recovery suite

Destination	Number
ICU	449
HDU	118
Other specialised unit	27
Specialist ward	372
General surgical ward	396
General medical ward	34
Other	4
Died in theatre	63
Died in recovery	28
Not answered	26
Not known	1
Total	**1518**

Table 3.27: Reason for discharge from ICU/HDU/CCU

Reason	1998/99		1990	
Elective transfer to ward	168	28%	260	29%
Pressure on beds	7	1%	14	2%
Death	335	55%	609	68%
Not answered	99	16%	7	1%
Other	0	-	10	1%
Total	**609**		**900**	

There is probably little change in the figures shown in Table 3.27 as, if the 16% of cases where no answer was given are assumed to be deaths, the percentages would be approximately equal. Any conclusions drawn are only as good as the data submitted.

Table 3.28: Postoperative complications
(Answers may be multiple)

Complications	1998/99 (1518 cases)		1990 (2558 cases)	
Respiratory	462	30%	847	33%
Cardiac failure (IHD/arrhythmia/cardiac arrest)	540	36%	796	31%
Renal failure	249	16%	574	22%
Generalised sepsis	217	14%	349	14%
Stroke or other neurological problems	140	9%	281	11%
Postoperative haemorrhage/bleeding requiring transfusion	103	7%	266	10%
Nutritional problems	76	5%	160	6%
Other organ failure	48	3%	151	6%
Wound infection/dehiscence/fistula	46	3%	166	6%
Thromboembolic	43	3%	129	5%
Hepatic failure	36	2%	141	6%
Urinary tract infection/retention	27	2%	131	5%
Anastomotic failure	26	2%	54	2%
Peripheral ischaemia	24	2%	88	3%
Endocrine failure	14	1%	32	1%
Pressure sores	13	1%	73	3%
Problems with analgesia	10	1%	34	1%
Prosthetic complication	4	<1%	9	<1%
Fat embolus	2	<1%	2	<1%
Other	7	<1%	338	13%

Cardiorespiratory problems remain the most common postoperative complication in patients who die. Whilst the percentages for other complications may vary, the general order remains similar with renal failure, sepsis and neurological complications being the next most common.

Table 3.29: Personnel shortages
(Answers may be multiple)

Personnel	1998/99 (22 cases)		1990 (121 cases)	
Consultant surgeons	3	14%	5	4%
Trainee surgeons	1	5%	13	11%
Consultant anaesthetists	2	9%	25	21%
Trainee anaesthetists	1	5%	11	9%
Skilled assistants	2	9%	19	16%
Nurses	11	50%	32	26%
Operating department assistants	-	-	32	26%
Porters	-	-	22	18%
Other	3	14%	12	10%

Question 3.12: Was there a shortage of personnel in this case?

	1998/99		1990	
Yes	22	1%	121	5%
No	1313	87%	2437	95%
Not answered	183	12%	0	-
Total	1518		2558	

Whilst the problem of staff shortages appears overall to be less in 1998/99, the type of staff involved has changed, as shown in Table 3.29.

Table 3.29 shows a reported increasing shortage of consultant surgeons, which is interesting. This could reflect the recognition that a consultant is needed for the case, that trainees are less experienced, a specialist is needed or that the consultants are overworked or too few in numbers to cover the workload.

There has also been a significant increase in the shortage of nursing staff.

Audit

Question 3.13: Has this death been considered, or will it be considered, at a local audit/quality assurance meeting?

	1998/99		1990	
Yes	1140	75%	1635	64%
No	313	21%	403	16%
Not answered	57	4%	520	20%
Not known	8	<1%	-	-
Total	1518		2558	

In the 1990 data, 64% of all deaths were considered at an audit meeting whereas the percentage in the 1998/99 data was 75%. In addition, there has been a marked improvement in the completion of this question. Whereas in 1990 20% of respondents either could not or would not answer this question, the latest figure has fallen to 4%. Clearly the profession has moved a long way (with administrative support) and now embraces audit within the working week. However, the use of audit varies amongst specialties, as shown in Figure 3.5.

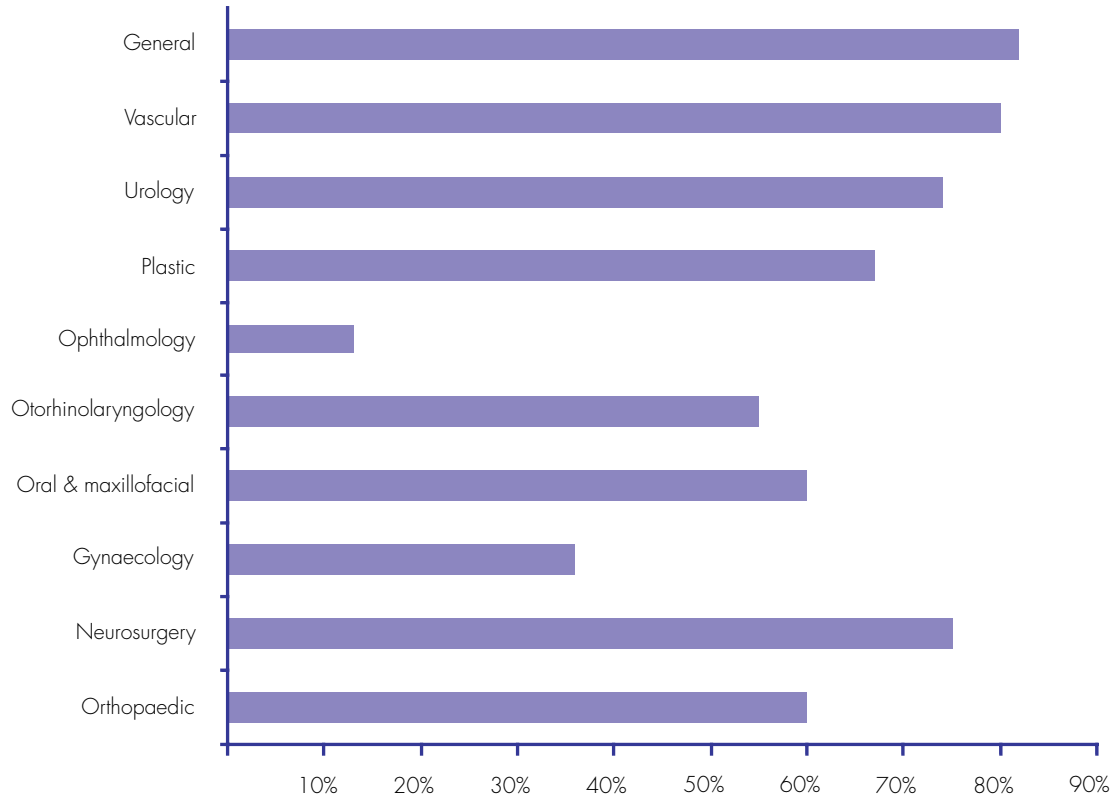
There are issues around these variations for individual specialties and departments to address and justify, especially in the light of clinical governance.

Question 3.14: Has the consultant surgeon seen and agreed this questionnaire?

Yes	1403
No	49
Not answered	66
Total	1518

A small percentage of consultants (3%, 49/1518) do not check the content of the completed questionnaire. Even when the questionnaires are checked before return, there are omissions and verifiable inaccuracies. Perhaps the time is approaching when it will be necessary to audit the accuracy of completion of NCEPOD questionnaires.

Figure 3.5: Percentage of deaths considered at audit meetings by surgical specialty



Specific issues and surgical specialties

Consent

Key Points

- *Consent was frequently obtained by pre-registration house officers and senior house officers for complex surgical procedures, where death was anticipated.*
- *Clinicians must be aware of their legal obligations concerning consent.*

Introduction

For the first time, this year's enquiry asked questions about consent. These will become increasingly important in future samples as the effects of the recent GMC guidance[45] begin to be seen.

In 30 cases consent had definitely not been obtained prior to operation. In a further 54 cases there was no evidence that consent had been obtained, as either the question was not answered or the answer was not known by the person completing the questionnaire.

The majority of cases were classified as emergency or urgent (Figure 3.6).

All of this group of patients had either life threatening conditions requiring immediate surgery, or were extremely ill, and possibly legally incompetent to give consent. All patients undergoing scheduled or elective surgery without consent were recorded as having psychiatric or neurological illness, which may have rendered them incompetent to give consent.

The over-riding legal and professional duty to a patient is to act in good faith and in the best interest of the patient. Where the patient's life is at risk, a doctor may operate without the consent of the patient, provided that he does so in the patient's best interest, and provided that no indication was given by the patient in advance (advance directives) that they would not consent to surgery.

If an adult patient is judged to be incompetent (and that is a matter to be determined by the treating clinician), then no other person may give or withhold consent for a procedure. The doctor must act in the patient's best interest; however, if time permits, consultation with relatives and carers is good practice, provided the patient has not previously indicated a desire for confidentiality.

Where the clinician is in doubt, and where time permits, application may be made for a direction to be issued by the High Court.

Figure 3.6: Classification of operation when no consent was obtained prior to surgery

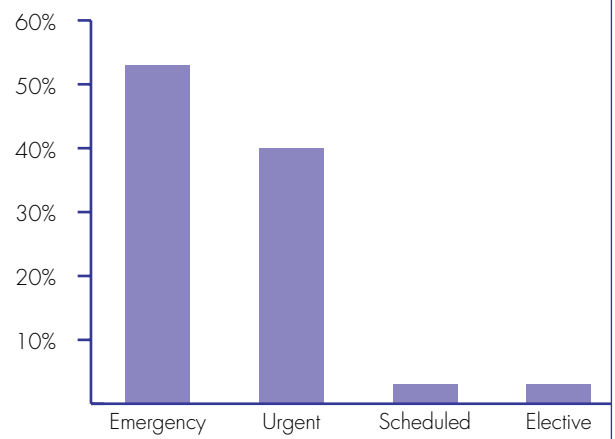
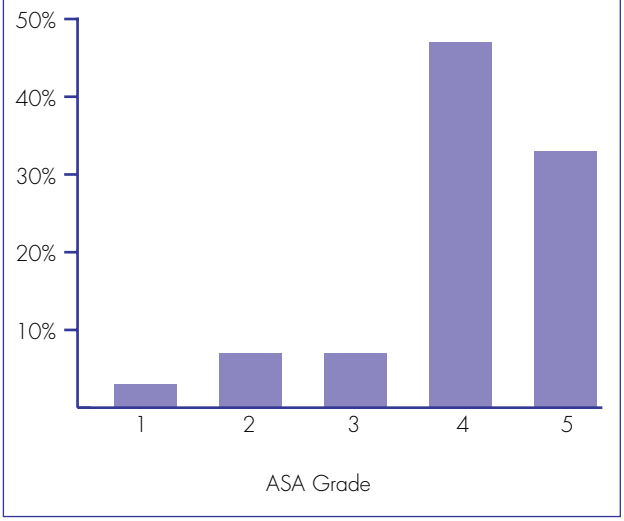


Figure 3.7: ASA classification when no consent was obtained prior to surgery

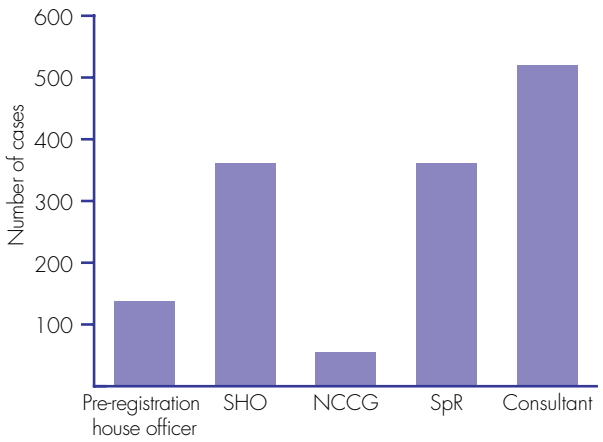


Was the surgeon who obtained consent present at the operation?

Of the 1434 cases in which consent was definitely obtained prior to operation, in 399 (28%) the surgeon obtaining consent was not present at the operation.

Seniority of surgeon taking consent

Figure 3.8: Seniority of surgeon taking consent



Consent was taken by pre-registration house officers and SHOs in 498 (33%) cases for a wide range of complex surgical procedures. It is likely that in most cases the procedures will have been discussed in detail by a senior member of the surgical team prior to operation. It is important, however, that salient details of the discussions that take place prior to surgery between senior staff and the patient are recorded in the notes.

It is important that the clinician obtaining consent from the patient fully understands the nature of the procedure proposed, the likelihood of complications arising, and is capable of answering questions asked by the patient. Furthermore, for consent to be valid, the risks of particular relevance to the individual patient must be discussed and complication rates must take account not only of published rates but also of the operating surgeon's own outcomes[46].

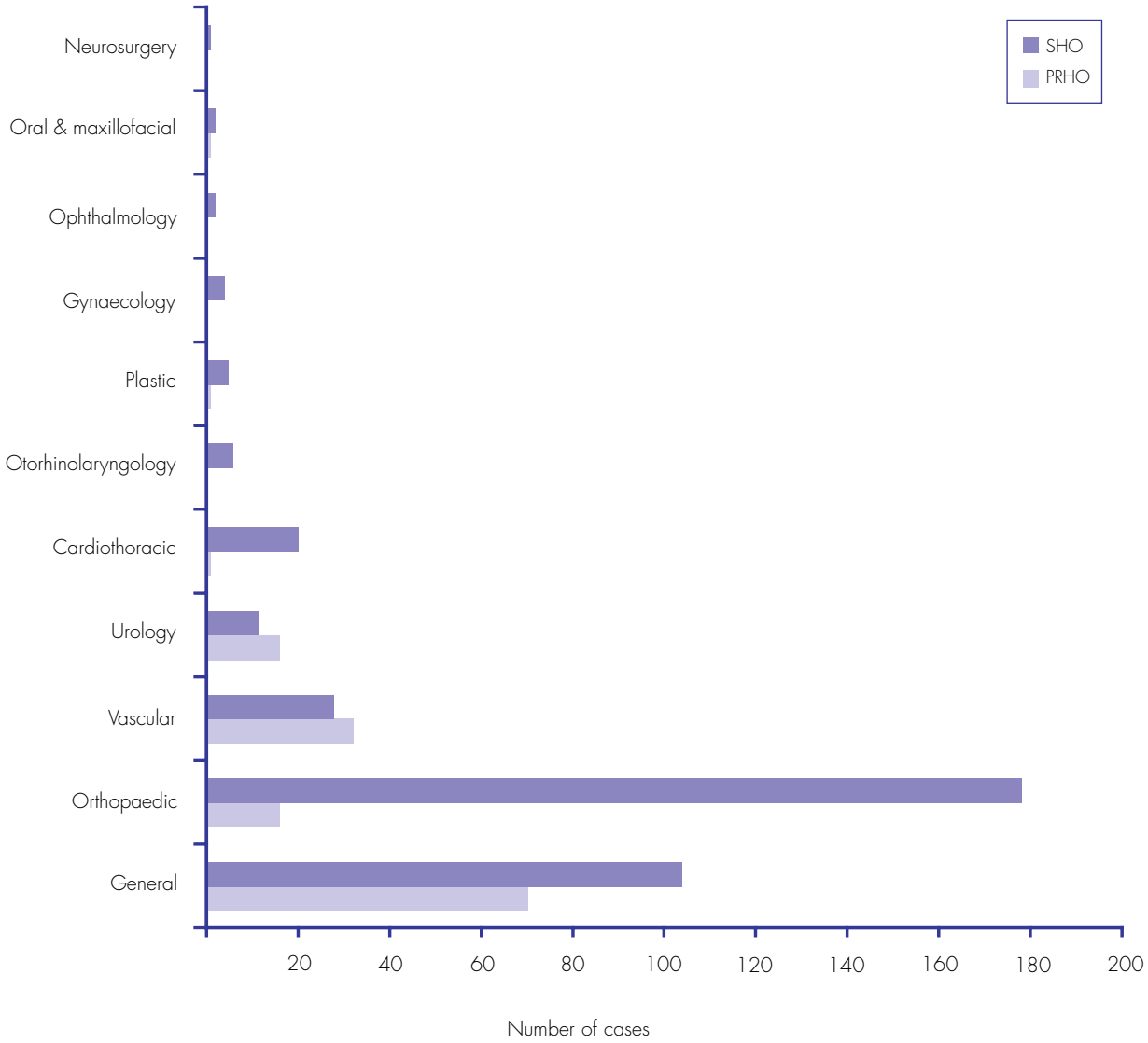
The GMC has recently issued the following guidance[45]:

"*If you are the doctor providing treatment or undertaking an investigation, it is your responsibility to discuss it with the patient and obtain consent, as you will have a comprehensive understanding of the procedure or treatment, how it is carried out, and the risks attached to it. Where this is not practicable, you may delegate these tasks provided you ensure that the person to whom you delegate*

- *Is suitably trained and qualified;*
- *Has sufficient knowledge of the proposed investigation or treatment, and understands the risks involved;*
- *Acts in accordance with the guidance in this booklet.*"

Of the patients for whom consent was obtained by SHOs or pre-registration house officers, 273 were regarded as having definite risk of death or of death being expected. Is it appropriate for inexperienced house officers to be obtaining consent for complex surgical procedures where there is a significant possibility of death?

