

### 3 THE ELDERLY

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#### RECOMMENDATIONS

- Fluid management in the elderly is often poor; it should be accorded the same status as drug prescription. Multidisciplinary reviews to develop good local working practices are required.
- A team of senior surgeons, anaesthetists and physicians needs to be closely involved in the care of elderly patients who have poor physical status and high operative risk.
- The experience of the surgeon and anaesthetist need to be matched to the physical status of the elderly patient, as well as to the technical demands of the procedure.
- If a decision is made to operate on an elderly patient then that must include a decision to provide appropriate postoperative care, which may include high dependency or intensive care support.
- 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.
- Elderly patients need their pain management to be provided by those with appropriate specialised experience in order that they receive safe and effective pain relief.
- Surgeons need to be more aware that, in the elderly, clinically unsuspected gastrointestinal complications are commonly found at postmortem to be the cause, or contribute to the cause, of death following surgery.



## 3. THE ELDERLY

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### INTRODUCTION

There are good reasons why the very elderly may die following surgery. The life expectancy of those aged 90 years and over in the UK in 1996 was 3.6 years for males and 4.5 years for females<sup>35</sup>, and thus for some death will occur coincidentally with surgery. With advancing age there is a functional deterioration of all body systems and this increases the risk of postoperative complications. Very elderly patients have a high incidence of coexisting diseases that will further increase their operative risk.

NCEPOD advisors and coordinators recognised that, within this group of those aged 90 years and over, many of the deaths following surgery were inevitable but were also conscious that many others of this age survive. In order to minimise mortality and morbidity, and to maximise survival with good quality of life, these patients require excellent care. This sample enabled NCEPOD to review the decision-making and care provided to this group of vulnerable patients.

The benefits of an operation need to be carefully weighed against the risks, and the decision to operate includes the commitment to provide appropriate supportive care. NCEPOD found that senior surgical staff involvement in decision-making was commendably high. The grade of operative surgeon and anaesthetist, however, was not well matched to the physical status of the patient. Aspects of postoperative care that should be addressed include the infrequent use of high dependency units and poor fluid management.

Elderly patients may not do well despite being provided with the best care. Nevertheless, all unfavourable outcomes should be reviewed in order that the lessons that they may provide can be learned.

# GENERAL ISSUES

## PATIENT PROFILE

### Key Point

- *Elderly patients have a high incidence of coexisting disorders and a high risk of early postoperative death.*

### Age

Table 3.1: Age of patient at time of final operation (SQ3)

Age (years)	Number
89*-94	827
95-99	224
100-106	26
<b>Total</b>	<b>1077</b>

\* Seven patients were aged 89 years at the time of operation, but at the time of death were aged 90 years and thus formed part of the sample.

### Procedures

Table 3.2 shows the ten most frequently performed operative procedures in this age group, using information from the 1077 surgical questionnaires returned.

Table 3.2: Most frequently performed operative procedures (procedures may be multiple in some cases)

Procedure	Number	
Hemiarthroplasty	258	24%
Sliding hip screw	243	23%
Laparotomy	141	13%
Amputation	48 (36 legs, 10 toes, 1 arm, 1 finger)	
Cystoscopy	30	
Embolectomy	27	
Femoral hernia repair	21	
Femoral nailing	21	
Gastrointestinal endoscopy	20	
Inguinal hernia repair	14	

Orthopaedic and general surgeons were the consultants in charge of 92% of the patients in this sample (Table 3.3).

Table 3.3: Specialty of consultant surgeon in charge at the time of final operation (SQ14)

Specialty	Number	
Orthopaedic	648	60%
General (including special interests)	346	32%
Urology	30	
Vascular	12	
Ophthalmology	11	
Otorhinolaryngology	9	
Plastic	9	
Cardiac/Thoracic/Cardiothoracic	4	
Accident & Emergency	2	
Gynaecology	2	
Neurosurgery	2	
Oral/Maxillofacial	1	
Other	1	
<b>Total</b>	<b>1077</b>	

### Preoperative status

Table 3.4: ASA status prior to final operation (AQ10 and SQ20)

	Anaesthetic questionnaire		Surgical questionnaire	
ASA 1	9	1%	8	1%
ASA 2	156	17%	197	18%
ASA 3	478	51%	534	50%
ASA 4	266	28%	299	28%
ASA 5	32	3%	22	2%
Not answered	3		17	
<b>Total</b>	<b>944</b>		<b>1077</b>	

Most patients were of a poor physical status, ASA 3 and greater. In this sample there was good agreement between the anaesthetists and surgeons on the ASA grading of patients.

Coexisting disorders	Number	
None	128	
Not answered	17	
Cardiac	609	57%
Respiratory	301	28%
Neurological	193	18%
Psychiatric	136	13%
Renal	126	12%
Musculoskeletal	121	11%
Gastrointestinal	105	
Malignancy	92	
Haematological	92	
Vascular	79	
Sepsis	58	
Diabetes mellitus	57	
Other endocrine	37	
Alcohol-related problems	5	
Other	1	

Surgeons indicated that 87% (932/1077) of patients had coexisting medical problems at the time of operation (Table 3.5).

The form of this question differed between the anaesthetic and surgical questionnaires making direct comparisons difficult. However, both specialties reported a very high incidence of coexisting medical problems. Anaesthetists reported coexisting medical diagnoses in 95% of patients.

Anaesthetists reported dementia in 27% of patients. Surgeons reported neurological disease in 18% and psychiatric disease in 13% of patients. In an elderly patient it is important to distinguish between a remediable confusional state secondary to a medical disorder (e.g. urinary tract infection, chest infection, abdominal sepsis, low cardiac output state, electrolyte disorder etc.) and true dementia.

Only 22% of these patients received shared care on a formal basis. This was surprisingly few in a population with such a high incidence of medical comorbidity. When necessary a medical/rehabilitation opinion should be sought from a physician with an interest in care of the elderly; in many cases this is appropriate preoperatively.

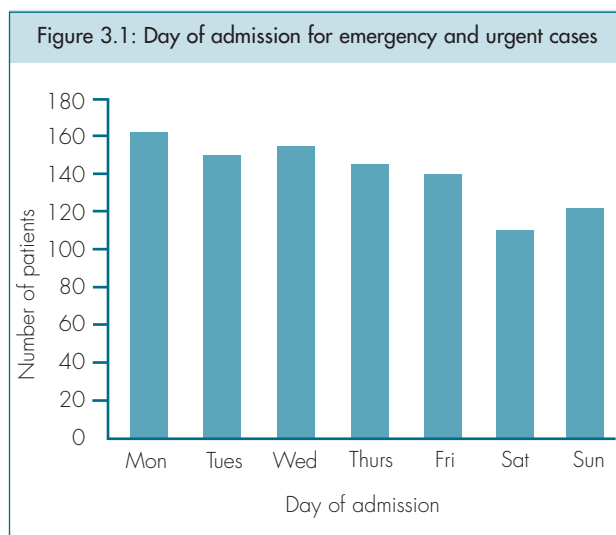
Fifty-four percent of patients were admitted via A&E and 27% following referral by their general practitioner (Table 3.6).

The majority of admissions were classified by surgeons as emergency, i.e. requiring immediate admission regardless of time. Figure 3.1 shows that the emergency and urgent admissions appeared to be

Admission category	Number	
Elective	79	
Urgent	74	
Emergency	919	85%
Not answered	4	
Not known	1	
<b>Total</b>	<b>1077</b>	

skewed towards weekdays and in particular to the beginning of the week.

Why was this? Is there a problem with provision of emergency medical care within the health care system? Are the patients themselves, or their carers, reluctant to seek medical advice at the weekend? The vulnerability of the elderly is such that a delay in emergency treatment may result in increased morbidity and mortality.



## TIME OF DEATH

Figure 3.2: Calendar days from operation to death

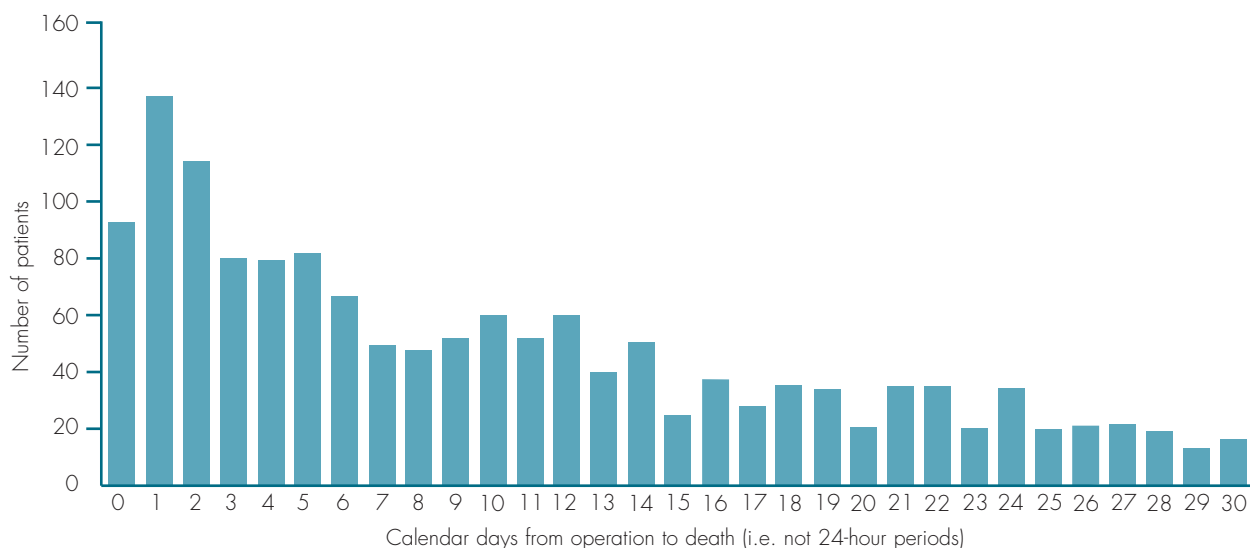


Figure 3.2 is based on the total number of deaths in this age group reported to NCEPOD and shows that one quarter (24%) of patients died on or before the second postoperative day.

## HOSPITALS, FACILITIES AND STAFFING

### Key Points

- Every acute surgical hospital should have a recovery area, staffed and equipped 24 hours a day, and a high dependency unit.
- A team of senior surgeons, anaesthetists and physicians needs to be closely involved in the care of elderly patients who have poor physical status and a high operative risk.
- There should be adequate daytime operating lists for urgent orthopaedic trauma and general surgical emergencies.

### Type of hospital

Table 3.7: Type of hospital in which the final operation took place (SQ1)

Type of hospital	Number
District general (or equivalent)	875
University/teaching	183
Single surgical specialty	1
Other acute/partly acute	1
Independent	4
Not answered	13
<b>Total</b>	<b>1077</b>

## Facilities

In both the anaesthetic and surgical questionnaires clinicians were asked about the specialist facilities within the hospital. Table 3.8 summarises responses given by anaesthetists.

### *Recovery facilities*

The surgical questionnaire asked whether recovery facilities were available and staffed 24 hours a day. Of those who responded, 18% (147/813) indicated that they were not.

The operations undertaken in hospitals with recovery facilities that were not available on a 24-hour basis are shown in Table 3.9, and some of these were emergencies.

### *Intensive care and high dependency units*

The percentages quoted in Table 3.8 for high dependency units (HDU) and intensive care units (ICU) are taken from the anaesthetic questionnaires. The surgical response indicated that an HDU existed in the hospital for 53% of cases and an ICU for 97% of patients. Table 3.10 shows the destination of patients on leaving the operating theatre.

The argument for a high dependency unit in all hospitals undertaking acute surgical services has been made by NCEPOD in previous reports<sup>5, 6, 7, 9</sup>. It applies equally forcibly to this very elderly population for the following reasons:

- If a decision is made to operate then that must include a decision to provide appropriate postoperative care that may include HDU/ICU

Table 3.8: Availability of facilities

Facilities available	1997/98	1995/96	1994/95
Recovery area or room equipped and staffed for this purpose (AQ2)	97%	97%	93%
High dependency unit (AQ2)	46%	41%	27%
Intensive care unit (AQ2)	96%	93%	82%
Scheduled emergency lists for urgent general surgical cases (AQ3)	77%		
Scheduled trauma lists for urgent orthopaedic trauma cases (AQ4)	93%		

Table 3.9: Operations in hospitals with recovery facilities not available on a 24-hour basis

Type of surgery	Number
Fractured hip	89
Other orthopaedic trauma	7
Elective orthopaedic surgery	4
Open abdominal surgery including obstruction, perforated viscus, cholecystectomy	17
Endoscopy	11
Other major surgery including leaking abdominal aneurysm, burr holes, above knee amputation, recurrent carcinoma of the breast, postoperative bleeding after rectal prolapse repair	9
Other minor surgery	10
<b>Total</b>	<b>147</b>

Table 3.10: Destination of patient on leaving the operating theatre/recovery room (AQs 58 and 62)

Destination	Number
Ward	787 83%
ICU	52 6%
HDU	34 4%
CCU	3
Died in theatre/recovery room	27
Other (including specialised nursing areas)	8
Not answered	33
<b>Total</b>	<b>944</b>

Table 3.11: Anaesthetic staffing for general surgical emergency and orthopaedic trauma lists (AQs 3 and 4)

Anaesthetic staffing	General surgical emergency lists	Orthopaedic trauma lists
Consultant/associate specialist	297	507
Trainee	282	148
Staff grade	28	77
Where answers multiple – some consultant sessions	79	103
Where answers multiple – no consultant sessions	34	36
Other/not answered	10	11
<b>Total</b>	<b>730</b>	<b>882</b>

support. It is accepted that operative findings, e.g. disseminated malignancy, may subsequently influence management.

- Approximately 90% of patients had at least one coexisting medical disorder.
- Eleven percent of patients had received attention to improve their cardiovascular system and 6% to improve their respiratory system preoperatively.
- Postoperative morbidity and mortality are associated with pre-existing disorders and at least 35% of patients had postoperative cardiac and/or ventilatory complications, many of which could be predicted preoperatively.
- Almost one quarter of the patients suffered complications early and died on or before the second postoperative day.

Many clinicians are of the opinion that an HDU can beneficially influence early postoperative patient management and the lack of an HDU results in a lower standard of care. We would suggest that for hospitals without an HDU discussions should take place between clinicians, managers and primary care groups. Why are managers and commissioners of healthcare slow to respond? (See also page 70).

### *General surgical emergency and orthopaedic trauma lists*

NCEPOD has not previously asked about general surgical emergency and orthopaedic trauma lists. From the questionnaires 77% of anaesthetists responded that their hospital provided general surgical emergency lists and 93% indicated that their hospital provided orthopaedic trauma lists (Table 3.8).

It is encouraging that most hospitals have made local arrangements to enable these urgent daytime lists to take place.

Table 3.11 shows the grade of anaesthetist who

covered the general surgical emergency and orthopaedic trauma lists most of the time.

Urgent and emergency surgical patients as a group have higher operative risk factors than elective ones. Ideally all daytime emergency lists should come with funding for senior anaesthetic and surgical cover. It appears that trainee or staff grade anaesthetists frequently run them, more often for the general surgical emergency than the orthopaedic trauma lists.

## Staffing

Table 3.12 shows that a consultant was the most senior surgeon and anaesthetist present in the operating room in 43% of cases. Importantly a consultant surgeon was involved in the decision-making process in 83% of cases.

Figure 3.3 illustrates that each grade of surgeon operates on a similar percentage of the good and poor ASA patient groups.

The association between the physical status of the patient and the grade of operative surgeon or anaesthetist is poor in this age group.

The care of a patient who is graded as having poor physical status and who requires major surgery should be closely supervised by senior medical staff.

## DELAYS BEFORE OPERATION

In a quarter (232/944) of cases the operation was delayed appropriately in order to improve the patient's condition before surgery (AQ20) (see also page 66).

On 175/944 (19%) occasions the operation was delayed for non-medical reasons (AQ21). Included in these were 76 cases (8% of the sample) in which the delay was caused by a lack of theatre time (Table 3.13).



Table 3.12: Grade of most senior surgeon and anaesthetist present in operating room (SQ30 and AQ30)

Grade	Surgeon		Anaesthetist	
Consultant	459	43%	405	43%
Associate specialist	65		52	
Staff grade	96		90	
Clinical assistant	14		7	
SpR – Accredited/CCST	38	} 37%	11	} 15%
SpR – 3, 4	171		70	
SpR – 1, 2	98		53	
Visiting SpR or year not stated	92		3	
SHO	41	4%	207	22%
Other	2		39	
Not answered	1		7	
<b>Total</b>	<b>1077</b>		<b>944</b>	

Figure 3.3: Seniority of surgeon by ASA group

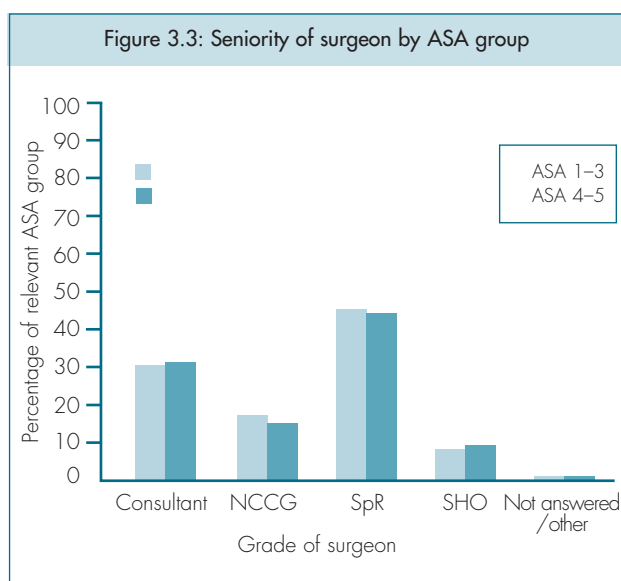
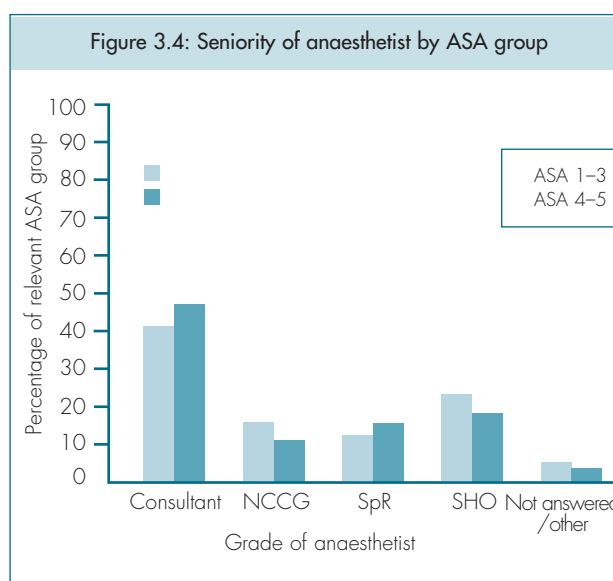


Figure 3.4: Seniority of anaesthetist by ASA group



The elderly do not tolerate repeated episodes of preoperative starvation, or prolonged pain, sepsis or immobility, and should be considered as having a high surgical priority. In this sample the number of operations that were delayed because of insufficient theatre time or ‘overbooked lists’ suggests that the surgical priority of the elderly is low. A fractured hip was cancelled one day because the trauma list was overbooked and cancelled the next after inadvertent feeding in the morning. A laparotomy for an iatrogenic perforated diverticulum that occurred during a barium enema was delayed for five hours for ‘patient assessment and correct priority of emergencies’. It was done in the evening by an anaesthetic SHO 1 and a surgical SpR 2.