Figure 3.9: Consent taken by pre-registration house officer (PRHO) or senior house officer (SHO) by specialty



Cardiothoracic surgery

Key Points

- *Waiting lists for cardiac surgery remain unacceptably long.*
- *Patients continue to have operations cancelled due to lack of ICU beds.*
- *Consultant input is even greater than it was in 1990. Almost all urgent or emergency operations were performed by consultants.*
- *An increased number of patients were admitted as emergencies and were of poor physical status.*
- *A higher proportion of deaths were discussed at audit meetings.*

Introduction

As with other specialties cardiothoracic surgery is being compared with the data presented in the 1990 NCEPOD report[4]. The number of cases in the 1998/99 sample is smaller, being 10% of the total deaths reported, compared to the 20% sample reviewed in 1990. In 1999 the Society of Cardiothoracic Surgeons of Great Britain and Ireland published the results of an audit of adult cardiac operations performed in 1998[47]. The number of deaths included in the NCEPOD sample is smaller than in this audit; this is due to the exclusion of Scotland and the Irish Republic, likely under-reporting of deaths from some hospitals and a return rate of questionnaires of 78%. Reporting and return rates are expected to continue to improve as clinical governance takes effect.

Cardiothoracic surgery as a specialty collects better data and has been subject to more internal scrutiny than perhaps any other specialty[48]. Audit has shown a steady improvement in results for coronary surgery during the period from 1993-98[47], despite the fact that there has been an increase in the number of operations on older patients. It is ironic, therefore, that the specialty should have had such adverse publicity in recent years.

As in 1990, there was a very high level of input from consultants, both in the decision to operate and in the person performing the actual operation. Some operations were performed by trainees indicating that training is in progress; these were all on scheduled or elective patients, with the emergencies being performed by consultants.

Cardiac surgery

Table 3.30: Procedures in cardiac surgery

Procedure	Number
Coronary artery bypass grafting (CABG)	23
CABG + carotid endarterectomy	1
CABG + mitral valve replacement	3
CABG + repair of LV aneurysm	2
CABG + repair of ascending aorta	1
CABG + repair of VSD	3
CABG + aortic valve replacement	2
Redo CABG	5
Redo CABG + mitral valve replacement	1
Redo CABG + repair of LV aneurysm	1
Aortic valve replacement	6
Redo aortic valve replacement	2
Mitral valve replacement	3
Redo mitral valve replacement	2
Aortic and mitral valve replacement	1
Mitral and tricuspid valve replacement	1
Replacement of aortic root	2
Replacement of ascending aorta	3
Replacement of descending aorta	1
ASD	1
Reopening after CABG	1
Formation of pericardial window	1
Insertion of LV assist device	1
Total	67

Age

Table 3.31 compares the age of patients in 1998/99 with those in 1990. Forty-three percent of the patients in the 1998/99 sample were aged 70 years or over, as compared with 21% in 1990. Children aged ten years or under were excluded from the 1990 sample. There were nine cardiothoracic procedures in children aged ten years or under in the 1998/99 sample and these have been included in the paediatric surgery section of this report (see page 105).

Table 3.31: Age of patient at time of final operation

Age in years	1998/99		1990	
11-19	0	-	3	3%
20-29	1	2%	2	2%
30-39	0	-	3	3%
40-49	4	6%	14	14%
50-59	10	15%	19	18%
60-69	23	34%	40	39%
70-79	22	33%	18	17%
80-89	7	10%	4	4%
Total	67		103	

Sex

The distribution between the sexes has remained unchanged since 1990, with the female to male ratio being 1:1.7, reflecting the higher incidence of ischaemic heart disease in males.

Admission category

Table 3.32: Admission category

Admission category	1998/99		1990	
Elective	29	43%	64	62%
Urgent	16	24%	18	17%
Emergency	21	31%	21	20%
Not known	1	1%	0	-
Total	67		103	

Many operations continue to be performed electively, although the proportion done urgently or as an emergency has increased since 1990.

Delay, cancellation and transfer

There was a delay in performing the operation in 13/67 (19%) cases. In 1990 there were 16/103 (16%) reported delays in admission due to lack of resources.

Table 3.33: Reasons given for delay

Reason	Number
Elective operations:	
Long waiting list (up to 14 months cited)	8
No ICU bed (cancelled twice)	1
Surgeon to whom patient referred was on leave; referred to a second surgeon whose lists were full	1
Difficulty in funding a patient who was not entitled to NHS treatment	1
Emergency operations:	
Time taken for perfusionist and anaesthetist to get to hospital	1
Patient had a cardiac arrest requiring ventilation and stabilisation	1

NCEPOD has no information regarding patients who may have died while on long waiting lists.

Two patients had had their operations cancelled on a previous occasion; one because there was no ICU bed and the other because there was a need for carotid Dopplers to be performed.

Forty-two percent (28/67) of patients were transferred as an inpatient from another hospital, compared to 34% (35/103) in 1990. This is not surprising as cardiac surgery is practiced in regional or subregional centres.

Coexisting medical disorders

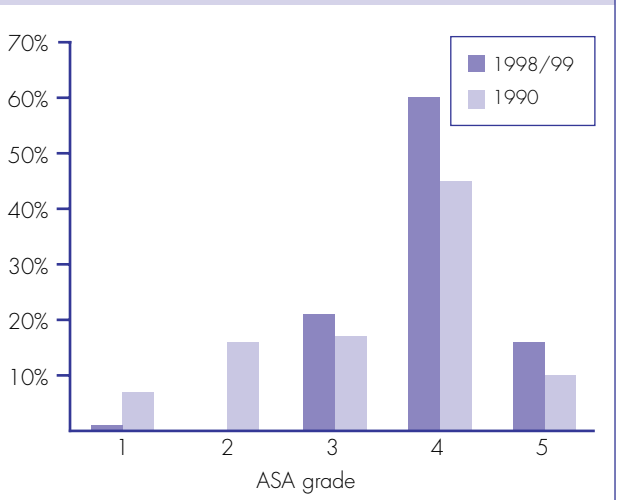
Table 3.34: Coexisting medical disorders (other than the main diagnosis)
(Answers may be multiple)

Coexisting disorder	1998/99 (67 cases)		1990 (103 cases)	
Cardiac	21	31%	61	59%
Renal	17	25%	21	20%
Respiratory	16	24%	19	18%
Diabetes	9		*	
Neurological	7		9	
Gastrointestinal	5		5	
Vascular	5		*	
Other endocrine	5		7	
Malignancy	3		*	
Sepsis	3		*	
Haematological	1		2	
Musculoskeletal	1		5	
Psychiatric	1		1	
Other	0		10	
None	21		17	
Not known	1		1	

* *Not a separate category in 1990 question*

There appears to have been a relative rise in respiratory and renal problems, but a relative fall in cardiac disorders other than the condition requiring surgery.

Figure 3.10: Comparison of ASA grade in cardiac surgery



ASA status

Table 3.35 and Figure 3.10 show that 60% of the patients who died were ASA grade 4; this compares to 45% in this category in 1990.

Table 3.35: ASA status by classification of operation

Classification	ASA 1		ASA 2		ASA 3		ASA 4		ASA 5		Total	
	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990
Emergency	0	0	0	0	0	1	6	8	10	10	16	19
Urgent	0	1	0	1	2	0	14	12	1	0	17	14
Scheduled	1	4	0	6	5	14	14	21	0	0	20	45
Elective	0	3	0	9	7	3	6	5	0	0	13	20
Total	**1**	**8**	**0**	**16**	**14**	**18**	**40**	**46**	**11**	**10**	**66***	**98****

* *In one elective case the ASA grade was not known.*
** *In five cases the ASA grade or classification of operation was not known.*

The surgeon

Table 3.36: Grade of the most senior surgeon consulted		
Grade	1998/99	1990
Consultant	67	100
Senior registrar	-	1
Associate specialist	0	2
Total	67	103

Table 3.37: Grade of the most senior operating surgeon				
Grade	1998/99		1990	
Consultant	59	88%	90	87%
Associate specialist	0	-	2	2%
SpR with CCST/SR	2	3%	10	10%
SpR 4 or greater	4	6%	Not applicable	
SpR 3/Registrar	1	1%	1	1%
SpR 2	1	1%	Not applicable	
Total	67		103	

A very high level of consultant involvement continues although, in the 1998/99 group, 11 surgeons did not indicate who proposed the operation undertaken; in the remaining 56 cases the consultant made this decision.

Table 3.38: Grade of the most senior operating surgeon by classification of operation										
Grade	Emergency		Urgent		Scheduled		Elective		Total	
	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990
Consultant	15	19	17	12	16	43	11	16	59	90
Associate specialist	0	0	0	0	0	1	0	1	0	2
SpR with CCST/SR	1	1	0	5	0	1	1	3	2	10
SpR 4 or greater	0	-	0	-	3	-	1	-	4	-
SpR 3	0	-	0	-	1	-	0	-	1	-
SpR 2	0	-	0	-	1	-	0	-	1	-
Total	16	20	17	17	20	45	14	20	67	102*

* *One case in 1990 was performed by a registrar but the operation was not classified.*

Table 3.38 shows that once again the overwhelming majority of operations were performed by consultants. In 1990, six out of 37 emergency and urgent cases were performed by senior registrars, whereas now only one out of 33 such cases was performed by a surgeon below consultant grade and this was by an SpR with a CCST. Trainees are, therefore, being taught cardiac surgery on the planned rather than the emergency cases. This is reassuring but raises the issue of SpRs not being adequately trained in emergency surgery on achieving consultancy. There is other evidence to support this[49].

Postoperative complications

These were remarkably similar to those identified in 1990.

Audit

Ninety-three percent (62/67) of cases were considered at a local audit meeting. This commendably high figure is a great improvement on the 68% recorded in 1990.

Thoracic surgery

Table 3.39: Procedures in thoracic surgery	
Procedure	Number
Bronchoscopy	2
Bronchoscopy + oesophagoscopy	1
Bronchoscopy + lung biopsy	1
Bronchoscopy + lobectomy	1
Bronchoscopy + pneumonectomy	2
Pneumonectomy	2
Lobectomy	4
Tracheostomy	2
Rigid oesophagoscopy	1
Oesophagoscopy + dilatation and stent	3
Repair of oesophageal tear and removal of foreign body	1
Lung volume reduction	1
Stapling of bulla	1
Stapling of bulla + closure of bronchopleural fistula	1
Pleurectomy + closure of air leaks	1
Pleural biopsy + talc pleuradesis	3
Cervical mediastinoscopy	1
Pulmonary thromboendarterectomy	1
Reopen, resection necrotic stomach + fistula in neck	2
Thoracotomy + evacuation of clot	2
Mini laparotomy + splenectomy	1
Total	34

Age

Table 3.40 shows the age of those who died, compared to 1990 data. The numbers are small, but there does seem to have been an increase in the number of patients aged over 70 years having operations.

Table 3.40: Age of patient at time of final operation				
Age in years	1998/99		1990	
11-20	0	-	1	2%
21-30	0	-	1	2%
31-40	1	3%	0	-
41-50	2	6%	3	7%
51-60	5	15%	3	7%
61-70	13	38%	24	59%
71-80	11	32%	8	20%
81-90	2	6%	1	2%
Total	34		41	

Admission category

There has been an increase in the proportion of emergency operations among those who died.

Table 3.41: Admission category				
Admission category	1998/99		1990	
Elective	17	50%	26	63%
Urgent	9	26%	11	27%
Emergency	7	21%	4	10%
Not answered	1	3%	0	-
Total	34		41	

Delay, cancellation and transfer

Three patients had their operations delayed; two because the waiting list was too long and one had a delayed transfer because no bed was available on the surgical ward.

None of the thoracic patients had their operation cancelled for a non-clinical reason.

Thirty-five percent (12/34) of the patients were transferred from other hospitals.

Coexisting medical disorders

Table 3.42: Coexisting medical disorders (other than main diagnosis) *(34 cases; answers may be multiple)*	
Coexisting disorder	Number
Cardiac	14
Respiratory	12
Malignancy	8
Sepsis	4
Vascular	3
Diabetes	3
Renal	2
Haematological	2
Neurological	1
Other endocrine	1
Psychiatric	1
None	8

These complications are similar to those seen in 1990, with cardiorespiratory problems being predominant.

ASA status

Table 3.43: ASA status by classification of operation												
Classification	ASA 1		ASA 2		ASA 3		ASA 4		ASA 5		Total	
	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990
Emergency	0	0	1	1	0	0	2	2	2	3	5	6
Urgent	0	0	0	1	3	1	8	2	1	0	12	4
Scheduled	0	3	4	9	7	3	3	7	0	1	14	23
Elective	0	1	0	4	3	2	0	0	0	0	3	7
Total	**0**	**4**	**5**	**15**	**13**	**6**	**13**	**11**	**3**	**4**	**34**	**40***

* *One scheduled case had no ASA grade recorded.*

Figure 3.11: Comparison of ASA grade in thoracic surgery

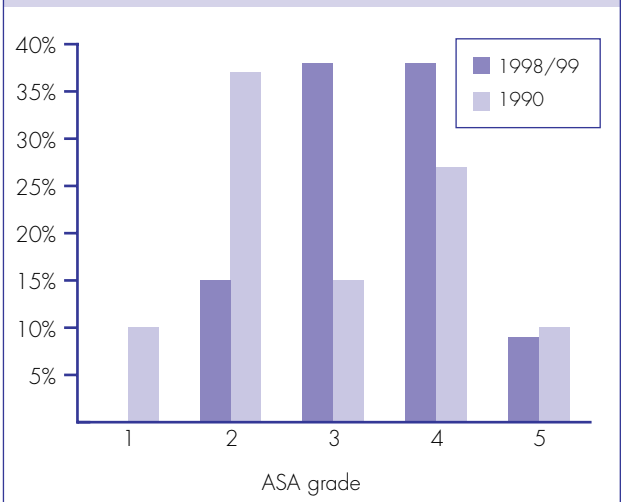


Table 3.43 and Figure 3.11 show that 76% (26/34) of patients in 1998/99 were graded ASA 3 or 4; this compared to 41% in 1990.

The surgeon

In all 34 cases a consultant was consulted before the operation. This is an improvement since 1990, when a consultant made the diagnosis in 35/41 (85%) patients.

Table 3.44: Grade of the most senior operating surgeon				
Grade	1998/99		1990	
Consultant	24	71%	31	76%
Staff grade	1	3%	0	-
Senior registrar	Not applicable		4	10%
SpR 4 or greater/Registrar	5	15%	6	15%
Visiting SpR	2	6%	Not applicable	
Not answered	2	6%	0	-
Total	**34**		**41**	

Table 3.45: Grade of most senior operating surgeon by classification of operation										
Grade	Emergency		Urgent		Scheduled		Elective		Total	
	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990
Consultant	5	6	7	3	9	16	3	6	24	31
Staff grade	0	0	0	0	1	0	0	0	1	0
Senior registrar	-	0	-	1	-	3	-	0	-	4
SpR 4 or greater/Registrar	0	0	3	0	2	5	0	1	5	6
Visiting SpR (or year unknown)	0	-	0	-	2	-	0	-	2	-
Not answered	0	0	2	0	0	0	0	0	2	0
Total	**5**	**6**	**12**	**4**	**14**	**24**	**3**	**7**	**34**	**41**

As in 1990, all the emergency cases were performed by consultants. In the urgent and scheduled cases a number were done by an SpR 4 or visiting SpR, and one case by a staff grade.

Postoperative complications

Table 3.46: Postoperative complications *(34 cases; answers may be multiple)*	
Complication	Number
Respiratory	17
Generalised sepsis	8
Cardiac arrest	5
Renal failure	4
Postoperative haemorrhage/bleeding requiring transfusion	3
Cardiac failure (IHD/arrhythmia)	3
Nutritional problems	2
Anastomotic failure	1
Problems with analgesia	1
Thromboembolic	1
Other	1
None	11

These are very similar to the complications identified in the 1990 report.

Audit

Eighty-two percent (28/34) of cases were considered at a local audit meeting. This shows some improvement on the 61% (25/41) reported in 1990.

Key Points

- *There has been an increase in emergency admissions compared to 1990.*
- *The ability to do an operation is not an indication for surgery.*
- *Consultants are undertaking some major operations when there is no hope of cure and without defining the aims of the procedure.*
- *If a surgeon firmly believes that surgery is contraindicated, he/she should decline to operate. A second opinion can always be sought.*
- *Endoscopy for gastrointestinal (GI) bleeding may be difficult. There needs to be experienced endoscopy cover 24 hours per day in hospitals that receive and treat patients with GI haemorrhage. This is an area for collaboration with other disciplines, such as medical gastroenterology.*
- *Some examples of apparent breakdown in teamwork were identified. Surgeons and anaesthetists should ensure that good professional working relationships are maintained in the current climate of clinical practice.*

Introduction

A total of 639 deaths were reviewed in this year's 10% sample compared with 1188 deaths in 1990 (based on a sample of 20% of all deaths). Data relating to general surgery in the 1990 report[4] were subdivided by procedure and not all pieces of information were reported; for the purposes of comparison with the current data, the old 1990 data have, where possible, been aggregated.

The two samples are broadly similar in terms of age and sex. However, 70% of patients (445/639) were aged between 70 and 100 years in this sample, compared with 64% (766/1188) in the 1990 group. This increase in age mirrors the difference between 1990 and 1998/99 seen in the overall surgical sample. The male to female ratio was 1:1.2 in the current sample and 1:1.1 in 1990.

Procedures

The procedures performed in each of the seven groups are shown in Tables 3.47 to 3.53; these groups are identical to those used in the 1990 report. The groups were loosely created on the basis of pathology or procedures; this subdivision of general surgery has been retained in order to allow some comparison although a broader overview is also taken. Due to differences in sampling and changes in clinical practice no specific comparisons can be made concerning the individual procedures which resulted in death. The reader is referred to the 1990 NCEPOD report for in-depth comments on the subgroups[4].

Table 3.47: Procedures in oesophageal surgery
(May be multiple in any one patient)

Procedure	Number
Oesophagectomy (all approaches for malignant disease)	7
Procedures for oesophageal varices	4
Endoscopic dilatation and intubation (malignancy)	3
Oesophagoscopy and dilatation of stricture	2
Miscellaneous (one each of: laser resection of oesophageal tumour, open insertion of oesophageal tube, unblocking of stent, oesophagostomy, gastrostomy)	5

Table 3.48: Procedures in abdominal surgery *(May be multiple in any one patient)*	
Procedure	**Number**
'Open and shut' laparotomy, for widespread malignancy or acute mesenteric ischaemia	72
Small bowel resection (all causes)	38
Oesophagogastroduodenoscopy	26
Gastroenterostomy	23
Laparotomy for adhesive obstruction	20
Feeding jejunostomy	14
Partial gastrectomy for carcinoma	13
Drainage of intra-abdominal abscess (all sites)	8
Resuturing of abdominal wound dehiscence	7
Splenectomy	6
Enteroenterostomy for malignant obstruction	6
Removal of packs	4
PEG insertion	4
Total gastrectomy	4
Laparotomy for multiple trauma/haemorrhage	4
Laparotomy for malignant obstruction	3
Laparostomy	3
Diagnostic laparoscopy (with or without biopsy)	3
Drainage of ascites	3
Gastrostomy	2
Laparoscopic fundoplication	2
Miscellaneous (one each of: removal of CAPD catheter, repair gastrojejunal fistula, second look laparotomy, repair duodenum)	4

When compared to the 1990 data, exploratory laparotomy, mainly for undiagnosed mesenteric ischaemia or intra-abdominal malignancy, remains the most common procedure within this group (Table 3.48). This is perhaps surprising but there is still no specific diagnostic test for acute mesenteric ischaemia. In addition, limitations within the resourcing of the health service and the availability of investigative techniques and imaging often mean that a laparotomy is the most expeditious means of arriving at a diagnosis. Is this in the best interests of the patient?

CASE 3 • *An 81-year-old patient had a diagnostic laparotomy. He was known to suffer from COPD, ischaemic heart disease and chronic renal failure. No preoperative diagnostic tests or imaging were carried out. At laparotomy multiple metastases were found and no procedure performed. He died within 24 hours of surgery.*

CASE 4 • *A 73-year-old patient was referred with an acute abdomen from a medical specialty. She had been in hospital for four days. After suitable resuscitation an SpR 4 performed a laparotomy after discussion with the consultant surgeon. Extensive mesenteric infarction was found and the abdomen closed. The surgeon commented that the clinical findings were not clear cut and that he had operated as soon as the resuscitation was effective.*

There were seven cases where the abdomen was resutured after a dehiscence (Table 3.48). In this sample, when compared to the 1990 data (four cases), there appears to have been an increase in this procedure, despite changes in techniques and suture materials.

Table 3.49: Procedures for complications of peptic ulcer disease *(May be multiple in any one patient)*	
Procedure	**Number**
Bleeding gastric ulcer:	
Under-running of bleeding ulcer	4
Excision of bleeding ulcer	2
Partial gastrectomy	1
Perforated gastric ulcer:	
Simple closure	10
Bleeding duodenal ulcer:	
Under-running of bleeding ulcer	13
Truncal vagotomy and pyloroplasty	2
Pyloroplasty only	2
Perforated duodenal ulcer:	
Oversewing and/or omental patch	23
Stomal ulcer:	
Oversewing	1

Within the sample of deaths following upper gastrointestinal haemorrhage there were examples of poor management and failure to adhere to published guidelines[50]. As this area appears to be of concern there is a case for reviewing these guidelines, revising them if necessary and ensuring that they receive a wide circulation. Perhaps this subject could be encompassed within the agenda for NICE.

CASE 5 • *A 97-year-old patient presented with a gastrointestinal haemorrhage and haematemesis. She was apparently under the care of a medical gastroenterology unit. However, a surgical registrar (SpR 4) was left to perform an endoscopy in theatre at 23.00. All he found was 'blood in the stomach'. The patient continued to bleed and died four days later.*

These arrangements for the investigation of gastrointestinal haemorrhage could be much improved.

CASE 6 • *An 80-year-old ASA 5 patient had a haematemesis. Without preoperative endoscopy a surgical registrar (SpR 4) in a university hospital operated and attempted to oversew a bleeding duodenal ulcer. An incidental small bowel resection was performed but the reason is unknown, as the operation note was not returned. The patient died the same day.*

Preoperative endoscopy might have allowed a rational policy of management to be formulated. The initial endoscopic management of gastrointestinal (GI) haemorrhage is to exclude oesophageal varices. Often an ulcer can be injected with adrenaline or sclerosant to arrest haemorrhage without recourse to surgery.

There is a widespread lack of proper facilities for emergency endoscopy. This is not entirely a surgical problem and needs a collaborative approach between physicians and surgeons. Endoscopy for GI bleeding may be difficult and requires an expert endoscopist supported by an endoscopy team. This cover is needed 24 hours per day. Emergency endoscopy should not be left to a surgical trainee, often working in an operating theatre where the necessary support and equipment are not available.

In the previous report no deaths were reviewed following laparoscopic procedures, as this technique was in its infancy at that time. In the current sample (Table 3.50) there were five deaths related to laparoscopic surgery (three following an initial laparoscopic cholecystectomy, which was converted to an open procedure, and two following a laparoscopic procedure alone). When the procedure is not going well the surgeon should summon help or convert to an open operation. The problems highlighted in case 7 were not only technical but also concerned communication.

CASE 7 • *An 83-year-old patient had a laparoscopic cholecystectomy performed by an experienced SpR in a university hospital. The procedure was difficult due to adhesions and, therefore, the surgeon converted the approach to an open cholecystectomy. There was no appeal for senior help. The following day there was evidence of a biliary leak and attempts were made to drain the common bile duct by an ERCP and then a percutaneous approach; both failed. Intra-abdominal bleeding commenced. Two further laparotomies were performed for haemoperitoneum and haemobilia. Embolisation was also attempted but the patient died from haemorrhage on the 24th postoperative day. A postmortem identified a torn common bile duct but could not identify the source of bleeding.*

Table 3.50: Procedures in hepatopancreaticobiliary surgery
(May be multiple in any one patient)

Procedure	Number
Open cholecystectomy (conversion from laparoscopic procedure)	12 (3)
Bypass surgery for malignant obstructive jaundice	5
ERCP and insertion of biliary stent	4
Pancreaticoduodenectomy	3
Pancreatic necrosectomy	3
Laparoscopic cholecystectomy	2
Cholecystostomy	2
Liver biopsy	2
Exploration of common bile duct	2
Miscellaneous (one each of: drainage of peripancreatic collection, revision of cholecystenterostomy, choledochoduodenostomy, packing of liver for trauma)	4

Table 3.51: Procedures in colorectal surgery
(May be multiple in any one patient)

Procedure	Number
Hartmann's procedure	63
Right hemicolectomy	52
Anterior resection of rectum	21
Sigmoid colectomy	17
Defunctioning ileostomy	17
Sigmoid colostomy (all types, including one laparoscopic procedure)	16
Transverse colostomy	11
Ileotransverse bypass	9
Abdominoperineal excision of rectum	8
Appendicectomy	8
Left hemicolectomy	6
Colonoscopy/flexible sigmoidoscopy	6
Rigid sigmoidoscopy	5
Transverse colectomy	5
Total colectomy +/- ileorectal anastomosis	4
Total colectomy and ileostomy	4
EUA rectum	3
Closure of ileostomy	2
Transabdominal rectopexy	2
Caecostomy	2
Miscellaneous (one each of: dilatation of rectal stricture, correction of sigmoid volvulus, repair of caecal perforation, repair of sigmoid perforation, peranal excision of villous adenoma, closure of colostomy, refashioning of colostomy, refashioning of ileostomy)	8

In the 1990 report a right hemicolectomy was the most frequent procedure preceding death in this group. Although a Hartmann's procedure was more common in the current group, a right hemicolectomy is still high in the table. NCEPOD has previously commented that a right hemicolectomy is a more dangerous procedure than is perceived[11].

Table 3.52: Procedures in hernia surgery
(May be multiple in any one patient)

Procedure	Number
Strangulated femoral hernia repair (all approaches +/- small bowel resection)	17
Obstructed incisional hernia repair	6
Strangulated inguinal hernia repair (+/- small bowel resection)	3
Uncomplicated elective inguinal hernia repair	3
Paraumbilical hernia repair	3
Recurrent inguinal hernia repair	2
Miscellaneous (one each of: parastomal hernia repair and release of internal abdominal hernia)	2

Surgery for strangulated femoral hernia remains the most frequent hernia-related procedure associated with death.

Table 3.53: Miscellaneous primary procedures in general surgery
(May be multiple and/or coincidental with other procedures in any one patient)

Procedure	Number
Drainage of abscess (excluding abdomen)	4
Biopsy of tumour mass (excluding abdomen)	4
Partial cystectomy	4
Debridement of wound	3
Oophorectomy	3
Tracheostomy	3
Excision biopsy of lymph node (all sites)	3
Repair of major arterial trauma	3
Insertion of intercostal drain	2
Miscellaneous (one each of: toilet mastectomy and chest wall reconstruction, cadaver renal transplant, excision breast lump, fasciotomy, desloughing pressure sore, suture scalp wound, orchidectomy, hysterectomy, manual evacuation of rectum, insertion of central venous catheter, insertion of Hickman line)	11

Admission category

In 1990, 55% of the admissions were emergencies; this figure is now 71% (453/639). This reflects the general increase in emergency admissions which most surgical specialties are experiencing (see also section on orthopaedic surgery, page 102). This increasing unplanned load on services, beds etc. requires careful analysis, planning and resourcing.

Shared care

Given the high level of emergency admissions, there may be little time to organise consultations and the formal involvement of physicians etc. Indeed, only 22% (139/639) of these patients were managed jointly. This is a very similar figure to that of the overall surgical data (25%) for 1998/99 and to the data for 1990 (28%, although this was only collected for oesophageal surgery and a few miscellaneous procedures). Anaesthetists are familiar with the immediate requirements of ill patients awaiting urgent general surgical procedures and shared care may have less relevance here than in other specialties, such as orthopaedic surgery, where longer term care and rehabilitation are needed.