Some of the non-medical reasons for surgical delay were appropriate, for example, referral to physicians, awaiting consultant operating lists or discussions with patients and relatives. Other reasons were less appropriate. In four cases surgery was delayed for

over 24 hours while waiting for the arrival of a relative to give consent. The patients concerned were blind (1) or demented (3). The Association of Anaesthetists’ guidance states that a relative cannot legally give consent for operation on an adult, even if the patient is incompetent<sup>36</sup>.

In addition there were organisational problems, including lack of surgical or anaesthetic personnel and poor patient preparation. One patient with a fractured hip had surgery delayed for 24 hours because no blood had been crossmatched.

Table 3.13: Operations delayed by lack of theatre time

Type of surgery	Number
Fractured neck of femur	59
Fractured shaft of femur	2
Screening of hip for suspected fracture, reduction dislocated shoulder and Denham pin	3
Bowel obstruction	5
Perforated abdominal viscus	4
Tibial split skin grafts to lacerations, thyroidectomy and above knee amputation	3
<b>Total</b>	<b>76</b>

## AUDIT

### Key Point

- All deaths should be reviewed at local audit meetings.

#### Question 3.1: Do you have morbidity/mortality review meetings in your anaesthetic department? (AQ79)

Yes .....	876
No .....	61
Not answered .....	7
<b>Total .....</b>	<b>944</b>

The Royal College of Anaesthetists and Association of Anaesthetists of Great Britain and Ireland recommend a monthly review of deaths<sup>37</sup>. Is it acceptable that some hospitals still have no anaesthetic review of morbidity and mortality?

#### Question 3.2: Has this death been considered (or will it be considered) at a local audit meeting? (SQ62 and AQ79a)

	Surgical	Anaesthetic
Yes .....	692	193
No .....	311	663
Not answered .....	71	16
Not known .....	3	4
<b>Total .....</b>	<b>1077</b>	<b>876</b>

This group of elderly patients has a homogeneous profile; they are urgent cases with a high incidence of comorbidity. The circumstances surrounding such deaths can be educational. They can be used to examine, for example, aspects of the organisation and provision of services for urgent and emergency surgical admissions, as well as the perioperative surgical and anaesthetic management of patients with coexisting medical disorders.

The failure of anaesthetic departments to review

deaths has been highlighted by NCEPOD previously<sup>38</sup>. The figure for departments of anaesthesia is again low, with 76% of cases not being considered at a local audit meeting. There was no surgical discussion of circumstances surrounding the death of 29% of patients in this sample.

A lack of review represents a missed learning opportunity, for both disciplines.

The surgical questionnaire asked if problems were encountered in supplying information to NCEPOD.

#### Question 3.3: Did you have any problems in obtaining the patient's notes (i.e. more than one week)? (SQ63)

Yes .....	104
No .....	895
Not answered .....	75
Not known .....	3
<b>Total .....</b>	<b>1077</b>

#### Question 3.4: Were all the notes available? (SQ64)

Yes .....	831
No .....	158
Not answered .....	88
<b>Total .....</b>	<b>1077</b>

If no, which part was inadequate/unavailable? (158 cases; answers may be multiple)

Preoperative notes .....	11
Operative notes .....	11
Postoperative notes .....	19
Death certificate book .....	99
Nursing notes .....	15

Anaesthetic notes .....	18
Postmortem report .....	62
Other notes .....	2
Not answered .....	1

The Audit Commission and NCEPOD have been reporting problems pertaining to the availability of clinical records for many years. It is hoped that the revised NCEPOD systems outlined on page 12 will result in greater assistance from medical record managers and that these problems will diminish.

**Question 3.5: Do you have anaesthetic departmental guidelines relating to the care of the elderly? (AQ78)**

Yes .....	51
No .....	849
Not answered .....	39
Not known .....	5
<b>Total .....</b>	<b>944</b>

The elderly are a group suitable for anaesthetic departmental guidelines. In those few departments (5%) that have them they are based on age, ASA group, coexisting medical conditions, type and urgency of surgery. They trigger discussion with, or referral to, an anaesthetist of specified seniority.

Guidelines need to be appropriately distributed. One anaesthetist commented that the locum junior

anaesthetist on duty that weekend did not follow departmental guidelines relating to anaesthetic care of the elderly patient. Were the guidelines available to this locum anaesthetist?

A question about departmental guidelines for the elderly patient was not asked in the surgical questionnaire.

In four cases the most senior surgeon involved in the decision-making process, either before or during surgery, was an SHO (SQs 16, 30, 31 and 35). The cases were as follows:

**ASA GRADE 3** • Laparotomy, division of adhesions, oversew DU. SHO surgeon and SHO anaesthetist. Cardiac and respiratory comorbidity.

**ASA GRADE 3** • Thompson's hemiarthroplasty. SHO surgeon. Cardiac, renal and vascular comorbidity.

**ASA GRADE NOT KNOWN** • Sliding hip screw. SHO surgeon. Cardiac, respiratory, renal and malignant comorbidity.

**ASA GRADE 3** • Sliding hip screw. SHO surgeon and SHO anaesthetist. Severe cardiac and respiratory problems. Lengthy procedure.

Local guidelines on surgical decision-making and management of the elderly patient may also be appropriate.

## SPECIAL CLINICAL PROBLEMS

### Operative hypotension

#### Key Points

- Hypotension is common during anaesthesia in the elderly patient. It requires prompt appropriate treatment.
- Hypovolaemia should be corrected before operation whenever possible.
- Particular care is required when general anaesthesia combined with epidural analgesia is used during emergency abdominal surgery, especially when there may be sepsis.
- When a vasoconstrictor is not effective in repeated dose the anaesthetist should consider alternative drugs and other methods of delivery.

It was noted that a large number of patients in this sample were hypotensive during surgery.

The precise incidence of operative hypotension was difficult to quantify. Hypotension was reported as a perioperative adverse event in 17% of cases and this may be indicative. However, some of these reports were of transient hypotension or hypotension as part of a terminal event, e.g. during cardiac arrest.

Other patients considered to be hypotensive by the advisors did not have it noted as an adverse event in the anaesthetic questionnaire.

The main causes of hypotension in these patients are hypovolaemia and the vasodilator effects of anaesthesia. Hypotension in this age group is poorly tolerated. This opinion is not based on any known association between hypotension and clinical

outcome, but on clinical judgement. Myocardial, renal cortical and gastrointestinal blood flow is often at a critical level in the very elderly. Prolonged periods of hypotension may lead to infarction or ischaemic injury to these organs. Perioperative hypotension should, therefore, be treated vigorously and effectively.

The examples described represent a small proportion of patients who were considered to be hypotensive. In these examples the values of systolic arterial pressure cited are the best and worst during the time period. In general the systolic arterial pressure was 85 mmHg or less for most of the time. Many of the examples are patients with a fractured hip. This is not only because they form the largest group in this sample but also because they have more predictable fluid losses than patients with abdominal pathology, and so are easier to evaluate objectively. The problem of hypotension was by no means confined to patients with a fractured hip.

Operative hypotension can be potentiated by hypovolaemia. This should be corrected before operation and for most patients there is time to do this. In this sample anaesthetists indicated that 74% of patients underwent emergency or urgent surgery, but only 12% had an operation on the day of admission and the majority (51%) had an operation within the next two days. It is the surgical trainees who usually supervise the initial preoperative assessment and resuscitation of surgical admissions; they are often the first points of medical contact within the hospital. It is important therefore that surgical trainees are able to detect dehydration and hypovolaemia clinically and understand the management of preoperative fluid resuscitation in the elderly. This should have been learned during their undergraduate and basic postgraduate training. Some patients will require intensive resuscitation with invasive monitoring and for these the early referral to, and involvement of, the anaesthetic department may be valuable.

**CASE 1** • A patient underwent a laparotomy and hemicolectomy for a gangrenous caecum. There was a delay of four days between admission and operation, reportedly for fluid resuscitation. Despite the recognition of dehydration on admission, the resuscitation was apparently not carefully monitored. There was no CVP monitoring or record of hourly urine output. Over the four preoperative days the haemoglobin increased from 16 to 17 g/dl and urea from 11.9 to 13.5 mmol/l. The creatinine measured on admission was normal. The patient had passed 346 ml of urine on the day before surgery; none had been recorded on the chart for the day of surgery. The anaesthetist first saw the patient at 23.00 and induction of anaesthesia was at 23.30. The patient became hypotensive following the induction of anaesthesia and after 30 minutes had a cardiac arrest and died.

**CASE 2** • A patient was admitted with cholecystitis and a recent myocardial infarction. After four days he required an operation for a perforated gall bladder from which he made a good recovery. Six weeks later he required a further operation for an ileocaecal intussusception. Before this second surgical intervention he became dehydrated and was transferred to the ICU for insertion of monitoring lines and fluid resuscitation. During the operation he was haemodynamically stable and postoperatively he was managed on the ICU. He died of sepsis six days later.

The potential for preoperative dehydration in acute admission general surgical and trauma patients is recognised and 73% of patients received intravenous fluids in the 12 hours before surgery. However, for some patients the start of intravenous fluid therapy was delayed and for many their dehydration was inadequately treated.

Fifty-five percent of patients had surgery for a fractured neck of femur. Blood loss with this fracture is concealed, not easy to assess and often underestimated. Nevertheless, some allowance for blood loss should be attempted. There is in general a greater preoperative blood loss from extracapsular than intracapsular fractures.

Increased serum creatinine, urea and sodium preoperatively should trigger a suspicion of dehydration.

**CASE 3** • A patient was admitted with a fractured neck of femur and received no intravenous fluid for the next two days. The total fluid intake over the first two days was 300 ml and urine output was 450 ml. An intravenous infusion was started in the afternoon of the third day. For the third and fourth days the total fluid intake was 1900 ml IV and 635 ml orally, total urine output was 650 ml. Surgery was on the fifth day. Biochemistry on the day of surgery showed Na<sup>+</sup> 157 mmol/l, K<sup>+</sup> 5.2 mmol/l, urea 28.8 mmol/l and creatinine 180 micromol/l. Haemoglobin was 13 g/dl and WCC 15.3 x 10<sup>9</sup>/l. During spinal anaesthesia 700 ml of crystalloid were given. The systolic arterial pressure remained between 70 and 100 mmHg during and after the operation until a cardiac arrest 15 hours postoperatively.