Consultation

Table 3.54: Grade of most senior surgeon consulted before the operation
(Figures for locums given in brackets)

Grade	Number
Consultant	580 (5)
Associate specialist	9
Staff grade	6
SpR with CCST	6
SpR 4 or greater	17
SpR 3	6
SpR 2	2
SpR 1	3
Visiting SpR or year not known	3 (1)
Premier SHO	1
SHO 1	1
Not answered	5 (1)
Total	**639**

A consultant, or SpR 4 with a CCST, was consulted in 92% of cases. In 1990, a consultant or senior registrar was consulted in 90% of cases (1066/1188). These figures are in contrast to those for anaesthesia where there was less consultation with a senior member of staff in 1998/99 compared to 1990 (see pages 28,48). Local guidelines should clarify when it is appropriate for a trainee to discuss a patient and their management with a consultant. It might be suspected that trainees are not consulting senior surgeons concerning elderly patients for whom they perceive that nothing can be done; this is not so. In cases where no opinion was sought from a consultant (59 patients), 38 were less than 80 years old and only two patients were aged 90 years or over. In the older patients (>79 years of age) there were no moribund (ASA 5) patients.

Coexisting medical disorders

Comorbidity was present in 87% of the patients (555/639). Cardiorespiratory problems were most common followed by malignancy and renal disease.

ASA status and risk of death

There has been a shift in the ASA class with an increase in the sicker (ASA 3 and 4) patients compared to 1990 (Figure 3.12).

Surgeons were asked how they assessed the risk for the procedures undertaken, and their responses are shown in Table 3.55.

Figure 3.12: ASA grade of general surgery patients

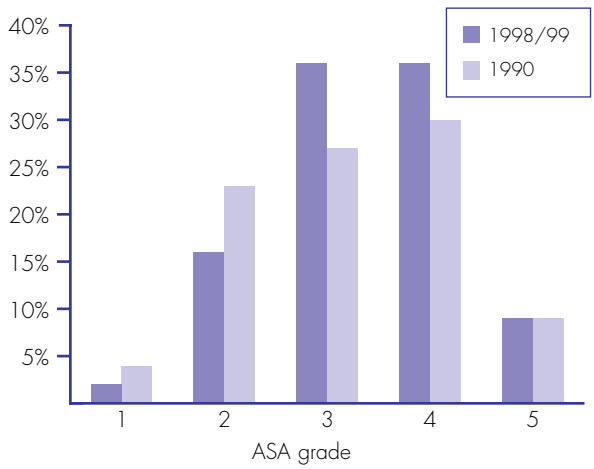


Table 3.55: ASA status by anticipated risk of death

Risk of death	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Not answered	Not known	Total
Not expected	9	25	17	15	0	0	1	67
Small, significant risk	1	32	58	21	1	3	0	116
Definite risk	3	41	138	174	30	7	1	394
Expected	2	1	11	17	25	0	0	56
Not answered	0	2	4	0	0	0	0	6
Total	**15**	**101**	**228**	**227**	**56**	**10**	**2**	**639**

There were 25 cases where the patient was moribund (ASA 5) yet the surgeon operated knowing that death was expected (Table 3.55). The procedures are shown in Table 3.56.

Table 3.56: Procedures performed on ASA 5 patients where death was the expected outcome

Procedure	Number
'Open and close' laparotomy	5
Hartmann's procedure	4
Surgery for strangulated hernia with bowel resection	3
Suture of perforated peptic ulcer	3
Oversewing of bleeding peptic ulcer	2
Miscellaneous (one each of: diagnostic laparoscopy, pancreatic necrosectomy, anterior resection of rectum, oversewing of gastrojejunal fistula, ligation of subclavian artery, suture of scalp laceration, OGD and sigmoidoscopy)	8
Total	**25**

In certain cases the question might be 'why operate?' Some procedures were clearly inappropriate. With hindsight some surgeons might have used a different, more conservative, management plan.

Inappropriate surgery by consultants in advanced malignancy

Overall the pattern of inappropriate operating appears to have changed. The problem is no longer one of trainees operating beyond their capability (as was reported in the 1990 report) but rather that of consultants doing radical and inappropriate procedures, simply because they have the ability, without regard for the outcome. Why make heroic attempts to palliate rather than refer to palliative/symptom control teams?

CASE 8 • *A 79-year-old patient with colorectal cancer was treated by a consultant surgeon with an interest in coloproctology. The patient was anaemic and hypoalbuminaemic. A laparotomy was performed and the consultant then proceeded to do a palliative right hemicolectomy, a cholecystectomy and a partial gastrectomy. There was tumour spillage at surgery. There was no HDU bed available and so the patient was held in recovery. Death from respiratory failure occurred five days later. No postmortem was performed.*

The advisors questioned the advisability of such radical surgery in an unfit patient.

CASE 9 • *An 85-year-old patient had a left hemicolectomy, partial cystectomy and appendicectomy in order to remove a colonic carcinoma. This was performed by a consultant general surgeon with an interest in vascular surgery. The patient died with cardiac failure three days later.*

CASE 10 • *A 59-year-old patient suffered from an advanced carcinoma of the breast and pulmonary metastases. The surgeon was under considerable pressure from the patient's family and agreed, reluctantly, to operate. A radical toilet mastectomy and chest wall reconstruction was performed. The patient died within 30 days from carcinomatosis.*

These were massive procedures with no hope of cure although they could possibly have been palliative. Would a lesser procedure have enabled the patients to leave hospital? The aim of the first of these operations is unclear; perhaps it was never defined!

CASE 11 • *A 48-year-old patient presented to an appropriate specialist with a carcinoma of the oesophagus. An initial CT scan suggested inoperability. Preoperative laparoscopy suggested that the lesion was operable. At surgery the tumour was adherent and it was apparent that the extent of disease had been underestimated. A 3-stage oesophagectomy was done together with insertion of a feeding jejunostomy. The surgeon stated that he had left tumour behind. The anastomosis leaked and the patient died with septicaemia seven days later. A postmortem examination revealed widespread malignancy not seen on laparoscopy.*

The initial CT scan suggested involvement of adjacent tissues but this can be unreliable. The advisors questioned whether the surgery should have taken place at all. However, the patient was young and resection offered the best chance for palliation. Unfortunately the initial staging was inaccurate.

Unexpected deaths in patients graded ASA 1 or 2

Table 3.57: Procedures performed on ASA 1 or 2 patients where death was unexpected

ASA 1	Number
Diagnostic laparotomy	1
Appendicectomy	1
Sigmoid loop colostomy	1
Laparoscopic cholecystectomy, converted to open procedure	1
Anterior resection of rectum	1
Flexible sigmoidoscopy	1
Gastrectomy & Roux-en-Y	1
Repair recurrent inguinal hernia	1
Laparotomy and intestinal bypass	1
ASA 2	
Right hemicolectomy	5
OGD	3
'Open & close' laparotomy (with or without biopsy)	3
Biopsy of superficial malignant mass	2
Laparoscopic cholecystectomy, converted to open procedure	2
Colonoscopy	2
Miscellaneous (one each of: repair strangulated femoral hernia, elective repair inguinal hernia, laparoscopic repair hiatus hernia, anterior resection of rectum, sigmoid colectomy, small bowel resection, gastroenterostomy, anal dilatation)	8
Total	**34**

An area of considerable interest is the fact that 34 patients died after anaesthesia and surgery when they were ASA 1 or 2 and not expected to die (Table 3.55). These procedures are shown in Table 3.57.

Why did the ASA 1 patients die?

- The laparotomy was for an unsuspected ruptured hepatoma in a 39-year-old patient treated in a DGH by a general surgeon. There was no preoperative investigation and when the laparotomy was performed it took four hours. Death occurred within 24 hours and was said to be due to a combination of renal failure, ARDS and sepsis. A postmortem was not performed. Why did the surgeon not call for more specialist help? Why was there no postmortem to establish the diagnosis?

- The death after appendicectomy in a 38-year-old patient appeared to be due to technical error. A consultant operated, there was 600 ml blood loss and two sutures transfixed a loop of small bowel when the abdomen was closed (shown at postmortem examination). Death was due to streptococcal septicaemia on the fourth postoperative day.

- The patient with a sigmoid colostomy was found to have unexpected carcinomatosis at laparotomy.

- The death after cholecystectomy was due to a myocardial infarction in a patient with a history of angina (i.e. the ASA classification was incorrect).

- Death following the anterior resection was due to septic shock. The patient was obstructed and there was spillage of colonic contents. The original ASA classification is rather optimistic; the anaesthetist classified the patient as moribund, ASA 5. Death occurred the same day.

- The details returned about the patient having a flexible sigmoidoscopy were so inadequate that no comment is possible.

- The patient dying after gastric surgery developed ARDS and gastric bleeding.

- The death after surgery for a recurrent inguinal hernia was in a 90-year-old patient and was due to pneumonia following aspiration of gastric contents.

- The death after laparotomy and intestinal bypass was in an apparently fit 89-year-old patient who presented with intestinal obstruction. At laparotomy widespread carcinomatous seedlings were found to be the cause of the obstruction.

Preoperative therapy

Most patients had some form of additional therapy to prepare them for surgery but there were 26 instances where the surgeon completing the questionnaire stated that no therapeutic manoeuvres were undertaken prior to surgery. Included within this group were four major colorectal resections, an oesophagogastrectomy and several elective procedures. It seems inconceivable that there were no preoperative preparations. It is more likely that the data submitted are inaccurate.

Delays

There were 26 instances (4% of the general surgery cases) where delays occurred which were due to non-clinical factors. Reasons for delay included no theatre being available at the required time, the absence of a senior surgeon and the lack of an ICU or HDU bed. There were also ten cases where delay in referral by physicians contributed to a bad outcome (10/639, 2%). There were further cases where the advisors felt that delay in referral had occurred despite the fact that this was not commented on by the surgeon returning the questionnaire.

CASE 12 • *A 68-year-old patient was being treated with bed rest and analgesia for a crush fracture of the 1st lumbar vertebra. General surgeons were called when he had established peritonitis and sepsis due to perforated diverticular disease. A Hartmann's procedure was performed and later a laparotomy for an ischaemic colostomy. He died nine days after surgery from multisystem failure.*

CASE 13 • *A 36-year-old patient with multiple fractures following an RTA developed abdominal pain. Eight days after the accident (following which he had complained of abdominal pain) a laparotomy showed a mesenteric tear and gangrenous ileum. This was resected but despite ICU care (at another hospital because of bed problems) he died from septicaemia 11 days after the accident.*

Seniority of surgeon

Table 3.58: Grade of the most senior operating surgeon
(Figures for locums given in brackets)

Grade	Number
Consultant	346 (4)
Associate specialist	14
Staff grade	29
SpR with CCST	38
SpR 4 or greater	86
SpR 3	43
SpR 2	20
SpR 1	12
Visiting SpR (or year not known)	18 (4)
Premier SHO	17
SHO 2	6
Pre-registration house officer	1
Not answered	9 (1)
Total	**639**

Consultants operated on 54% (346/639) of the patients. In the 1990 sample consultants operated on 52% (618/1188) of the cases. The changes seen in the latest sample (Figure 3.13) are an increase in the number of cases performed by NCCGs (1% in 1990 compared to 7% in 1998/99), a decrease from 45% to 34% in cases undertaken by registrars and a small increase in cases where the operator was an SHO (2% in 1990 compared to 4% in 1998/99).

Figure 3.13: Grade of operating surgeon

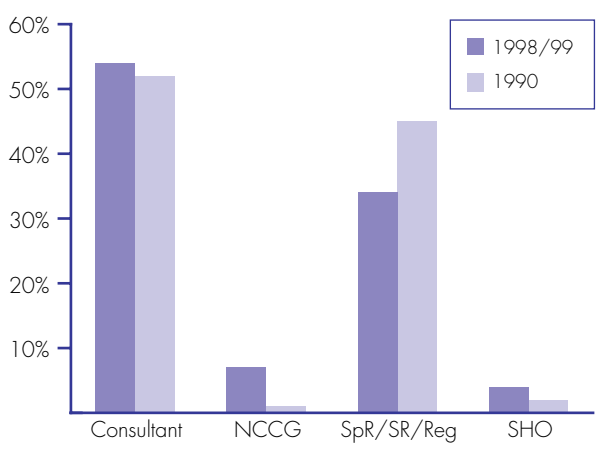


Figure 3.14 shows that there are still differences between the specialties in terms of the grades involved with patients, particularly in the trainee grades. Anaesthetists in basic training are far more likely to be the most senior anaesthetist present than surgical SHOs are likely to be in charge.

Figure 3.14: Grade of most senior operating surgeon and anaesthetist present
(464 cases where both questionnaires available)

Table 3.59: Grade of most senior operating surgeon by classification of operation
(Figures for locums given in brackets)

Grade	Emergency	Urgent	Scheduled	Elective	Not answered	Total
Consultant	58	147 (2)	111 (2)	26	4	346 (4)
Associate specialist	5	7	2	0	0	14
Staff grade	8	15	4	1	1	29
SpR with CCST	13	17	8	0	0	38
SpR 4 or greater	17	52	14	3	0	86
SpR 3	8	26	7	2	0	43
SpR 2	6	10	4	0	0	20
SpR 1	2	7	3	0	0	12
Visiting SpR (or year not known)	5	10 (3)	2 (1)	1	0	18 (4)
Premier SHO	3	12	2	0	0	17
SHO 2	0	4	2	0	0	6
Pre-registration HO	0	1	0	0	0	1
Not answered	0	6	2 (1)	0	1	9 (1)
Total	**125**	**314**	**161**	**33**	**6**	**639**

Consultant surgeons operated on 47% of the patients undergoing emergency or urgent procedures. The majority of these procedures were major undertakings and it was quite appropriate that a consultant was involved. With the move towards a consultant-based service this figure is likely to increase with time. There were 20 emergency or urgent procedures involving an unsupervised SHO or preregistration house surgeon. Of these 15 were done by Premier SHOs who would be capable of performing as an SpR 1. The death following a procedure by a house surgeon was a quite appropriate drainage of ascites under local anaesthesia on a ward. The other procedures included three laparotomies for intestinal obstruction due to adhesions, three cases of strangulated femoral hernia and a miscellany of other procedures of intermediate to major complexity.

Table 3.60: Elective procedures performed by consultants	
Procedure	Number
Ivor Lewis 2 stage oesophagogastrectomy	1
Gastrojejunal pouch + Roux-en-Y	1
Laparoscopic fundoplication	1
Laparoscopic cholecystectomy converted to open cholecystectomy	2
ERCP and stent insertion	1
Gastrojejunostomy & ileo transverse bypass	1
OGD and colonoscopy	1
Toilet mastectomy and chest wall excision, reconstruction chest wall	1
Open prolene mesh repair of inguinal hernia	2
Laparotomy and transverse loop colostomy	1
Sigmoid colectomy & bilateral ureteric catheterisation	1
Resection hepatic flexure colonic carcinoma and distal gastrectomy (Polya)	1
Transabdominal rectopexy	2
Closure of ileostomy	2
Closure of colostomy	1
Hartmann's procedure	1
Anterior resection of rectum	3
Abdominoperineal resection of rectum	2
Transanal excision of villous adenoma	1
Total	26

There were 26 elective procedures performed by consultants. These were largely major procedures and are listed in Table 3.60.