Operative hypotension is usually a combination of the vasodilator effects of anaesthesia and low circulating volume. Appropriate treatment involves vasoconstrictor and fluid therapy tailored to the needs of the individual. In many patients operative hypotension was appropriately treated. In some patients hypotension was either untreated or treated with large volumes of intravenous fluids or with repeated doses of vasoconstrictors.

**CASE 4** • An ASA 4 patient weighing 46 kg was admitted with sub-acute intestinal obstruction four days before surgery to perform a Hartmann's procedure. At operation a bowel perforation was diagnosed. During three hours of general anaesthesia the systolic arterial pressure was between 55 and 120 mmHg, for 90 minutes it was less than 85 mmHg. No invasive monitoring or vasoconstrictors were used and 5000 ml (109 ml/kg) of crystalloid were transfused.

In this sample there was an apparently higher incidence of hypotension with spinal anaesthesia than with general anaesthesia, particularly in the presence of hypovolaemia. We are not suggesting that spinal anaesthesia should not be used, but that the requirements of spinal anaesthesia in the elderly include meticulous correction of preoperative and operative hypovolaemia as well as treatment of vasodilatation.

**CASE 5** • A patient with a fractured neck of femur and weighing 60 kg had an operation under a spinal anaesthetic. The operation lasted for 60 minutes during which time the systolic arterial pressure was a maximum of 100 mmHg, and often much lower, and 2500 ml (42 ml/kg) of fluid were given. A vasoconstrictor was not used.

**CASE 6** • A patient had a sliding hip screw inserted under a spinal anaesthetic. The operation lasted for 1 h 10 min, during which time the systolic arterial pressure was between 80 and 95 mmHg for 60 minutes, and 2500 ml of fluid were given. Intermittent ephedrine IV to a total of 15 mg was given with little apparent effect.

**CASE 7** • A patient with a fractured neck of femur and weighing 45 kg had an operation under a spinal anaesthetic. The operation lasted for 2 h 15 min. For two hours the systolic arterial pressure was between 85 and 95 mmHg and 1500 ml (33 ml/kg) of clear fluid were given. Ephedrine 3 mg IV was given once at the start of the operation.

**Hypotension was not confined to patients who had spinal anaesthesia.**

**CASE 8** • A patient with a fractured neck of femur had a general anaesthetic with mechanical ventilation of the lungs. The operation lasted for 1 h 15 min during which time systolic arterial pressure was between 55 and 75 mmHg and 1500 ml of crystalloid were transfused. Vasoconstrictors were not used.

**CASE 9** • A patient with a fractured neck of femur had general anaesthesia with mechanical ventilation and a 3 in 1 nerve block. The operation lasted for 60 minutes and during the whole of this time the systolic arterial pressure was between 65 and 90 mmHg and 1000 ml of fluid, and ephedrine in small doses to a total of 33 mg IV, were given.

**Hypotension was common when combined general anaesthesia and epidural analgesia were used during emergency abdominal surgery, particularly in the presence of abdominal sepsis. Would it be better if the use of the epidural was deferred until after completion of the operation?**

**CASE 10** • A patient with a four-day history of perforated colon had a Hartmann's procedure under general anaesthesia with epidural analgesia. Operative hypotension was unresponsive to ephedrine 3 mg, increasing doses of dopamine infusion and finally an adrenaline infusion. The patient developed severe acidosis and died the next day.

**Ephedrine in intermittent doses was the most commonly used vasoconstrictor. When ephedrine**

**is ineffective an alternative vasoconstrictor should be tried. It was noticeable that a continuous infusion of vasoconstrictor, as an alternative strategy, was rarely used.**

**CASE 11** • A patient with a fractured neck of femur and weighing 60 kg had an operation under a spinal anaesthetic. The operation lasted for 1 h 25 min during which for 55 minutes the systolic arterial pressure was between 45 and 95 mmHg and 1900 ml (32 ml/kg) of clear fluid were given. Ephedrine in doses between 3 and 6 mg IV was given to a total dose of 60 mg with little apparent effect, then methoxamine 5 mg IV was given at the end of the operation.

## Postoperative fluid management

### Key Points

- *Fluid imbalance can contribute to serious postoperative morbidity and mortality.*
- *Fluid imbalance is more likely in the elderly who may have renal impairment or other comorbidity.*
- *Accurate monitoring, early recognition and appropriate treatment of fluid balance are essential.*
- *Fluid management should be accorded the same status as drug prescription.*
- *Training in fluid management, for medical and nursing staff, is required to increase awareness and spread good practice.*
- *There is a fundamental need for improved postoperative care facilities.*

The anaesthetic questionnaire requested copies of the fluid balance charts for two days before, the day of, and three days after surgery. In this sample these were returned for about 50% of the patients. Approximately 20% of the charts reviewed were criticised on points of either documentation or management of the patient's fluid therapy. It is from these that the following case studies have been drawn.

**CASE 12** • A patient who was admitted in heart failure developed an ischaemic foot and required an above knee amputation. Preoperative blood tests showed WCC  $25.2 \times 10^9/l$ . During anaesthesia a bradycardia of 35/min responded to atropine, and hypotension of 45/30 mmHg responded to ephedrine 6 mg. Fluid balance on the day of operation was 3810 ml positive and on day 1 was 3641 ml positive. Fluid restriction and dopamine were started 27 hours postoperatively when urine output had been less than 10 ml per hour for 12 hours. Fluid intake on day 2 was 1165 ml and urine output 643 ml and fluid intake on day 3 was 1190 ml and urine output 871 ml. The patient died of left ventricular failure on day 3.

**CASE 13** • A patient with a chest infection and history of previous myocardial infarction was admitted after a hip fracture to be treated by Austin Moore hemiarthroplasty. Preoperative blood tests showed urea 15.8 mmol/l and creatinine 180 micromol/l. The operation was performed during the evening and the patient left recovery at 23.20. On the day of surgery the fluid balance was 2175 ml positive, on day 1 it was 2480 ml positive and on day 2 it was 2156 ml positive. The urine output on day 2 was 108 ml and diclofenac, which had been prescribed on admission, was given on that day. The patient died of pneumonia and renal failure on day 3.

**CASE 14** • A patient underwent a laparotomy and right hemicolectomy for gastrointestinal bleeding. Concomitant problems were mixed aortic valve disease and mitral regurgitation, ischaemic heart disease and a previous cerebrovascular accident. Haemoglobin was 8.5 g/dl. No ICU bed was available and the hospital had no HDU. An adrenaline infusion was used in theatre. Fluid intake on the day of operation was 6550 ml of clear fluid and 2100 ml of blood and urine output was 250 ml. Fluid intake on day 1 was 3750 ml and urine output 282 ml.

On this day the patient was given two doses of frusemide 40 mg IV in the morning without response. The fluid balance charts were discontinued at 15.00 and the patient died 13 hours later.

**CASE 15** • A patient was admitted with a hip fracture to be treated with a sliding hip screw. The fluid charts were difficult to interpret but the nursing staff had estimated fluid intake on the day of operation as 4850 ml and the urine output was 645 ml. Fluid intake on day 1 was 800 ml and urine output 425 ml. The IV cannula fell out on this day and was not replaced for 34 hours. Fluid intake on day 2 was 460 ml and urine output 325 ml. Fluid balance on day 3 was 330 ml positive. On day 4 the IV infusion tissued and was not replaced, fluid intake was 260 ml and urine output was 1100 ml. On this day diclofenac and frusemide 80 mg IV were given and the fluid balance chart discontinued. The patient died in pulmonary oedema on day 7.

**CASE 16** • A patient with ischaemic heart disease was admitted with a hip fracture to be treated with a sliding hip screw. Preoperative blood tests showed serum urea 19.5 mmol/l, creatinine was not recorded. The fluid charts were almost unintelligible but a best guess is that on the day of operation fluid intake was 2600 ml and urine output 70 ml. Fluid intake on day 1 (as estimated by the nursing staff) was 1296 ml and urine output 185 ml. There were no records for day 2. Fluid intake on day 3 was 825 ml and urine output 60 ml. The patient died of bronchopneumonia and left ventricular failure on day 26. The quality of recording on the fluid balance charts was such that it is doubtful whether anyone could know what the true fluid balance was.

**CASE 17** • A patient with a fractured hip was admitted for an Austin Moore prosthesis. She was described as frail and weighed 43 kg. Preoperative blood tests were normal. On the day of operation fluid intake was 4800 ml. There was no urine output. Fluid intake on day 1 was 600 ml and urine output 400 ml. Fluid intake on day 2 was 900 ml and there was no urine output. She had been hypotensive postoperatively and died in heart failure on day 2. Postmortem revealed previously undiagnosed aortic stenosis.

**CASE 18** • A patient with ischaemic heart disease and hypertension underwent a Hartmann's procedure. Anaesthesia was complicated by atrial fibrillation of 160/min. Fluid intake on the day of operation was



3560 ml and urine output 945 ml. Fluid intake on day 1 was 6320 ml and urine output 430 ml. Fluid intake for the first six hours of day 2 was 2500 ml and urine output 28 ml when the patient died in left ventricular failure.

**CASE 19** • A patient with small bowel obstruction underwent ileocaecal resection for tumour. She weighed 48 kg and had chronic heart failure causing shortness of breath at 50 yards. She was described as unwell preoperatively. Fluid intake on the day of operation was 5007 ml and urine output 1320 ml. Balances on subsequent days were: day 1 intake 4550 ml and output 1345 ml, day 2 intake 2683 ml and output 576 ml, day 3 intake 3634 ml and output 684 ml, day 4 intake 3062 ml and output 770 ml, day 5 intake 2486 ml and output 240 ml, day 6 intake 3309 ml and output 80 ml. She died of disseminated adenocarcinoma on day 7.

Fluid imbalance, excessive fluid intake and/or poor urine output, is a symptom of an underlying problem. There are several causes of postoperative fluid imbalance. Each patient in whom postoperative fluid imbalance occurs needs to be clinically evaluated and investigated so that the imbalance can be appropriately treated.

Many patients in this sample had large fluid intake and/or poor urine output postoperatively. A positive fluid balance may be appropriate, for instance if there is dehydration which has not been corrected previously or large concealed fluid losses such as occur following some bowel surgery. However, it may be pathological. Renal function decreases by about 10% for each decade over the age of 40 years and so the elderly are liable to develop postoperative renal failure with fluid retention.

The following coexisting problems make postoperative renal failure more likely:

- Prerenal renal impairment secondary to preoperative dehydration.
- Chronic renal impairment with raised serum creatinine.
- Surgically induced increased secretion of antidiuretic hormone. Hypovolaemia, hypotension, opiates, pain, stress or hypoxia can cause this.
- Low cardiac output states, for example from pre-existing cardiac disease or recent onset arrhythmia.
- Concomitant drug treatment, such as non-steroidal anti-inflammatory drugs.

Postoperative fluid retention increases the likelihood of other postoperative complications, for example left ventricular failure or bronchopneumonia.

## Audit

NCEPOD has estimated that 20% of patients in this sample had either poor documentation of fluid balance or unrecognised/untreated fluid imbalance. Local audit is required to identify where the problems are and what solutions need to be applied.

## Patients

Many of the patients who develop low urine output or positive fluid balance postoperatively can be predicted from the severity of their surgical condition or their concomitant medical diseases, for example patients with cardiac, renal or electrolyte disorders. Patients at risk of renal impairment need to be identified, and recorded as such, by clinicians preoperatively on initial assessment and closely monitored postoperatively.

## Monitoring

Urinary catheters are used freely by general surgeons. Some orthopaedic surgeons are reluctant to use them for patients with a prosthesis; others will use them routinely if patients are undergoing hip replacement. The association between bladder catheterisation and prosthetic hip infection still needs to be clarified. If urine is not passed within a reasonable time postoperatively, or if there is persistent urinary incontinence, then the benefits of monitoring urine output outweigh the risks associated with a catheter in the bladder (see also page 83).

Most elderly patients should have their serum urea, electrolytes and creatinine monitored daily after operation.

Nine percent of patients in this sample had central venous pressure monitoring. In some situations central venous pressure monitoring can give valuable clinical information and the line can also be used for vasoactive drug infusions. There are many advantages to inserting these in the operating theatre. Further research is required to define the role of more invasive monitoring in this group of patients.

## Documentation

Some fluid balance records are poorly completed, making it difficult to identify a problem (see page 71). The importance of accurately recording fluid balance is equal to that of drug administration and the responsibility for this rests primarily with the nursing staff.

In addition to contemporaneous records some hospitals have summary 24-hour fluid balance recorded either on the TPR chart or on a separate sheet. These provide an easy reference for review of the patient.

### *Management and training*

When fluid imbalance was evident from review of the charts it often continued uncorrected. Some doctors and nurses may lack awareness of the central role of good fluid management in these patients. Medical schools may be able to help. Is a high enough priority given to teaching the importance of perioperative fluid management in the medical school curriculum and during preregistration medical training?

Patient fluid management, both preoperatively and postoperatively, should be included as part of the formal surgical SHO training curriculum. In some hospitals surgical SHO training schemes include a rotation through the ICU/HDU. This provides valuable experience in the management of patients undergoing major surgery and should take place early in the rotation. Local guidelines in the management of postoperative fluids could be developed. Is this a situation for national guidelines?

In order to maintain continuity of patient care there is, or should be, a formal handover of patient information between surgical trainees at each change of duty. This handover, and the doctors attending, could be made a matter of record. The most senior trainee on duty and available should attend. Patients' charts and results should be reviewed by the medical staff daily, and daily intravenous fluid prescribing should only be done after clinical evaluation of the patient.

In most hospitals the first line management of postoperative fluid therapy rests with the surgical trainees and the responsibility for supervision rests with their consultants.

In some hospitals this may not be providing the best available care and other clinical input to the patient's postoperative fluid management would be welcomed. Other models of care are possible, including:

- Development of protocols for referral. These would depend on local circumstances, but could possibly be to physicians with an interest in care of the elderly. A strong case can be made for medical preoperative assessment in the very elderly patient, as well as postoperative advice.
- Expansion of the role of the anaesthetic department, the acute pain team, or the acute

care team to include advising on postoperative fluid management.

- Some hospitals now have anaesthetic house officers. Could postoperative fluid management be part of their responsibilities?

Such shared care would probably be for a limited time after operation, following which full responsibility would revert to the surgical team.

### *Patient location*

Elderly patients with renal dysfunction, especially with concomitant disorders, need a high level of nursing care. Many wards have a nurse to patient ratio of 1:8 and are ill-equipped to provide this high level of care.

Ideally many of these patients should be nursed in a high dependency unit (see also page 61). In this sample anaesthetists indicated that there was an HDU in the hospital of 46% of patients but only 34/944 (4%) were nursed in one postoperatively. Are the elderly excluded from consideration in prioritising patients for admission to these oversubscribed facilities? Twenty-eight surgical questionnaires indicated that there was an age limit for admission to their HDU or ICU.

A comment was: *"There is no HDU and in my opinion normally all patients over 90 years with a fractured hip should go to HDU."*

There is a need for more properly staffed and equipped high dependency beds.

Most high dependency units plan a nurse to patient ratio of 1:2. There is a large gap between nursing staff to patient ratios on the HDU and the ward. Some hospitals have developed intermediate care facilities for patients whose nursing needs fall between these two. These do not replace the HDU:

- Facilities such as postoperative recovery wards deserve consideration. These specialised postoperative wards have higher nursing staff to patient numbers than general wards. Here patients can receive appropriately monitored specialised pain relief and fluid management following major surgery.
- Monitored beds on the general ward can also be successful. They allow less-well patients to be grouped together in an area where there are nursing staff of appropriate number and experience.



## Fluid chart documentation

### Key Points

- *The documentation on fluid charts was often poor.*
- *Doctors and nurses of all grades need to understand the clinical importance, and ensure the accurate recording, of fluid intake and output.*
- *Multidisciplinary review of the problem and development of good local working practices is required.*
- *Fluid charts are important documents that need to be retained and appropriately filed for future reference.*

The anaesthetic questionnaire requested copies of the fluid charts for two days before, the day of, and three days after surgery.

Photocopies of fluid charts were returned in approximately 50% of cases. For the majority of the cases when they were not included no reason was given for their absence. Some anaesthetists stated that they had not been filed with the patient case notes; either they were filed separately with ICU notes or had been discarded at the end of the patient's admission. Fluid charts are important patient documents.

Documentation of intake and output on some fluid charts was good. In some hospitals daily summary results are recorded on a separate fluid balance 'flow' chart or on the TPR (temperature, pulse and respiration) chart. These are particularly helpful and make fluid review straightforward.

However, some charts were of poor standard, sufficient to hamper clinical care. The following problems were noted:

**POOR IDENTIFICATION** • No patient name, no hospital number, no date to which the page referred. This makes review of fluids difficult. In some cases a completely new chart was started postoperatively resulting in two charts for one day. Was this local practice or did it accompany a change of ward? There should be continuity of such important documentation, especially on the critical day of operation.

**INACCURATE FLUID INTAKE** • Very low oral fluid intake with little or no intravenous supplementation recorded over successive 24-hour periods (i.e. intake compatible with severe dehydration) with the comment "sips" or "sips only". Was the fluid intake in fact greater but being recorded incorrectly? This was probable in those patients who remained well. Or was fluid intake indeed inadequate?

**INACCURATE FLUID OUTPUT** • Some charts either had no output recorded or only an occasional "wet bed". Some patients had frequent persistent urinary incontinence recorded over several days. Whilst not advising 'routine' urinary catheters in the elderly, in selected patients the benefits of urinary catheterisation outweigh the risks. If no urine is passed postoperatively within a reasonable period of time a urinary catheter can help to differentiate between oliguria and urinary retention. If a patient suffers from persistent 'wet beds' a urinary catheter can help to differentiate between true incontinence and retention with overflow. When there is urinary incontinence a catheter is beneficial both for the patient's dignity and for nursing care. It will reduce the potential for macerated skin and bedsores.

Management of fluid balance is a multidisciplinary exercise involving doctors, nurses and possibly other ward staff responsible for providing oral fluid intake for patients. This is akin to drug therapy where it is the responsibility of doctors to prescribe drugs and the responsibility of nurses to give the drugs and chart their administration. However, it is clear that fluid management is not perceived as having the same importance or status as drug therapy.

Clinical audit and governance should provide a framework for multidisciplinary review of the problem, be responsible for the development of good local working practices and oversee their implementation.

Fluid excess or deficit can contribute to serious postoperative morbidity. Doctors and nurses of all grades need to understand the clinical importance of fluid intake and output and ensure its accurate recording. Its importance is equal to the accurate recording of drug administration and this should be recognised.

## SPECIFIC ISSUES

### ANAESTHESIA

#### Non-training anaesthetic appointments

##### Key Point

- *There has been an expansion in the number of non-consultant career grade (NCCG) anaesthetists. Their requirements for personal development, continuing medical education and supervision need to be recognised.*

##### *The role of the staff grade anaesthetist*

Data from the NCEPOD report of 1993/94<sup>8</sup> indicated that some of the more seriously ill patients were being anaesthetised by staff grade anaesthetists. Less than 50% of the staff grade anaesthetists participating in that report held the FRCA. It was predicted then that staff grade numbers would increase.

Since then the national ceiling on staff grade doctors has been removed<sup>39</sup> and junior doctors' hours have been reduced. The percentage of cases in this sample where the most senior anaesthetist was a staff grade was 10% (90/944). This can be compared to percentages in recent NCEPOD reports as follows: 1994/95, 3%; 1995/96, 5%; 1996/97, 10%. The NCEPOD sample for review has changed annually so

that direct comparison year on year has limitations. The 1994/95 sample was of deaths within three days of surgery, the 1995/96 report "Who Operates When?" examined overall surgical activity and the 1996/97 sample reviewed specific types of surgery.