Audit

While 82% (524/639) of these deaths had been discussed at an audit meeting, there were still 18% of deaths that were either not discussed or about which we do not have information. It is noteworthy that the general surgical sub-specialties had the highest rate of audit amongst specialties in 1998/99 and that there has been a considerable improvement since 1990 when 71% of deaths were considered at an audit meeting. It is our opinion that no death following a surgical procedure should be allowed to pass unremarked. All deaths should be subject to audit.

Other issues identified

Bowel obstruction

There were cases where patients with malignant small intestinal obstruction were treated with laparotomy. There are now good regimens for the pharmacological management of this problem and, in terminal illness, laparotomy should be avoided if at all possible[51].

Friction between surgeon and anaesthetist

The questionnaires returned for this report appeared to contain more statements and allusions to a breakdown in collaboration between the specialties than has been seen previously. It is unclear whether this is a general attempt to shift blame in the current climate of clinical practice (despite the advent of clinical governance and a 'blame free' culture), a few isolated incidences or a more widespread breakdown in collaboration.

CASE 14 • *An 88-year-old patient was treated in a teaching hospital for perforated diverticular disease. The anaesthetist thought 'it was considered inappropriate to proceed to full postoperative support in view of the patient's age and pathology. However, at the insistence of the surgical team, full support was instituted'. The surgeon stated 'I asked for the patient to be nursed in ICU but this was not complied with'. The patient was subsequently admitted to ICU where, despite full support, she died.*

CASE 15 • *A 77-year-old patient was admitted in a moribund state with acute abdominal pain. She was reviewed by a consultant anaesthetist who personally telephoned a consultant surgeon and asked him to review the patient before surgery. The surgeon refused to see the patient and instructed an SHO to go ahead with a laparotomy. The anaesthetist wrote: 'moribund patient with severe COPD and acute abdomen. Hypoxic, tachycardic, hypokalaemic, acidotic. Sent to ICU for resuscitation for four hours. Not fit for surgery but duty surgeon insisted on opening to ensure that there was not a simple remediable cause. I am reluctant to anaesthetise this moribund patient'. The patient died the same day.*

The consultant surgeon's behaviour was deplorable. It also showed an ignorance of pathology; while there may have been a 'simple' technical problem within the abdomen, this patient was most unlikely to survive anaesthesia and surgery.

CASE 16 • *An open feeding jejunostomy was performed on a 78-year-old patient who could not swallow. Seven years previously he had undergone an oesophagectomy and a recent cerebrovascular accident had resulted in dysphagia. The anaesthetist said that he was being asked to do an increasing number of this type of patient and procedure and that he could not see the benefits for the patient. The surgeon reported that he was under pressure from both physician colleagues and the patient's relatives.*

There did not appear to be much 'teamwork' in this case. There were other examples where cooperation and teamwork appeared to have broken down. Surgeons and anaesthetists should strive to maintain the good professional working relationships that have built up over the last two centuries. If audit and other initiatives are creating an atmosphere of blame shifting we should take positive corrective steps and work to avoid further deterioration.

Epidurals and heparin

The advisors noted many cases where pharmacological thromboembolic prophylaxis was omitted despite the presence of a protocol. The explanation was often that the anaesthetist wished to use a regional (epidural) anaesthetic technique and that the use of heparin was contraindicated until the epidural catheter was in place. Unfortunately the prophylaxis was often not commenced at all.

There are recommendations on this issue and anaesthetic departments should have a protocol. It is important that appropriate prophylaxis is started as soon as it is safe to do so[52].

Inappropriate operations

There were 50 (50/639, 8%) cases in which the advisors considered that the surgery was inappropriate. The reasons for this were multiple; they included the following:

- There was a better, alternative procedure:

CASE 11 • *A 48-year-old patient had a 3-stage oesophagectomy and insertion of a feeding jejunostomy (see page 90 for further details of this case).*

Why did the surgeon elect for this over ambitious operation when lesser alternatives were available which might have allowed the patient to leave hospital for palliative care?

- There was no hope of success:

CASE 17 • *A 75-year-old ASA 4 patient had a laparotomy for peritonitis. Surgery was performed by an SpR 3. At operation ischaemic bowel was found. The surgeon resected the gut but the patient died on the table. No consultant supervision or opinion was available.*

The surgeon should have decided to close the abdomen without a resection. The lack of consultation for advice is regrettable.

- There was a clear diagnosis of advanced malignancy and surgery was of no benefit to the patient. Palliative treatment was a better choice:

CASE 3 • *An 81-year-old patient, who was unresponsive and moribund, had a laparotomy in order to diagnose an abdominal mass (see page 85 for further details of this case).*

Was it necessary to operate at all?

- Preoperative investigations might have identified (or excluded) the intra-abdominal problem and avoided surgery (often a laparotomy):

CASE 18 • *An 84-year-old patient presented to a teaching hospital with acute abdominal pain. A laparotomy was performed without any specific investigations or referral to a consultant. The laparotomy was negative. The patient died from a pulmonary embolus ten days later.*

The management of this patient is indefensible. While this case involved a negative laparotomy, in many cases where malignancy was found, few preoperative investigations were done.

- An inappropriate case to use as a teaching session:

CASE 19 • *A 79-year-old patient had a right hemicolectomy for a tumour. A consultant was present and teaching. The SpR 1 operated and took three hours to do the procedure. The patient died later.*

The operation took too long. While death may not have been related to the length of operation, there is evidence that this consultant does not understand how to teach. It is not necessary to add to the length of surgery if the teaching is done in a structured manner.

- The general condition of the patient indicated that surgery was inappropriate:

CASE 20 • *An 89-year-old patient presented with small bowel obstruction. The patient already had cardiac failure and a chest infection. A carcinoma of the ascending colon was found at laparotomy. Hepatic secondaries were present. Nevertheless a right hemicolectomy was performed. The patient died.*

Pressure on surgeons

In ten cases (10/639, 2%) surgeons reported that they operated against their better judgement due to pressure from relatives or medical colleagues. Examples included operations which were considered unkind (see cases 10 on page 90 and 16 on page 95), operations with no chance of success and cases where more careful investigation using non-surgical techniques might have identified a diagnosis. Surgery might be a quicker option than pursuing investigations but must be requested appropriately and with some chance of a successful outcome.

CASE 21 • *A 68-year-old man was in an ICU with septic shock. He was under the care of physicians. There was no evidence in the questionnaire of any imaging or other investigations but the advisors felt that it was highly likely that these would have been done. The surgeon came under pressure from the physicians to look for a source of sepsis within the abdomen. He agreed to a laparoscopy, which was negative. The patient subsequently died and pancreatitis was found at postmortem examination.*

If a surgeon firmly believes that surgery is contraindicated for whatever reason, then he must justify those reasons and decline to operate. A second opinion can always be sought.

Gynaecology

Key Points

- *The number of procedures undertaken by consultants in this specialty is high (82%) and has increased since 1990 when it was 68%.*
- *No procedures were performed by SHOs.*
- *Preoperative assessment was sometimes deficient in elderly patients with malignancy.*
- *The benefit of surgery was unclear in a small number of elderly patients with disseminated malignancy.*

The majority of the 22 patients in this group were over 60 years old (86%) and this is similar to the 1990 findings[4].

Procedures

The majority of procedures (86%) were undertaken for patients with gynaecological malignancy, or where malignancy was suspected.

Table 3.61: Gynaecological procedures
(22 cases; procedures may be multiple)

Procedure	Number
Laparotomy	8
Total abdominal hysterectomy	3
Oophorectomy	7
Omentectomy	4
Omental biopsy	4
Other	12

Admission category

In this specialty 13/22 (59%) cases were admitted either urgently or as emergencies, compared to 43% in 1990.

Shared care

Shared care was undertaken in only 36% of cases.

Seniority of surgeon consulted

In 1990, consultant involvement in the decision to operate was high and in this sample, in all cases, a consultant was involved in the decision to operate.

Coexisting medical disorders

Forty-five percent (10/22) of patients had pre-existing cardiac and/or respiratory disease.

ASA status

Fifty-five percent (12/22) of patients were graded ASA 3-5. In only one ASA 1 case was death not expected. There has been no significant shift in the ASA grading between this sample and the 1990 sample.

Delays

There were no cases in which significant delays occurred between the decision to operate and operation in this specialty.

Seniority of operating surgeon

The majority of procedures were undertaken by consultants (18/22, 82%). This is an increase by comparison with the 68% of cases operated upon by consultants in the 1990 sample. No operations in this sample were performed by SHOs.

Decision making

In the 1990 sample, a number of questions were raised about the appropriateness of surgery in patients with advanced malignancy. Similar questions are raised in this sample:

Case 22• *A 73-year-old ASA 3 patient with advanced abdominopelvic malignancy underwent laparoscopic ovarian and peritoneal biopsies. Was this appropriate?*

Case 23• *A 78-year-old ASA 2 patient underwent laparotomy, oophorectomy and omentectomy, for disseminated abdominopelvic malignancy. A CT scan had not been performed, and pathology revealed no evidence of ovarian malignancy. Should a general surgical or oncological opinion have been sought prior to operation?*

Audit

The number of cases considered at audit meetings was 8/22 (36%). This is similar to the response in 1990.

Neurosurgery

Key Points

- *Consultants were involved in the care of all patients.*
- *Thromboembolic prophylaxis was used in 75% of patients, representing a significant increase over the 6% reported in 1990.*
- *A small number of elderly patients with a very poor prognosis had operations which were of questionable benefit.*

Fifty percent of patients (34/68) were under 60 years of age, and the male to female ratio was 1:1.

Procedures

The most common procedures are shown in Table 3.62. The range of procedures performed is similar to the 1990 sample[4].

Table 3.62: Common neurosurgical procedures
(68 cases; procedures may be multiple)

Procedure	Number
Craniotomy for haematoma	24
Craniotomy for tumour	11
External ventricular drain	17
Burr holes	11
Stereotactic biopsy	2
Other	17

Admission category

As in 1990, the majority of patients were admitted as emergencies (69%).

Shared care

Only 13% of cases were managed on a formal shared care basis.

Seniority of surgeon consulted

Consultants were involved in the care of all 68 patients.

Coexisting medical disorders

Fifteen percent of patients had pre-existing cardiac disease and 15% of patients had pre-existing respiratory disease.

ASA status

Sixty percent (41/68) of patients were graded ASA 4 or 5, and 50/68 (74%) were either regarded as at definite risk or expected to die. These grades are in keeping with the 1990 report.

Therapeutic manoeuvres

The 1990 report identified 82/87 (94%) cases in which no DVT prophylaxis was administered, and at least three deaths were attributable to pulmonary embolus. By contrast, only 17/68 (25%) cases in the present sample were not given DVT prophylaxis. There were no reported deaths due to pulmonary emboli.

Delay

In only one case was a possibly remediable delay encountered when a cerebral angiogram could not be obtained.

Classification and day of operation

The majority of operations 35/68 (51%) were classified as emergencies and, interestingly, emergency operations occurred predominantly on Mondays (11/35, 31%). Does this reflect a deficiency in primary, secondary or tertiary services at weekends?

Seniority of operating surgeon

Registrars performed 38/68 (56%) procedures and an SHO performed only one. Consultants performed 25/68 (37%). Where the operator was not a consultant, a consultant was immediately available in 18/43 (42%). In only four cases did the operator not possess a relevant higher surgical diploma. In no case did the advisors feel that the grade of operator was inappropriate to the procedure being performed. In 1990 consultants performed 29/87 (33%) operations.

Decision making

As in the 1990 study, advisors were concerned about the value of surgery in a small number of cases.

CASE 24• *A 72-year-old ASA 5 patient underwent craniotomy for an acute subdural haematoma, the procedure being performed by an SpR 3. The patient was moribund with fixed dilated pupils. Was surgery appropriate?*

CASE 25• *A 64-year-old ASA 4 patient, with known carcinomatosis, underwent a CT guided cerebral biopsy. What was the indication in this terminally ill patient?*

Audit

A total of 51/68 (75%) cases were considered at an audit meeting; a significant improvement over the 1990 figure of 39%.

Ophthalmology

Key Points

- *These patients were elderly with a significant degree of coexisting medical disease. Despite this the majority of patients were treated in hospitals with no HDU or ICU and two patients were treated in single specialty hospitals.*
- *Audit of deaths continues to be carried out infrequently in this specialty.*

There were only eight cases in this sample. All were over 50 years of age and all but two were over 70 years. The female to male ratio was 1.7:1.

All of these patients were admitted electively, and none was managed on a formal shared care basis.

Procedures

Table 3.63: Ophthalmology procedures

Procedure	Number
Unilateral cataract extraction and implant	3
Bilateral phacoemulsification and lens implants	1
Removal of implant	1
Vitrectomy	1
Trabeculectomy	1
Eyelid procedures (Wies)	1

Anaesthesia

General anaesthesia was used in two cases. In one case local anaesthesia was administered in the presence of an anaesthetist and in the remaining five cases, local anaesthesia was administered by the surgeon.

Seniority of surgeon consulted

Consultants were involved in the care of 6/8 patients.

Coexisting medical disorders

Three patients had pre-existing cardiac disease, and two had pre-existing respiratory disease.

ASA status

One patient was ASA 1, three patients ASA 2 and four patients ASA 3. Death was not expected in any of the eight patients.

Advisors expressed concern about the five elderly patients with significant coexisting medical problems undergoing surgery in hospitals without HDU/ICU facilities. Concern was also expressed about two cases undertaken in single specialty hospitals with very limited access to general medical back up.

Case 26• *A 75-year-old ASA 4 patient with bilateral leg amputations, diabetes and angina, on warfarin, underwent vitrectomy under general anaesthesia in a single specialty hospital. No HDU or ICU facilities were available. Should patients with extensive coexisting medical problems be treated in single specialty hospitals without access to HDU/ICU and other back up facilities?*

Decision making

Case 27• *An 88-year-old ASA 3 patient underwent bilateral cataract extraction and intraocular lens implants under general anaesthesia. Should bilateral procedures be performed, and should general anaesthesia be employed?*

Delays

There were no delays reported. One procedure was urgent, one scheduled and six elective.

Seniority of operating surgeon

Consultants operated on 6/8 patients.

Audit

Only one patient was considered at an audit meeting. The low rate of audit of deaths in this specialty has been commented upon previously.

Oral and maxillofacial surgery

Key Points

- *Patients undergoing surgery should have their general medical status optimised prior to operation, particularly when surgery is non-urgent.*
- *Patients with significant cardiovascular disease would benefit from the presence of an anaesthetist and appropriate monitoring, even when local anaesthesia is employed.*

There were five deaths in this specialty; all patients were over 60 years old. Three of these patients were elective admissions.

Procedures

Table 3.64: Oral & maxillofacial procedures

Procedure	Number
Tracheostomy	1
Extraction of two dental roots under LA	1
Incisional biopsy under LA	1
Partial left maxillectomy	1
Excision carcinoma in situ, bilateral medial canthi supraclavicular Wolfe graft repair under LA	1

Shared care

Formal shared care was undertaken in only one case. Consultants were involved in the care of all but one case.

Coexisting medical disorders

Two patients had pre-existing cardiac problems and two had pre-existing respiratory problems.