In many hospitals staff grade anaesthetists are contracted to cover trauma and general surgical emergency lists. In this year's sample the high involvement of staff grade anaesthetists may have been due to the large number of patients with a fractured hip operated on during regular trauma lists. The Royal College of Anaesthetists' database records the number of non-consultant career grade anaesthetists in the United Kingdom<sup>40</sup>, as shown in Table 3.14.

Table 3.14: Non-consultant career grade anaesthetists

	Total number	Whole time equivalent	Number part-time
Associate specialist	316	295	103
Staff grade	544	533	95
Clinical assistant	342	206	265
Trust anaesthetist	231	221	88
Hospital practitioner	88	78	88
<b>Total</b>	<b>1521</b>	<b>1333</b>	<b>639</b>

Table 3.15: Grade of the most senior anaesthetist by ASA status of the patient (AQs 10 and 30)

	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Not answered	Total
Consultant	8	67	190	122	18	0	405
Associate specialist	0	7	32	11	2	0	52
Staff grade	1	14	55	19	1	0	90
Clinical assistant	0	2	4	1	0	0	7
SpR - 3, 4, Accredited/CCST	0	12	36	29	3	1	81
SpR - 1, 2	0	10	26	15	2	0	53
SHO	0	38	113	51	3	2	207
Other	0	4	20	15	3	0	42
Not answered	0	2	2	3	0	0	7
<b>Total</b>	<b>9</b>	<b>156</b>	<b>478</b>	<b>266</b>	<b>32</b>	<b>3</b>	<b>944</b>

Table 3.15 shows that a staff grade anaesthetist, with no anaesthetic qualifications, anaesthetised an ASA 5 patient for a polya gastrectomy.

The requirements of the Royal College of Anaesthetists (RCA) for the appointment of a staff grade anaesthetist include: full registration with the General Medical Council and completion of three years' training in anaesthesia at SHO or higher grade, or comparable overseas training. In addition it is recommended that a staff grade anaesthetist should have the full Fellowship qualification of the Royal College of Anaesthetists of the UK (FRCA) or Ireland (FFARCSI). If not, then the job description should reflect more limited responsibilities<sup>41</sup>.

Qualification	Number
None	6
FRCA	28
Part Fellowship or DA	51
Other	2
Not answered	3
<b>Total</b>	<b>90</b>

Years	Number
0-3	5
4-10	14
11-15	20
16-20	9
>21	9
Not known	5
<b>Total</b>	<b>62</b>

Five staff grade anaesthetists indicated that they had not completed more than three years in anaesthetic training. Two had been medically qualified for more than ten years and may have discounted their overseas experience. Another two had been medically qualified for four years in total and it was difficult to understand why they had been appointed to non-consultant career grade posts. Of the five who reported that they had not completed more than three years in anaesthetic training, three had no postgraduate qualifications and two had the DA or part Fellowship.

Staff grade anaesthetists who have been many years in anaesthesia and do not have the full Fellowship qualification are unlikely to sit for it, either because the longer they are in post the less the incentive, or because they have previously tried, failed and have

become dispirited. Of those without full Fellowship qualifications there were 19 staff grade anaesthetists with ten years' or less anaesthetic experience and a further 20 with between 11 and 15 years' anaesthetic experience. Accepting the different needs and aspirations of the individual, could more staff grade anaesthetists be encouraged to study for the full Fellowship qualification? Are they getting sufficient access to the final Fellowship courses and do they have a dedicated educational period in their timetables? Training organisations should consider this group more when planning their educational programmes.

The RCA, with the National Health Service Executive, agreed that if the staff grade anaesthetist did not hold the FRCA or FFARCSI then they should work as an SHO equivalent and be closely supervised by senior staff. They should not be involved in the teaching, training or direct supervision of bona fide trainees in the specialty.

In this sample, on 24 occasions, a staff grade anaesthetised a patient with an SHO assisting. Twelve of these staff grade anaesthetists had the FRCA. The other twelve may have been working outside the above recommendation. Nine had part 2 of the Fellowship or the DA, one had the European Diploma, one had no anaesthetic postgraduate qualification and one did not specify a qualification.

Staff grade anaesthetists have an annual appraisal process and review of their job description. This process represents an opportunity to ensure that these non-consultant career grade anaesthetists have access to resources for, and do participate in, continuing professional development and medical education.

## Locum anaesthetists

Seventy questionnaires (7%) stated that the most senior anaesthetist present was working as a locum. This percentage is similar to that seen in previous NCEPOD reports<sup>8</sup>.

Locum grade	Number
Consultant	26
Associate specialist	5
Staff grade	6
Clinical assistant	2
SpR	12
SHO >2	11
SHO 2 and 1	4
LAS	2
Not answered	2
<b>Total</b>	<b>70</b>

The qualifications of the locum anaesthetists varied:

Qualification	Number
None or Part 1 FRCA only	8
Old Part 1 FRCA, DA or equivalent	21
Fellowship	30
Not answered	11
<b>Total</b>	<b>70</b>

Qualification	Number
None	1
Old Part 1 FRCA, DA or equivalent	3
Fellowship	17
Other	1
Not answered	4
<b>Total</b>	<b>26</b>

The majority of locum consultant anaesthetists did possess the Fellowship of the Royal College of Anaesthetists. Those with part of the FRCA or DA, and particularly the one locum consultant anaesthetist with no anaesthetic qualifications, appear to be inappropriate appointments.

Year of first full-time anaesthetic post	Number
Before 1973	8
1973 to 1977	6
1978 to 1982	4
1983 to 1987	14
1988 to 1992	9
1993 to 1997	14
Not known	15
<b>Total</b>	<b>70</b>

We do not know the reasons why the 32 anaesthetists who had been practising anaesthesia for over ten years were in locum appointments. However, departments should recognise that those in long term or repeated locum appointments require proper study leave and funding for continuing medical education.

## Matching the seniority of the anaesthetist to the patient

Both the Royal College of Anaesthetists<sup>21</sup> and NCEPOD<sup>6, 7</sup> in their previous reports have made

specific recommendations as to the seniority and experience of anaesthetists taking responsibility for particular patients. These recommendations can be examined with particular reference to the patients in this sample:

### Royal College of Anaesthetists' recommendations

*"A consultant should always be available in the operating room when a first-year SHO is anaesthetising patients of ASA grade 3 and over."*<sup>21</sup>

First-year SHOs anaesthetised 19 patients of ASA grade 3 and over, without immediate supervision, and for 14 of these no senior advice was sought.

*"SHOs and SpR 1 grades should always be supervised at neurosurgery and cardiothoracic operations."*<sup>21</sup>

One neurosurgical operation was managed by an SpR 4 anaesthetist and one cardiac operation was managed by a consultant anaesthetist. Both cases therefore complied with the RCA guidance.

### NCEPOD recommendations

*"Very sick patients should be anaesthetised in the knowledge and (or) presence of senior registrar (SpR 3 or 4) or consultant."*<sup>7</sup>

Anaesthetic questionnaires were returned for 298 patients of ASA 4 or 5. An SHO, SpR 1 or SpR 2 was the most senior anaesthetist present for 71 (24%) of these patients. In 36/71 (51%) of these operations, the inexperienced anaesthetist did not seek advice from a senior source before starting the anaesthetic.

*"Many operations, particularly those of long duration, will require two anaesthetists, at least for part of the time."*<sup>6</sup>

Thirty-nine anaesthetics took longer than three hours. There were two anaesthetists present in 25 (64%) of these.

*"Anaesthesia for emergency or life-saving operations should ideally be managed by a team of anaesthetists."*<sup>6</sup>

The NCEPOD classification was stated as "Emergency" (immediate life-saving operation) for 35 patients. Of these, there were at least two anaesthetists present in 22 (63%). However, some of the classifications may be suspect. The operation "Left Austin Moore hemiarthroplasty" was one of those classified as an emergency, life-saving operation.

National recommendations might be more closely followed if they were incorporated locally into anaesthetic departmental guidelines.

# Pain relief in the elderly

## Key Points

- The majority (81%) of patients were treated in a hospital with an acute pain service.
- Only a minority of patients had a pain assessment chart.
- The use of a pain assessment chart improves the management of postoperative pain and reduces the chance of complications related to postoperative analgesia.

### Pain service

NCEPOD requested information on several aspects of postoperative pain relief management.

#### Question 3.6: Does the hospital in which the operation took place have an acute pain service? (AQ68)

Yes .....	763
No .....	176
Not answered .....	5
<b>Total .....</b>	<b>944</b>

If yes, when is this service available?

24 hours a day, seven days a week .....	362
Limited times .....	368
Not answered .....	33
<b>Total .....</b>	<b>763</b>

An acute pain service was available to 81% of patients. Unfortunately, in less than half (47%) of the hospitals was this service described as available “24 hours a day”.

#### Question 3.7: Who is on the pain team? (AQ68a) (763 cases; answers may be multiple)

Anaesthetic consultant(s) .....	680
Anaesthetic trainee(s) .....	347
Specialised pain nurse(s) .....	629
Pharmacist(s) .....	105
Other .....	39

Pain teams usually included consultant anaesthetists and specialised pain nurses. Trainees were present in less than half the teams. This represents the loss of a valuable training opportunity. Eleven percent of the questionnaires did not report a consultant anaesthetist as part of the pain team. It is probable that there was no funding for consultant sessions in these hospitals, although presumably there was consultant advice when the service was established, and a facility for consultant referral.

#### Question 3.8: How many ward nursing staff are specially trained in epidural and/or PCA analgesia? (AQ69)

None .....	63
Some .....	725
All .....	103
Not answered .....	46
Not known .....	7
<b>Total .....</b>	<b>944</b>

Four questionnaires reported continuous intravenous opiate infusion, patient controlled analgesia (PCA) or continuous epidural infusions had been used on general wards although no ward staff had been trained in the management of these techniques.

### Pain charts documentation

Two hundred and thirty five (25%) questionnaires reported that the patient had a pain assessment chart. This is disappointing. It is recognised that formal assessment of a patient’s pain improves pain management.