ASA status

One patient was graded ASA 4 and the remainder were ASA 2 or 3. Death was not expected, by the surgical team, in any of these patients.

Therapeutic manoeuvres

All but one of the cases were managed in units with an anti-thromboembolic prophylaxis protocol, and 2/5 patients received prophylaxis.

Delay

No delays were reported in the care of this group of patients.

Seniority of operating surgeon

Consultants operated on 3/5 patients.

Case 28• *A 60-year-old ASA 3 patient was admitted electively for bilateral excision of carcinoma in situ and skin grafts to the medial canthi, under local anaesthesia. Immediately prior to the procedure the patient suffered an ischaemic attack which responded to GTN. Surgery was performed by an SpR 3 using LA, without any monitoring, and without an anaesthetist being present. Was this appropriate? This case was not considered at an audit meeting.*

Audit

Three out of five cases were considered at a local audit meeting.

Key Points

- *A greater percentage of patients in this study were admitted as emergencies compared with the 1990 group.*
- *Shared care remains uncommon, despite the predominance of an elderly group of patients with significant coexisting medical problems. The specialty should have clear standards of care for the non-surgical management of trauma patients.*
- *There has been an increase in the number of patients receiving thromboembolic prophylaxis from 15% in 1990 to 74% in this sample.*
- *The reduction in the number of operations performed by registrars since 1990 has been matched by an increase in the number of operations performed by NCCGs.*
- *In this sample 39% of NCCGs had no relevant postgraduate qualification.*
- *Delays in treating trauma patients still occur for non-medical reasons despite an increase in the number of dedicated trauma lists.*

There were 341 deaths reviewed in comparison with 420 in the 1990 report[4]. There was no significant difference in the age distribution with 92% of patients being aged between 70-99 years in this sample compared with 88% in the 1990 group. The male to female ratio was 1:1.9 in both samples.

Table 3.65: Common orthopaedic procedures

Procedure	1998/99		1990	
Hip fracture (various)	239	70%	303	72%
Total hip replacement	15	4%	29	7%
Revision hip prosthesis	2	1%	12	3%
Total knee replacement	4	1%	5	1%

In both groups the range of procedures performed was similar, with the majority being undertaken for hip fracture.

Admission category

In 1990, 251/420 (60%) orthopaedic admissions were classified as emergency, whereas in the present sample, 287/341 (84%) were so classified. What is the reason for this?

Shared care

In 1990 only 90/420 (21%) cases were managed under formal shared care, whereas in the present sample this had increased to 104/341 (30%). There was a difference of opinion between orthopaedic advisors regarding the role of formal shared care. Some orthopaedic surgeons prefer to take an holistic approach to the management of their patients and are enthusiastic about being directly involved in the medical management of their own patients. Others would prefer to undertake care on a more formally shared basis with specialist physicians. The specialty should have clear standards of care for trauma patients who are predominantly elderly and have significant coexisting medical problems. This component of orthopaedic management should be more rigorously audited.

Seniority of surgeon consulted

In 1990, 285/420 (68%) cases involved a consultant prior to surgery, whereas in the present sample 314/341 (92%) patients benefited from the consultant having been involved in their care.

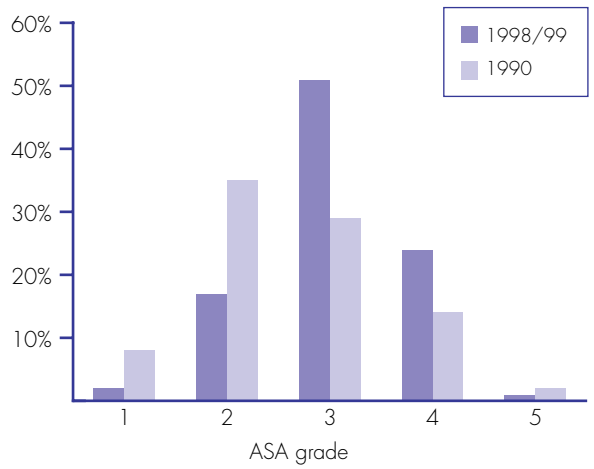
Coexisting medical disorders

In both samples 33% (1998/99: 112/341 and 1990: 140/420) had respiratory problems. Fifty-three percent (180/341) and 47% (199/420) respectively had cardiac problems.

ASA status

In this sample, surgeons used ASA grades 1, 2 and 5 less frequently, but tended to use grades 3 and 4 more often than in 1990 (Figure 3.15). Similar numbers of cases were designated as carrying small, significant or definite risks of death.

Figure 3.15: ASA grade of orthopaedic patients



Therapeutic manoeuvres

There was no significant difference in the range of preoperative therapeutic manoeuvres undertaken in either sample, with the exception of DVT prophylaxis. In 1990 only 64/420 (15%) patients received DVT prophylaxis, whereas in this sample 254/341 (74%) patients received prophylaxis. Of the 87 patients who received no prophylaxis, 28 were judged to be at high or moderate risk of thromboembolic complications. In only 188/341 (55%) cases was there an anti-thromboembolic protocol.

A urinary catheter was placed in only 89/341 (26%) patients. Of the remaining 252 patients, 143 were known to have either pre-existing renal or cardiovascular disease where careful fluid and electrolyte balance was required.

Delays

Despite the improvements in availability of trauma lists which have been demonstrated over the ten year period, it was disappointing to note that a significant number of orthopaedic patients are still having their operations delayed for non-clinical reasons. In 1990, 43/420 (10%) were so delayed compared with 40/341 (12%) in the present sample. Why is this? Is the failure to staff trauma lists with consultants a factor? Could it be that the failure to provide trauma lists at weekends is actually making delays worse for some patients?

CASE 29• *A 73-year-old ASA 3 patient admitted with a fractured neck of femur had to wait for five days before a theatre was available to treat her. She died 11 days following surgery of bronchopneumonia.*

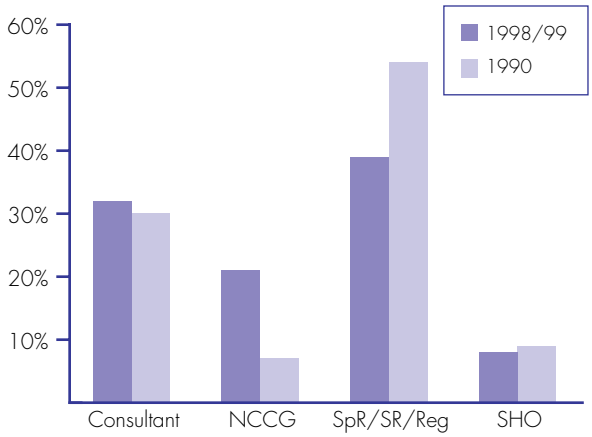
Classification and day of operation

There was no significant difference between the two samples in terms of either day of operation or classification.

Seniority of operating surgeon

Consultants operated on 108/341 (32%) cases in this sample, compared with 124/420 (30%) in 1990. There has been a reduction in the number of cases being treated by SpRs; however, in 1990 only 28/420 (7%) were operated upon by NCCGs whereas, in the present sample, there was a significant increase (71/341, 21%). Of these 71 NCCGs, 28 (39%) had no relevant postgraduate qualification. NCEPOD has previously commented upon the increasing trend toward the use of NCCGs, particularly in emergency surgery, and the significant number of such surgeons who possess no postgraduate qualification.

Figure 3.16: Grade of operating orthopaedic surgeon



Audit

In 1990, 207/420 (49%) deaths were considered at audit meetings; in the present sample the figure was 206/341 (60%).

Key Point

- *Major head and neck surgery continues to be performed on elderly patients with coexisting medical problems, in hospitals without on-site HDU or ICU facilities.*

There were 22 cases in this sample. There were seven patients under the age of 60 years, and there were equal numbers of male and female patients. Ten patients were admitted electively and nine as emergencies. There was no significant difference between this sample and the 1990 sample[4].

Table 3.66: Otorhinolaryngology procedures
(22 cases; procedures may be multiple)

Procedure	Number
Tracheostomy	7
EUA/endoscopy	5
Biopsy	3
Neck dissection and excision of malignant tumour	3
Partial glossectomy	1
Thyroplasty	1
Incision & drainage pharyngeal abscess	1
Debulking nasal tumour	1
Ivor Lewis oesophagectomy	1
Insertion of grommet	1
Insertion of nasogastric tube	1
Other	2

Shared care

In 8/22 cases care was undertaken on a shared care basis.

One patient was managed in a hospital without on-site ICU/HDU facilities.

CASE 30• *A 99-year-old ASA 3 patient underwent a partial glossectomy for a T2 carcinoma. Despite the patient having evidence of a preoperative chest infection, no chest radiograph was performed, and the operation was carried out by an SpR 2 in a hospital without on-site HDU or ICU facilities; these were available at another hospital within the Trust, but several miles distant. Was this appropriate?*

Seniority of surgeon consulted

In 17/22 (77%) cases a consultant was involved in care.

Coexisting medical disorders

Respiratory problems pre-existed in 11/22 (50%) patients and cardiac problems were present in 6/22. Death was not expected in 11/22 (50%). A total of nine patients were graded ASA 4 and the remainder were ASA 2 or 3.

Therapeutic manoeuvres

All but six cases were managed in units with a DVT prophylaxis protocol. Ten patients (45%) received DVT prophylaxis.

Delays

There were no cases in which non-medical delay occurred in this specialty.

Classification and day of operation

There was only one emergency operation and this was performed on a Sunday. The majority of operations were classified as urgent or scheduled (19/22, 86%) and these were all performed on weekdays.

Seniority of operating surgeon

Consultants performed 13/22 (59%) of the procedures. Specialist registrars performed 7/22 (32%); only one case was performed by a premier SHO and one by a staff grade. Again, allowing for the different grading system in 1990, there would appear to be no significant change since 1990. Unlike some other specialties, the staff grade surgeon does not seem to have replaced SpRs operating on urgent or emergency cases.

Audit

Fifty-five percent (12/22) of cases were considered at audit meetings, showing an improvement since 1990 when 36% of cases were considered at audit.

Key Points

- *Surgeons with appropriate training and experience treated the majority of children.*
- *Temperature maintenance is important in children.*
- *In the presence of multiple trauma, the management and timing of surgery require discussion and collaboration.*

There were 18 patients in the sample who were under 16 years of age when they died.

Children of ten years and under were excluded from the 1990 sample so comparisons are not possible. There were nine cardiothoracic procedures; the remaining deaths were principally due to necrotising enterocolitis (which was discussed in a previous report[2]) and tumours. Most deaths occurred in sick children and were inevitable. The advisors did identify two cases that raised issues.

CASE 31• *A two-month-old baby had a paralysed hemidiaphragm following a switch procedure. The child was referred from a university/teaching hospital to a specialty hospital as a semi-urgent case for diaphragmatic repair. The operation was to be performed by a consultant surgeon and a consultant administered the anaesthetic. At the time of anaesthetic induction the infant's temperature was 32°C. The child collapsed and died during induction of anaesthesia.*

The low temperature may have contributed to the collapse. It is important to ensure that a baby's temperature is maintained.

CASE 32• *An 11-year-old child was injured in an accident; she suffered a severe head injury, knee injuries and a fractured femur. She was managed in a DGH under the joint care of a neurosurgeon and an orthopaedic surgeon (locum). Due to an altering level of consciousness she was admitted to an ICU and the lungs were ventilated. Two days after admission, surgery was undertaken to treat the limb injuries. During surgery there were haemodynamic changes; she developed raised intracranial pressure, coning and died.*

The advisors made several comments. Despite the apparent shared care there was no evidence of a CT scan prior to the surgery. There was also no evidence of intracranial pressure monitoring during surgery. The question was raised as to whether the orthopaedic surgery was premature given the neurological problems. The locum orthopaedic surgeon had received an unorthodox training and may not have been appropriately trained in the management of children.

The recently published report on children's surgery[53] emphasises the need for surgeons and anaesthetists who regularly treat children to be specifically trained and updated in the paediatric aspects of the chosen specialty.

Plastic surgery

Key Points

- *Major surgery is being undertaken on elderly patients with significant coexisting medical problems, in hospitals without HDU or ICU facilities.*
- *Delay is occurring due to an inadequate number of ICU beds available for the postoperative management of complex scheduled surgery.*

Table 3.67: Plastic surgery procedures

Procedure	Number
Debulking neck metastasis	1
Evacuation of haematoma right lower leg, debridement and split skin graft	1
Change of burn dressing	1
Debridement lacerations to face & suture. Debridement and skin graft left arm and left leg	1
Excision squamous cell carcinoma left leg and split skin graft	1
Repair laceration to left ear	1
Revision reconstruction of pharyngolaryngectomy with right free radial forearm flap	1
Excision burns left upper arms/shoulders & skin grafting. Excision burns scalp & skin grafting	1
Shave excision of lesion on back	1
Excision biopsy of two skin nodules	1
Extensive burns	1
Incision of infected areas left thigh	1
Wound debridement	1
Second pectoralis major flap repair to cervical fistula	1
Full thickness abdominal wall resection, Marlex mesh, omental flap and skin graft	1

Fifteen cases were studied in this specialty. A wide range of procedures was undertaken. There was no significant change in the age and sex distribution compared with 1990[4].

Admission category

The majority of admissions in this specialty were emergency or urgent (10/15, 67%).

Shared care

Within this specialty, 8/15 (53%) cases were managed on a shared care basis. This is perhaps not surprising given the nature of the specialty. However, care was usually shared between different surgical groups. In all 15 cases there was significant comorbidity, but in only five cases were physicians involved. In five cases patients were managed in hospitals without an HDU and in three cases in hospitals without access to either HDU or ICU facilities.

Case 33• *An 88-year-old patient, graded ASA 2, underwent debulking of a metastatic tumour in the neck. The procedure was undertaken in a hospital without ICU or HDU facilities. Was this appropriate?*

Case 34• *A 76-year-old ASA 4 patient with COPD and hypertension underwent revision with a free radial forearm flap, following four previous failed attempts to reconstruct following pharyngolaryngectomy. The patient was poorly nourished and had had a carotid blow-out. The operation was cancelled due to unavailability of ICU beds, and several days' delay occurred. The patient subsequently died on the ICU of pseudomonas pneumonia.*

Seniority of surgeon consulted

Consultant involvement remains high in this specialty with 13/15 (87%) cases where consultants were involved prior to operation.

Coexisting medical disorders

All 15 patients had significant coexisting medical problems. Ten (67%) of these patients had pre-existing respiratory and/or cardiac problems. Psychiatric illness was present in 5/15 (33%).

ASA status

Sixty percent (9/15) of cases were graded ASA 3 or 4, and in seven cases there was deemed to be a definite risk of death. In only one ASA 1 patient was death not expected.

Therapeutic manoeuvres

Eighty percent (12/15) of patients were classified as at high or medium thromboembolic risk. Four of these patients may not have received prophylaxis.

Delays

Only one case was reported as being delayed for non-medical reasons.

Seniority of operating surgeon

Almost half (7/15) of these procedures were undertaken by consultants. Three procedures were undertaken by SHOs.

Audit

Ten cases (67%) were considered at an audit meeting, which appears to be an improvement on the 50% reported in 1990.