#### Question 3.9: Did this patient have a pain assessment chart? (AQ70)

Yes .....	235
No .....	651
Not answered .....	54
Not known .....	4
<b>Total .....</b>	<b>944</b>

In some cases the assessment chart related only to the time the patient spent in recovery. It is disturbing that 37% of those receiving epidural analgesia and 23% of those receiving PCA did not have a pain chart. It is well recognised that these techniques may be accompanied by serious complications such as respiratory depression or hypotension.

Table 3.22: Use of pain assessment charts (AQs 70 and 71b) (Patients may have received more than one form of analgesia)

Type of analgesia	Number of patients	% with pain chart
Epidural	57	63%
PCA	40	77%
IM injection	467	23%
Oral	341	23%
Subcutaneous infusion	22	43%
Rectal	30	17%

Forty of the questionnaires where pain charts were available were examined. In five cases the pain assessment chart covered only the time in the recovery ward. The information recorded on the remaining 35 charts is shown in Table 3.23.

The charts were examined for completeness. On 20% of occasions when a value should have been entered on the chart, data was absent. This suggests that the patients were not fully monitored at all times and episodes of poor analgesia, hypotension or respiratory depression could have been missed. Recording was carried out for an average of 50 hours, with a range from 12 hours to 7 days. In two-

Table 3.23: Information recorded on pain assessment charts

Clinical information recorded	Number	%
Respiratory rate	32	91%
Oxygen saturation	13	37%
Pulse	25	71%
Blood pressure	25	71%
Sedation level	29	83%
Pain score	25	71%
Postoperative nausea and vomiting	25	71%
<b>Total charts reviewed</b>	<b>35</b>	

thirds of questionnaires it was not clear why the pain chart had been discontinued.

Most charts recorded pain assessments only. Some charts were designed for specific methods of pain relief only, such as epidural analgesia or subcutaneous opiate infusions. In 12 charts, pain assessment and the side effects of treatment were recorded on the same chart as the regular ward TPR measurements. Greater use of such charts combining these observations may help to promote the recognition that the assessment and treatment of pain is an integral part of patient management.

## Non-steroidal anti-inflammatory drugs

### Key Points

- *Non-steroidal anti-inflammatory drugs (NSAIDs) should be prescribed with particular caution in elderly patients in the postoperative period.*
- *NSAIDs can contribute to postoperative renal failure in patients with renal impairment and those receiving ACE inhibitors, potassium-sparing diuretics or beta-adrenergic blockade.*
- *Royal College of Anaesthetists' guidelines on the use of NSAIDs need to be more widely consulted.*

In this sample 110 (12%) patients received non-steroidal anti-inflammatory drugs (NSAIDs) post-operatively. Table 3.24 gives examples of these patients.

Table 3.24: Use of non-steroidal anti-inflammatory drugs

Operation	CVS disorder	Renal disorder	GI risk factors	Complication/cause of death
Laparotomy and small bowel resection	None	None	None	ARDS, pulmonary oedema
Austin Moore hemiarthroplasty	Previous MI, on frusemide	Creatinine 180 micromol/l, urea 16 mmol/l	None	Renal failure, pneumonia
Sliding hip screw	Hypertension	None	None	GI bleed
Total hip replacement	Hypertension	None	None	Perforated DU, IHD and CVA
Right hemicolectomy	None	None	None	Respiratory failure, septicaemia, renal failure



Operation	CVS disorder	Renal disorder	GI risk factors	Complication/cause of death
Sliding hip screw	None	Creatinine 132 micromol/l, urea 8.7 mmol/l	None	Heart failure, pulmonary oedema
Debridement hip wound	None	None	Ranitidine	GI bleed
Bilateral femoral hernia repair	Hypertension	Creatinine 137 micromol/l, urea 17.3 mmol/l	None	Cardiac failure, renal failure
Halifax nail	CCF	None	None	GI bleed from diverticular disease
Sliding hip screw	Previous MI, CCF	Creatinine 212 micromol/l	None	CVA and cardiac arrest
Austin Moore hemiarthroplasty	None	Creatinine 146 micromol/l, urea 6.5 mmol/l	None	Cardiorespiratory arrest
Hemiarthroplasty	Hypertension	None	None	Renal impairment, peritonitis, ischaemic bowel, atherosclerosis
Total hip replacement	Previous MI	Creatinine 124 micromol/l, urea 10 mmol/l	Under investigation for melaena, on steroids	Bronchopneumonia
Transurethral resection of bladder tumour and prostate	Previous MI, angina, LVF, AF	None	On steroids	Cardiac failure
Sigmoid colectomy	CCF	None	None	Infarction of the small bowel
Thompson's hemiarthroplasty	None	None	On steroids	Cardiac failure, pulmonary oedema

The following extract from 'Clinical Guidelines for the Use of Non-steroidal Anti-Inflammatory Drugs in the Perioperative Period'<sup>42</sup> published by the Royal College of Anaesthetists, is relevant to patients in this sample:

#### "Clinical situations

**ORTHOPAEDIC SURGERY:** Several studies demonstrated opioid-sparing effects and improved analgesia, although there was little evidence of a reduction in opioid side effects. NSAIDs may be effective alone after some types of orthopaedic surgery.

**GENERAL SURGERY:** There was relatively little information on the use of NSAIDs for general surgery. NSAIDs should not be used as the sole analgesic in the first 24 hours after major surgery. They improve the quality of opioid-based analgesia.

#### Adverse effects

**GASTROINTESTINAL (GI) BLEEDING:** The risk of bleeding increases with dose and duration, especially in the elderly, and treatment for more than five days markedly increases the risk. NSAIDs should not be given to patients with a history of GI ulceration or bleeding.

**RENAL FUNCTION:** Practising nephrologists recognise that a high proportion of cases of postoperative renal failure are associated with the use of NSAIDs. Rather than being the primary cause, they are usually a contributory factor to the

development of acute renal failure, in situations where renal function would otherwise be expected to survive a particular insult, such as sepsis or hypovolaemia. The effects of NSAIDs on renal function postoperatively include decreased urine flow rate, reduced sodium and potassium excretion, a tendency to hyperkalaemia and increased requirement for diuretics.

NSAIDs should be avoided in the following clinical situations:

- renal impairment (plasma creatinine above normal);
- hyperkalaemia;
- hypovolaemia;
- systemic inflammatory response syndrome;
- circulatory failure (hypotension and/or cardiac failure).

NSAIDs should be used with caution in the following clinical situations:

- >65 years (renal impairment likely);
- patients receiving ACE inhibitors, potassium-sparing diuretics, beta-adrenergic blockers."

These guidelines, the above examples and the problem of low urine output postoperatively described in this report suggest that non-steroidal anti-inflammatory drugs should be used postoperatively for patients of 90 years and older only when there is a strong clinical indication. It is clear that the RCA guidelines are often disregarded.

## Postoperative respiratory complications

### Key Points

- *Elderly patients need their pain management to be provided by those with appropriate specialised experience in order that they receive safe and effective pain relief.*
- *Postoperative respiratory complications were more serious when patients were anaesthetised by less experienced anaesthetists.*
- *The dose of opioid or sedative drug needs to be titrated to effect.*
- *Elderly patients most at risk of complications are those with concomitant medical disorders, metabolic disorders or electrolyte disturbance.*

In this sample, when compared with previous NCEPOD reports, there was a higher incidence of respiratory complications associated with anaesthesia as evidenced by the use of opiate antagonist or analeptic drugs and the number of patients who required tracheal reintubation. Twenty-four such patients were identified. In some patients respiratory depression occurred despite good clinical management, in some the anaesthetic management could be criticised and in others there was insufficient detail within the questionnaires from which to draw conclusions.

Pharmacokinetics and pharmacodynamics change with age. The initial dose of opioid or sedative is often the same as for a younger person but to achieve an adequate response such drugs need to be titrated to effect. There is, however, a reduction in the ability of the elderly to metabolise and excrete drugs and this results in a longer drug half-life. It is more likely that some drugs, for example opioids, will accumulate when given in repeated doses at frequent intervals or when given as infusions. Elderly patients most at risk of drug accumulation are those with concomitant medical disorders (cardiovascular, respiratory or cerebrovascular disease, renal, hepatic or endocrine impairment), metabolic disorders (acidosis, sepsis) or electrolyte disturbance. All patients who were reported as having respiratory depression were ASA 3 or more and, for these patients, a drug dose which would be considered normal or moderate in a younger, fitter patient may have been excessive.

Some of the cases are summarised and illustrate the wide range of clinical circumstances.

**CASE 20** • An SHO 1 anaesthetised an ASA 4 patient with cardiac and renal disease for a sliding hip screw starting at 20.30. General anaesthesia included morphine 4 mg IV. In recovery the administration of morphine 10 mg IM was followed by respiratory depression and the PaCO<sub>2</sub> increased to 15.3 kPa. The trachea was reintubated, the

lungs were ventilated for 10 minutes and the patient given intravenous doxapram and naloxone. The patient returned to the ward at 00.30 and died of a cardiac arrest later that day.

**CASE 21** • An SHO 1 anaesthetised an ASA 3 patient with basal lung crepitations and hypothyroidism for amputation of a great toe starting at 18.00. General anaesthesia with a laryngeal mask airway (LMA) included fentanyl 100 micrograms IV. The patient had tracheal aspiration of gastric contents around the LMA in recovery and the trachea was intubated for tracheal toilet. The patient was returned to the ward at 19.00 and died of bronchopneumonia on day 6.

**CASE 22** • An SHO 2 anaesthetised an ASA 4 patient with myasthenia gravis and hypothyroidism for a laparotomy, hemicolecotomy and drainage of subphrenic abscess. Anaesthesia was induced at 19.20. Persistent supraventricular tachycardia and hypotension that were treated with amiodarone and adrenaline followed general anaesthesia and epidural analgesia. Blood gases taken during surgery revealed a base excess of -14 that was treated with sodium bicarbonate. Postoperatively the patient received ventilation of the lungs in recovery for 45 minutes before tracheal extubation. Poor respiratory effort was unresponsive to intravenous naloxone, doxapram and neostigmine and the trachea was reintubated. The patient required 39 ml/hr of adrenaline 5 mg/50 ml to maintain arterial pressure. No ICU bed was available so the patient was transferred to another hospital and died 15 minutes after arrival there.