Urology

Key Points

- *Consultants continue to perform the majority of operations in this specialty, although there has been an increase in the number of procedures performed by NCCGs compared with 1990.*
- *All NCCGs operating in this sample had a relevant postgraduate qualification.*
- *A small number of elderly patients underwent operations where the benefits of surgery are unclear.*

The majority of patients (89% in 1998/99 and 93% in 1990) were aged 60-99 years. Sex ratios varied slightly being male: female 4.5:1 in 1990 and 1.9:1 in this sample. There was no significant difference in admission category.

In 1990, one of the main concerns for advisors was the number of urological procedures being undertaken by non-urologists. In 1990[4], of 161 procedures, 22 were undertaken by surgeons with no stated interest in urology; 91 (57%) procedures were undertaken by trained urologists. In the present sample, all but 8/73 (11%) cases were undertaken by urologists. With three exceptions, all of the non-urologists in the present sample professed a special interest in urology. In contrast to the experience in 1990, there was no evidence from this sample that non-urologists were submitting patients to unnecessary open urological procedures.

Table 3.68: Urology procedures
(73 cases; procedures may be multiple)

Procedure	Number
Cystoscopy	24
TURBT	17
TURP	11
Laparotomy	7
Nephrectomy	6
Cystectomy	5
Bladder washout/clot evacuation	4
Other	14

Shared care

The response to this question was not reported in 1990; despite the elderly population of patients in this year's sample, only 20/73 (27%) cases were managed on a formal shared care basis.

Seniority of surgeon consulted

In only 3/73 cases (4%) was a consultant not involved in the decision to operate. Consultant urologists have consistently been involved in the care of the majority of patients.

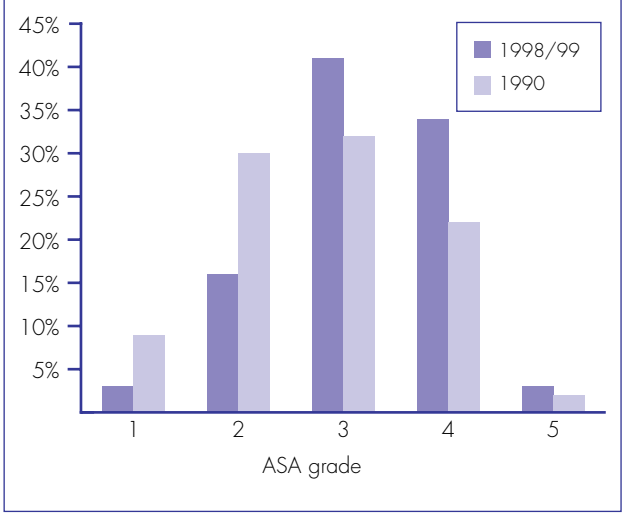
Coexisting medical disorders

In this sample 19/73 (26%) patients had pre-existing respiratory problems, 29/73 (40%) had cardiac problems and 21/73 (29%) had renal problems. These rates are very similar to those found in the 1990 study.

ASA status

The majority of patients 55/73 (75%) were graded ASA 3 or 4. Death was regarded as a small significant or definite risk in 46/73 (63%) cases, compared with 66% in the 1990 sample.

Figure 3.17: ASA grade of urology patients



Therapeutic manoeuvres

The overall rate of DVT prophylaxis in this group was 58/73 (79%) compared with 21% in the 1990 sample.

Classification of operation

The majority of procedures in this specialty were classified as scheduled or elective (52/73, 71%). Only one emergency and one urgent operation were undertaken during weekends.

Delays

Non-medical delay was only identified in four cases (5%). In no case was a lack of theatre time cited as the reason for delay. In one case there was no ICU bed available, and in another there was a staff shortage on the urology ward.

Seniority of operating surgeon

In this sample, 51/73 (70%) procedures were performed by consultants, compared to 80% in 1990. The reduction of 10% is largely accounted for by the increasing number of procedures undertaken by NCCGs. In 1990 only 3/161 (2%) cases were performed by NCCGs, whilst in this sample 6/73 (8%) were performed by NCCGs. In contrast to some other specialties, all of these NCCGs were in possession of a higher postgraduate diploma.

Of the 22 cases where a consultant was not operating, in only seven cases was the consultant not immediately available. Consultant supervision in this specialty remains high.

Decision making

In a number of cases, advisors questioned the benefits of surgery.

CASE 35• *A 77-year-old ASA 4 patient with bilateral malignant ureteric obstruction, severe congestive cardiac failure and Alzheimer's underwent bilateral ureteric reimplantation, and died on the day of surgery. Would more conservative methods of palliation have been more appropriate?*

CASE 36• *A 74-year-old arteriopath had a TURP performed by an SpR 2. The procedure took 2 hours 30 minutes and blood loss was significant. The patient was returned to the ward after only 30 minutes in recovery and died the next day of a myocardial infarction.*

CASE 37• *A 78-year-old ASA 4 patient underwent laparotomy and biopsy for an inoperable malignancy, but it was unclear as to why the diagnosis could not have been achieved with ultrasound or CT guided biopsy. The patient died in renal failure two days following surgery.*

Audit

In this sample 54/73 (74%) cases were considered at an audit meeting; an increase compared with the 57% reviewed in the 1990 sample.

VASCULAR SURGERY

Key Points

- *There is more specialisation compared to 1990 but inappropriate operations are still occurring.*
- *The percentage of emergency aneurysm surgery done by surgeons without a vascular interest is higher than seen in 1990.*
- *No patient should have an amputation without the benefit of a vascular surgical opinion.*
- *There is concern over delay in referral from physicians and lack of medical involvement in surgical audit.*

There were 206 questionnaires relating to deaths after vascular surgery. The final procedures related to deaths in vascular surgery are listed in Table 3.69. The most common procedures leading to death were surgery for ruptured abdominal aortic aneurysm and above knee amputation. This situation has not changed since 1990[4]. It must be recognised that the majority of these patients are elderly and have extensive comorbidity that prejudices the outcome. In this sample 80% (165/206) of patients were aged between 70-100 years compared with 65% (291/449) in the 1990 group. There was a preponderance of males in both samples.

The majority of deaths (84%) were reported by general surgeons who expressed an interest in vascular surgery or by vascular surgeons. In the 1990 data this figure was 66%. Thus it is clear that specialisation continues. Nevertheless, it is necessary to maintain a degree of generalism in order to provide an emergency on-call rota for 'general surgery'. For how much longer can this be sustained; has the time arrived for specialist rotas?

Table 3.70: Specialty of surgeon in charge at time of final operation
(206 cases; answers may be multiple)

Specialty	Number
Vascular	89
General	14
General with a special interest in:	
Vascular	84
Breast	11
Endocrine	4
Colorectal	3
Coloproctology	2
Gastroenterology	2
GI	2
Upper GI	2
Oncology	2
Urology	1
Transplantation	2

Table 3.69: Procedures in vascular surgery

(206 cases; procedures may be multiple. Some procedures were done by vascular surgeons when complications arose)

Procedure	Number
Abdominal aortic aneurysm surgery (including iliac and thoracic aneurysms presenting to vascular or general surgeons):	
Leaking (ruptured) aortic aneurysm	60
Urgent/elective surgery for non-leaking abdominal aortic aneurysm	12
Excision of aortic graft/abandoned repair and axillobifemoral bypass	3
Re-exploration for bleeding following abdominal aortic aneurysm repair	3
Leaking thoracoabdominal aneurysm	2
Ligation of abdominal aorta	1
Endoluminal stent graft	1
Leaking iliac aneurysm	1
Aortoiliac surgery for occlusive disease:	
Elective aortic bypass surgery	3
Iliodistal bypass	3
Femorofemoral crossover graft	2
Axillobifemoral bypass	2
Iliofemoral bypass	1
Peripheral vascular surgery:	
Femoral thromboembolectomy	19
Femorodistal bypass	8
Brachial embolectomy	7
Femoral endarterectomy and profundoplasty	3
Femoropopliteal bypass	3
Bypass of popliteal aneurysm	2
Repair femoral aneurysm	1
Removal of infected prosthesis and extra-anatomical reconstruction	1
Amputation surgery:	
Unilateral above knee amputation	28
Unilateral below knee amputation	16
Unilateral Gritti-Stokes amputation	3
Debridement ulcerated foot	3
Amputation of toes	2
Debridement amputation stump	2
Bilateral below knee amputation	1
Through knee amputation	1
Bilateral Gritti-Stokes amputation	1
Bilateral above knee amputation	1
Miscellaneous:	
Fasciotomy	2
Carotid endarterectomy	1
On-table iliac angioplasty	1
Debridement of leg ulcers	1
Thrombectomy of AV fistula	1
Drainage of perigraft infection	1
Insertion of Hickman line	1
Insertion of haemofiltration line	1
Repair aortic trauma	1
PEG	1
Bilateral inguinal hernia repair (at time of repair of aortic aneurysm)	1
Splenectomy	1
Subtotal colectomy and ileostomy	1
Laparotomy and removal of packs	1
Debridement of pressure sore	1

Inappropriate specialty

All the cases where the specialty of the surgeon was felt to be inappropriate involved the care of patients with abdominal aortic aneurysms that presented acutely.

There were 4/60 (7%) cases, where an abdominal aortic aneurysm presented acutely, in which the advisors felt that a surgeon with a vascular interest might have obtained a better outcome. Instead, a general surgeon without a vascular interest was called upon to operate in these acute situations. This compares with 4% (8/224) of cases in 1990 where the specialty was considered inappropriate. In all four of these latest cases the repair of the aneurysm was accompanied by technical difficulties due to:

- Perirenal aneurysm
- Inflammatory aneurysm
- Coincidental peripheral occlusive disease

Such cases can be technically demanding to the most experienced vascular surgeons; we need to work towards a situation where a specialist vascular surgical rota ensures the availability of a vascular surgeon for every patient 24 hours a day.

Where deaths followed technical problems with perirenal aneurysms, it was apparent that the surgery was poorly managed by non-vascular surgeons. Such cases emphasise the need for dedicated vascular specialists. If this is impractical, then general surgeons who may find themselves operating on leaking abdominal aortic aneurysms should take the time to learn the surgical techniques appropriate for difficult perirenal aneurysms.

Inflammatory aneurysms can be difficult to identify preoperatively. One death was identified where a consultant general surgeon with a vascular interest, who had been in post for less than two years, ran into difficulties with an inflammatory suprarenal aneurysm. This case highlights the need for a spirit of teamwork and collaboration on vascular units so that junior consultants can be assisted and advised by more senior colleagues when appropriate. A more experienced surgeon might, for instance, have given the simple advice to abandon the surgery and refer the patient to a centre with the appropriate expertise when unexpected problems were encountered during surgery.

Coagulopathy

Even when the difficult technical challenges of aneurysm surgery are overcome, severe diffuse bleeding can cause additional blood loss. Appropriate correction of any coagulopathy must be made. Platelets are rarely provided for this type of surgery but are essential to correct bleeding related to thrombocytopaenia. The anaesthetist monitoring the coagulation status should request platelets when needed and the pathological services should provide them.

Technical errors

There were cases where the technical procedures were questionable. Two examples included a long composite iliotibial graft, crossing two joints, and a femoral embolectomy done in a bed on a stroke unit. The advisors considered that the complex graft was unlikely to succeed and an ilioprofunda bypass alone would have been adequate. Failure to improve after this simpler graft would have led to an amputation, as did the more complex procedure. The embolectomy was done under local anaesthetic, in a ward, by a trainee surgeon. The advisors felt that this was inappropriate.

Amputations

No patient should undergo amputation without the benefit of a vascular surgical opinion. There were several cases of precipitate decisions, lack of consultation and investigation. Not only were no vascular opinions sought but also, in some cases, no prophylaxis against thromboembolus was given. There was then considerable complacency about the cause of death (often given as myocardial infarction, without a postmortem examination). Death could well have been due to a pulmonary embolus.

Inappropriate operations

Many operations were thought to be inappropriate. Common reasons were advanced malignancy with a terminal vascular event, patients with advanced arterial disease and numerous comorbidities and prolonged heroic (or simply slow and inexperienced) reconstructive surgery.

Admission category

In 1990, 62% of the admissions were emergencies. This figure was similar in 1998/99, being 65% (133/206). It appears that the unplanned workload in vascular surgery remains fairly steady and does not reflect the increasing workload seen in some specialties.

Delays

Surgeons reported delays due to non-clinical factors in 13 instances (13/206, 6%). The most common cause was delay in referral, by physicians, of elderly patients with ischaemic limbs. Other reasons were delay in transfer between hospitals and lack of an ICU bed. Advisors believed that some of the delays by physicians were crucial in affecting the outcome. By the time the patient was received by the vascular surgeons, surgery may have been inappropriate. Do physicians audit such cases or is the death attributed to surgery?

Grade of most senior surgeon consulted

In 95% (196/206) of cases either a consultant or an SpR with a CCST was consulted about the management of these patients.

Fitness for surgery

Cardiorespiratory disease and diabetes mellitus were the most common comorbidities present.

ASA status

There were no ASA 1 deaths where death was not expected, i.e. there were no surprises (Table 3.71). There was a good correlation between the ASA status and the surgeon's perception of risk.

Unfit for surgery

Patients may be denied elective surgery because they are unfit. When an emergency arises there is often a lack of communication and patients receive inappropriate surgery with no realistic hope of a successful outcome. This situation particularly applies to the surgery of ruptured abdominal aortic aneurysm. Whilst a lack of communication is often to blame, the surgeon sometimes feels under pressure to reverse his original decision when faced with an emergency presentation. Relatives may also pressurise the surgical team despite explanations that surgery is inappropriate. These pressures are often difficult to resist but it is the job of surgeons to help relatives understand the decisions made and the evidence upon which they are made.

There needs to be a means of recording the decision not to offer elective surgery to a patient for an aneurysm. A simple method is to lodge a copy of the letter recording this decision in the Accident & Emergency department (or other receiving area). When any patient with a ruptured aneurysm is admitted, the file could be checked for decisions concerning fitness for surgery. Another approach is to ensure that the patient's family are aware of the decisions about surgery.

Table 3.71: ASA status by anticipated risk of death

Risk of death	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Not answered	Not known	Total
Not expected	0	1	10	2	0	0	0	13
Small significant risk	0	7	19	9	0	1	0	36
Definite risk	1	9	55	54	16	1	0	136
Expected	0	1	2	7	9	0	1	20
Not answered	0	0	0	1	0	0	0	1
Total	**1**	**18**	**86**	**73**	**25**	**2**	**1**	**206**

Grade of surgeon

Table 3.72: Grade of the most senior operating surgeon
(Figures for locums given in brackets)

Grade	1998/99		1990	
Consultant	119 (1)	58%	254	57%
Associate specialist	4	2%	5	1%
Staff grade	9	4%	0	-
SpR with CCST/SR	6	3%	74 (4)	16%
Registrar (all levels below SpR with CCST/SR)	60 (5)	29%	98 (11)	22%
SHO (all levels)	7	3%	18 (1)	4%
Not answered	1 (1)	<1%	0	-
Total	**206**		**449**	

The demise of the experienced senior registrar has meant that more patients are operated on by registrars with a much-reduced experience and, probably, a lesser knowledge base.

Table 3.73: Grade of most senior operating surgeon by classification of operation

Grade	Emergency		Urgent		Scheduled		Elective	
	1998/99	1990	1998/99	1990	1998/99	1990	1998/99	1990
Consultant	80%	70%	24%	37%	62%	56%	86%	73%
Associate specialist	3%	1%	3%	-	-	2%	-	4%
Staff grade	1%	-	10%	-	3%	-	-	-
SpR with CCST/SR	3%	19%	2%	19%	5%	11%	-	15%
Registrar (all levels below SpR with CCST/SR)	13%	10%	55%	35%	24%	28%	14%	4%
SHO (all levels)	-	<1%	5%	9%	6%	4%	-	4%

Whereas, in the past, senior registrars performed a fair amount of emergency surgery this is not the case for SpRs with a CCST. These surgeons will soon be consultants; have they been exposed to a sufficient number of emergencies to enable them to practise unsupervised?

Postoperative complications

Cardiac, respiratory and renal complications remain the most common postoperative problems.

Audit

An audit rate of 80% (164/206) for these patients is above the aggregated figure of 75% for the whole sample. No figure was recorded in the 1990 data and so a direct comparison is not possible.

Compilers' note

There are no case reports in this section. This is at the request of the advisors nominated by the Vascular Surgical Society

4 Pathology

Compiled by: C Corbishley

4. Pathology

Key Points

- *The postmortem rate has dropped from 41% in 1990 to 30% in 1998/99 with a disproportionate decrease in the percentage of hospital (consent) postmortems from 22% to 14%.*
- *Since 1990 there has been a great improvement in the content of postmortem reports, notably the marked increase in the number of reports that include a clinical history, summary of findings and a clinicopathological correlation. The Royal College of Pathologists' guidelines may now need expansion and updating into a minimum data set format, with inclusion of guidance on ONS (formerly OPCS) formatting for cause of death.*
- *The Office of National Statistics' guidelines should be extended and modified to include more information about acceptable causes and modes of death, with perhaps the adoption of a restricted list of acceptable conditions similar to national clinical disease coding lists.*
- *The proportion of limited postmortems may increase following recent recommendations on retention of organs and tissues after postmortem and the introduction of new postmortem consent forms.*
- *A similar proportion of clinicians are recording that they receive a copy of the postmortem report as in 1990, although fewer postmortems are attended by clinicians. Systems need to be established to ensure that clinicians always receive timely copies of both coroners' and hospital postmortem reports.*
- *The patient's medical records should always be available to the pathologist at the time of postmortem.*
- *Weight and height should always be recorded as part of the external appearances and taken into consideration in assessing relative size of internal organs.*

Postmortem rate

Of the 1518 surgical questionnaires received, 448 (30%) recorded that a postmortem had been performed, 62 of which were hospital (consent) postmortems. Two hundred and seventy-one reports were available to the pathology subgroup for scrutiny, representing 60% of those cases where it was recorded that a postmortem had been performed. Nine hundred and twenty cases were recorded as having been reported to the coroner and in 386 of these a coroner's postmortem was performed; in 111 of the questionnaires it was not known or the question was not answered.

In 1990[4], 1058 of the 2558 questionnaires reported that a postmortem had taken place, indicating a 41% postmortem rate; 827 of these were for the coroner and 231 were hospital postmortems. There was a higher postmortem rate in 1990 than 1998/99 and a higher proportion of these (22%) were hospital postmortems. One hundred and eighteen hospital and 486 coroners' reports were scrutinised, representing 57% of the cases which had postmortems, which is comparable to the current sample. Two percent of the 1990 reports were handwritten, in contrast to none in 1998/99.

In all, reports from 249 coroners' postmortems and 22 hospital cases were studied from the 1998/99 sample. Two hundred and fifty-six cases (94%) had a full postmortem, but in 15 cases the postmortem was limited, with the most frequent exclusion being the central nervous system. The number of limited postmortems is thought likely to increase following the publication of guidelines on organ and tissue retention[54] and the proposed new postmortem consent form[55]. Recognition that the autopsy is important in audit[56] and governance has not increased the postmortem rate in the last ten years and it is likely that it will continue to decrease, particularly for those procedures requiring consent from next of kin.

The postmortem examination report

Clinical history

A clinical history was provided in 88% of coroners' postmortems and 100% of the hospital cases. In 94% of cases the history was satisfactory or better. It is recognised that some coroners do not wish such histories included with their reports and in some cases only a brief history appears to have been available, suggesting that the notes were not scrutinised at the time of the postmortem. In contrast, only 76% of coroners' postmortems and 82% of hospital cases provided a clinical history in 1990.

Description of external appearances

Most reports had an adequate description of the external appearances with 27 (10%) falling below an acceptable standard, which is similar to the figure of 12% in 1990. Scars and incisions were measured in 159 (59%) cases, which is an improvement on the 51% recorded in 1990. The height was recorded in 150 (55%) cases, but the weight was only recorded in 121 (45%). In assessing the relative weight of body organs these parameters are useful, particularly the body weight in relation to the heart weight[57] and it was a concern that this was recorded in less than half the cases scrutinised.

Gross description of internal organs

The majority of descriptions of the internal organs were deemed satisfactory or better (89%). In 29 cases (11%) the gross description of the internal organs was thought to be poor or inadequate, or inappropriate to the clinical problem. In nine cases (3%) no organs at all were weighed, contrasting with the 26% of cases in 1990 where no weights were recorded.

Table 4.1: Number of organs weighed
(271 cases; answers may be multiple)

Organ	Number
None	9
Brain	234
Lungs	246
Heart	255
Liver	238
Spleen	233
Kidneys	231
Other	7

Description of the operation site

In 38/271 (14%) cases the operation site was not described. In the 1999 NCEPOD report, 'Extremes of Age'[2], 27% of the operation sites in elderly patients were not described. The majority of procedures in that report were orthopaedic and it was noted that these sites were less likely to be fully examined and described than sites of internal operations. This data was not specifically recorded in 1990.

Postmortem histology

Seventy cases (26%) had postmortem histology performed (59 (24%) of the coroners' cases and eleven (50%) of the hospital cases), a marked increase on the 15% noted in 1990. In 53 of the 70 cases a histology report was included with the postmortem report. All but two of these 53 reports were graded satisfactory or better. In the majority of the other cases histology would have added little or nothing to the value of the postmortem and in only 36 cases was the absence of a histology report thought to detract from the value of the postmortem report. It was recognised that histology may have been undertaken on some of these cases but it was either not recorded in the anatomical report, or an additional report may have been issued at a later date that was not available for scrutiny.

Summary of lesions, clinicopathological correlation and ONS cause of death

Table 4.2: Cases where ONS/OPCS cause of death given

ONS/OPCS cause of death	1998/99		1997/98	1996/97	1994/95	1993/94*	1992/93
Yes	258	95%	94%	94%	96%	91%	82%
No	13	5%	6%	6%	4%	9%	18%

* *The 1993/94 report did not specifically mention an OPCS cause of death but asked "Is a certified cause of death present?" No question about recorded or certified cause of death was asked in 1990.*

A summary of the lesions was present in 205 (76%) cases, whereas in 1990 it was only present in 37%. Usually this was in the form of a list, but in many cases it was not in order of importance to the clinical condition. A clinicopathological correlation was present in 150 (55%) cases; in 1990 this was only 39%. Nine percent of these were felt to be poor or inadequate. The majority of the reports (95%) included an ONS (previously OPCS) cause of death but in 9% of cases this did not correspond to the text report and in 5% it did not follow ONS formatting rules. The lack of a list of lesions was not thought by the advisors to be so detrimental to the quality of the report as the lack of a clinicopathological correlation or a well formulated ONS cause of death. Guidance on the formatting of ONS causes of death may be found in the front of death certificate books[58] and a training video and information pack 'Death Counts'[59] is also available. However, there are no lists of recommended terms issued by the ONS similar to those used for clinical and disease coding so many terms and synonyms are used.

It was not known whether the full medical records were available to the pathologist at the time of postmortem but is was thought by the advisors that this might improve the clinicopathological correlation, particularly in the more complex cases.

In only 101/271 (37%) cases was the operation mentioned in the ONS cause of death (Table 4.3). Even when death occurred within the first week following operation, only 71 (38%) pathologists mentioned the operative procedure in the cause of death. This is a lower percentage than seen in the 1999 report, when 46% of reports noted the operation in the cause of death. There are no specific ONS guidelines on this matter, but the advisors considered that the operation was a contributory factor in the causation of death in a majority of cases and should at least be specifically recorded within part 2 of the ONS cause of death. Terminology such as 'fractured neck of left femur (operated upon)' or 'adenocarcinoma of the caecum (resected)' could be used.

Table 4.3: Record of operation in ONS cause of death

Day of death	Number of cases	Operation in ONS cause of death	
Day of operation	44	17	39%
Day 1-7	143	54	38%
Day 8-30	84	30	36%
Total	**271**	**101**	**37%**

Overall score for postmortem examinations

Table 4.4: Quality of postmortem examinations

Quality of postmortem	1998/99		1990
Unacceptable, laying the pathologist open to serious professional criticism	9	3%	5%
Poor	54	20%	19%
Satisfactory	117	43%	56% *
Good	80	30%	
Excellent, (meeting all standards set by RCPath 1993 guidelines)	11	4%	20%
Total	271		

** the 1990 report had a grouping of 'adequate/satisfactory'. 'Good' was not a grouping.*

Only nine (3%) of the 1998/99 reports were thought to be of a very low standard, often because of their brevity and lack of correlation with the clinical history (Table 4.4). Fifty-four (20%) of the cases had a poor report. Two hundred and eight (77%) were graded satisfactory or better. These figures are remarkably comparable to the 1990 data, although the number of reports graded excellent, 20% in 1990 and only 4% in 1998/99, probably indicates the application by the advisors of the 1993 RCPath guidelines[60] to the current sample of reports, which were not available nine years ago.

The detection of unexpected findings at postmortem reiterates the findings of previous years with 45 cases (17%) where a major discrepancy between clinical diagnosis and postmortem examination was found and a further 17 cases (6%) where a minor discrepancy or interesting incidental finding was found (Table 4.5). In 27 (10%) cases there was a failure to explain some important aspect of the case, although in nine of these the autopsy was felt to have been conducted satisfactorily.

Table 4.5: History, antemortem clinical diagnosis and cause of death compared with postmortem findings
(271 cases; answers may be multiple)

Postmortem findings	Coroner's	Hospital	Total
A discrepancy in the cause of death or in a major diagnosis which, if known, might have affected treatment, outcome or prognosis	12	3	15
A discrepancy in the cause of death or in a major diagnosis which, if known, would probably not have affected treatment, outcome or prognosis	30	0	30
A minor discrepancy	2	0	2
Confirmation of essential clinical findings	203	18	221
An interesting incidental finding	14	1	15
A failure to explain some important aspect of the clinical problem, as a result of a satisfactory autopsy	9	0	9
A failure to explain some important aspect of the clinical problem, as a result of an unsatisfactory autopsy	16	2	18

Attendance of the surgical team at the postmortem

An analysis of all 448 questionnaires indicating that a postmortem had taken place showed that only 127 (28%) surgical teams reported that they had been informed of the time and place of the postmortem compared to 355/1058 (34%) in 1990. Sixty-five of these clinicians (51%) indicated attendance of a member of the team at the postmortem compared to 72% in 1990. Lack of attendance, when stated, was mainly due to unavailability of the surgeon, other commitments or a feeling that nothing was to be gained from the postmortem as the diagnosis was already known.

Communication of the postmortem result to the surgical team

Table 4.6: Communication of postmortem results to the clinical team

Results to clinical team	1998/99		1990	
Postmortem copy received	338	75%	823	78%
Postmortem copy not received	90	20%	206	19%
Not answered	19	4%	29	3%
Not known	1	<1%	0	-
Total	**448**		**1058**	

Table 4.7: Time taken for first information to be received by clinical team

Days after patient's death	Coroner's	Hospital	Total
Less than 8 days	74	18	**92**
8 - 30 days	48	9	**57**
31 - 60 days	8	2	**10**
More than 60 days	30	4	**34**
Not answered	125	20	**145**
Total	**285**	**53**	**338**

In 90 cases (20%) the surgeon noted that no postmortem result was received by the clinical team (Table 4.6). The majority of those who answered the question indicated that the reports were received within one calendar month (Table 4.7). The pathological information was thought by the surgeons to confirm the clinical impression in 81% of cases and in 20% there were additional clinically unexpected findings noted as a result of the postmortem by the clinician. This is comparable to previous years including 1990.

Cause of death assigned by pathologist

Table 4.8: Cause of death assigned by pathologist

Cause of death	Number	
Cardiovascular disease	97	36%
Sepsis/DIC	35	13%
Pneumonia (excluding aspiration)	32	12%
Gastrointestinal disease	26	10%
Pulmonary embolism	17	6%
Malignant disease (as cause of death)	15	6%
Other primary lung disease	6	2%
Cerebrovascular disease	5	2%
Aspiration pneumonia	4	1%
Others including trauma	26	10%
Not stated	8	3%
Total	271	

The most common cause of death was cardiovascular disease (97/271, 36%) followed by infective pneumonias and sepsis (67/271, 25%), which together made up 61% of the causes of death. Pulmonary embolism was uncommon and caused only 17 deaths (6%), which is similar to the 5% of deaths from pulmonary embolism in the 1999 report on the elderly. This may well indicate the current success of preoperative prophylactic measures. In two of the cases where no cause of death was given the postmortem was limited.

Comment

The postmortem rate has dropped from 41% in 1990 to 30% in 1998/99 with a disproportionate decrease in the percentage of hospital (consent) postmortems from 22% to 14%. Since 1990 there has been a great improvement in the content of postmortem reports notably the marked increase in the number of reports that include a clinical history, summary of findings and a clinicopathological correlation. The Royal College of Pathologists' 1993 guidelines[60] are in general being followed, with most postmortem reports being of a good standard. A clinicopathological correlation, however, was not present in just under half of the cases studied. A minimum data set approach to postmortems may assist in improving reports.

ONS formatting rules for cause of death are not always followed and causes of death given in parts 1a, 1b and 1c are sometimes not appropriately related. The recent operation is frequently omitted from the ONS cause of death; it should be given as part of the cause of death in most cases, usually under 2 (contributory cause not directly causing death). An update of the Royal College of Pathologists' postmortem guidelines with specific attention to ONS rules[58] may help address this in the future.

Unlike clinical codes used in hospitals to classify patient episodes, there is no list of acceptable terms for causes of death and underlying conditions. Such a list would help standardise terms used on death certificates and may improve death certification. Such a list could be included in the ONS guidelines[58, 59] and may help with more accurate death statistics collection.

Too few postmortem examinations are attended by the surgical team, although the majority of clinicians are informed of the cause of death in a timely manner and most receive a copy of the report. A similar proportion of clinicians are recording that they receive a copy of the postmortem report as in 1990, although fewer postmortems are now attended by clinicians.

Pulmonary embolism appears to be an infrequent cause of death, with cardiovascular disease, sepsis and pneumonia being the most common causes of postoperative death assigned by pathologists.

Future surveys should closely monitor the postmortem rate and the use of limited postmortems following the recent guidelines on retention of tissues and organs and recommended new format for postmortem request forms issued by the Royal College of Pathologists[54, 55].

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