**CASE 23** • An SHO of more than two years' experience anaesthetised an ASA 4 patient with dementia and mitral regurgitation for an EUA and screening of a hip prosthesis for a suspected fracture; no fracture was seen. The unexpectedly short general anaesthesia included muscle relaxant and fentanyl 100 micrograms IV. There was hypotension perioperatively and poor respiratory effort postoperatively. The patient was unresponsive to naloxone, was returned to the ward and died shortly after.

**CASE 24** • An SHO 2 anaesthetised an ASA 3 patient with ischaemic heart disease and dementia for an Austin Moore hemiarthroplasty. Morphine 10 mg IM had been given twice on the day of surgery and the patient was drowsy and hypotensive (arterial pressure 80/40 mmHg) on entering the anaesthetic room at 15.20. General anaesthesia, which included fentanyl 25 micrograms and relaxant,



was complicated by profound hypotension unresponsive to vasoconstrictors and cardiac arrest occurred after 60 minutes.

**CASE 25** • An SpR 4 anaesthetised an ASA 3 patient with chronic cardiac failure and hypothyroidism for a Hartmann's procedure at midnight. Preoperative blood tests showed  $\text{Na}^+$  128 mmol/l, creatinine 248 micromol/l, urea 17.8 mmol/l and metabolic acidosis with a  $\text{PaCO}_2$  of 2.64 kPa. During surgery 3000 ml of crystalloid were given without a CVP line in place. Postoperatively the patient received ventilation of the lungs in recovery until tracheal extubation after 90 minutes. Respiratory failure supervened and the patient received ventilation of the lungs in recovery for a further nine hours until an ICU bed became available.

**CASE 26** • An SHO 1 anaesthetised an ASA 4 patient with ischaemic heart disease, renal impairment and chronic obstructive pulmonary disease for repair of an inguinal hernia. Surgery progressed to a resection of gangrenous and perforated bowel. Preoperative blood tests showed Hb 16.4 g/dl, WCC  $19.1 \times 10^9/l$ ,  $\text{Na}^+$  129 mmol/l and urea 22 mmol/l. Surgery was at 17.50. Spinal anaesthesia was supplemented with sedation using midazolam to a total of 40 mg IV and ketamine to a total of 50 mg IV. Postoperatively oxygen saturation was 82% on 4 l/min nasal oxygen, doxapram 50 mg IV was given, no flumazaniol was used, the patient returned to the ward and died after six hours.

**CASE 27** • An associate specialist anaesthetised an ASA 3 patient, described as "frail and dry", for a sliding hip screw. General anaesthesia included fentanyl 50 micrograms IV and a 3 in 1 nerve block. Pethidine 50 mg IM in recovery was followed by respiratory depression that responded to naloxone.

**CASE 28** • An SHO 2 anaesthetised an ASA 4 patient with atrial fibrillation for oversew of a peptic ulcer. Preoperative blood tests showed WCC  $31.4 \times 10^9/l$ , creatinine 149 micromol/l, urea 15.3 mmol/l. General anaesthesia at 18.55 included fentanyl 100 micrograms IV and relaxant. At 20.00 in recovery the patient had poor respiratory effort unresponsive to naloxone. Arterial blood gases revealed pH 7.194,  $\text{PaO}_2$  58 kPa,  $\text{PaCO}_2$  5.73 kPa, bicarbonate 15.9, base excess -11.3. The patient became disorientated before apnoea supervened. The trachea was reintubated and the patient went to ICU.

Postoperative respiratory complications were more serious when patients were anaesthetised by less experienced anaesthetists. These anaesthetists appeared not to anticipate the predictable respiratory failure associated with gross coexisting metabolic abnormalities. Was this a deficit in training or a lack of experience in anaesthesia for the elderly? Eight of the 11 anaesthetic SHOs involved with these 24 patients had asked advice from a more experienced anaesthetist either before the case or when problems supervened, but managed the patient alone.

Most patients who had postoperative respiratory failure also had an early death; 18 of the 24 died within one week of surgery. Undoubtedly this reflected that these patients were amongst the

sickest in the sample. In some cases the anaesthetic management may have been implicated in the patient's death.

Management of pain relief in the elderly is of paramount importance. Elderly patients must receive adequate analgesia. It should, however, be recognised that the elderly metabolise drugs differently from the younger patient. The expertise of the acute pain team, use of pain assessment charts by appropriately trained nursing staff, the use of local anaesthetic techniques and careful titration of systemic analgesic drugs to effect will result in safe and effective pain relief for these patients (see also page 75).

## ORTHOPAEDIC SURGERY

### Perioperative care

#### Key Points

- *Orthopaedic surgeons need to establish whether there is sufficient expertise available within their team to manage the complex medical problems of these patients, or whether local guidelines for shared care should be developed.*
- *Pressure sores remain a problem in orthopaedic patients. Constant vigilance is required in this high risk group of patients.*

There were 648 cases undertaken by orthopaedic surgeons, of which 258 (40%) were hemiarthroplasties and 243 (38%) were sliding hip screws.

Coexisting medical problems were reported in 90% of the elderly orthopaedic patients. Many of these conditions are aggravated by the physiological disturbance of trauma, anaesthesia and surgery. Eighty-six percent of the sample had postoperative complications. Sixty-six percent had cardiac, respiratory or renal complications. Despite the high incidence of comorbidity, only 25% of patients were managed on a shared care basis.

These patients require complex medical care from experienced clinicians. Orthopaedic surgeons need to determine locally whether that degree of expertise is available within the orthopaedic team, or whether arrangements for formal shared care should be established.

Advisors were concerned about the development of pressure sores. Pressure sores were identified as a postoperative complication in 24 orthopaedic patients.

**CASE 29** • A 91-year-old ASA 3 patient underwent an Austin Moore hemiarthroplasty for a fractured neck of femur. He died 28 days later with bronchopneumonia and pressure sores. Should not pressure sores be preventable?

#### Training

There were still a significant number of cases which were performed by inappropriately junior trainees, often outside normal working hours.

**CASE 30** • An SpR 1 performed an Austin Moore hemiarthroplasty, under spinal anaesthetic administered by an SHO 1, on a 91-year-old ASA 3 patient. The procedure took 1 h 45 min and the patient died of bronchopneumonia 11 days later.

The advisors were also concerned that a significant number of procedures appeared to be performed, often on elective trauma lists, by consultants without any trainees present in theatre. Managing trauma in the frail and elderly requires considerable expertise and every opportunity should be taken to involve trainees in the management of these cases.

## Seniority

### Key Points

- *The physical status of the patient, not just the procedure, should determine the seniority of surgeons and anaesthetists involved in perioperative management and undertaking procedures in the elderly.*
- *There is wide variation in the experience and qualifications of non-consultant staff undertaking emergency orthopaedic surgery. Consultants' delegation should be appropriate to the needs of individual patients.*

The overall level of consultant input into the management of orthopaedic patients was commendably high at 88%. For urgent and emergency admissions the level was 555/633 (88%) and for fractures of the neck of femur it was 488/559 (87%).

NCEPOD repeatedly raises concerns about the seniority of surgeons and anaesthetists performing procedures in the elderly. It is difficult to make accurate comments, however, because trainees and non-consultant career grades (NCCG) have very varying degrees of experience.

Comparison with data from 1995/96<sup>43</sup> shows an increasing number (135/633, 21%) of emergency and urgent admissions are having surgery undertaken by NCCGs. Some of these surgeons are relatively inexperienced in emergency surgery, and in 36/135 (27%) cases the surgeon did not possess a post-basic qualification.

In 31/135 (23%) cases NCCGs undertook surgery following emergency or urgent admission without seeking advice from consultants. It is important that consultants follow the guidance from the Royal College of Surgeons regarding appropriate delegation to members of the surgical team: *“The extent to which any invasive procedure can be delegated must depend upon the consultant*

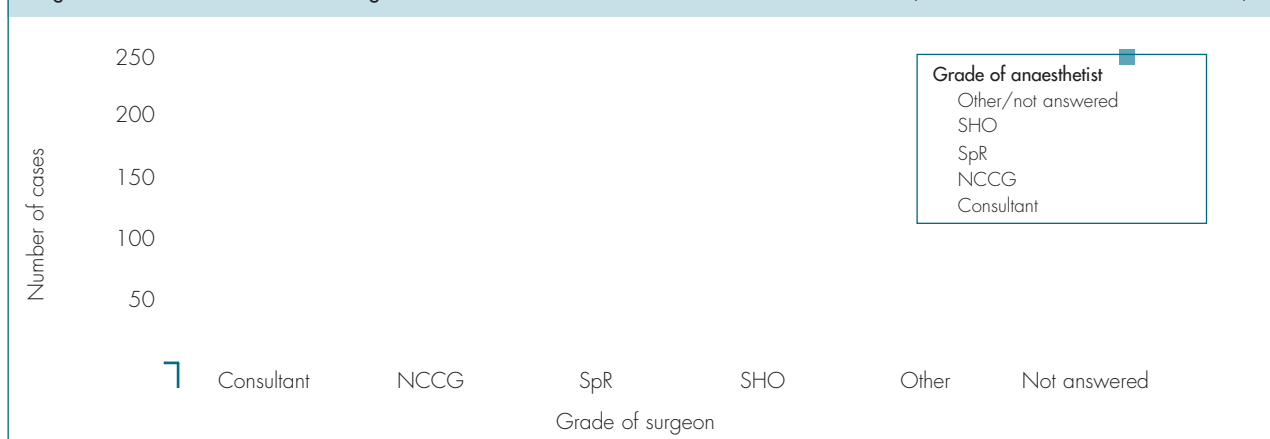
*knowing the ability and experience of the team, whether permanent or locum.”*<sup>44</sup>

Of the 559 patients treated for fractures of the neck of femur, in 117 (21%) cases the most senior surgeon present at the procedure was an NCCG. The range of experience was from four months to 30 years (mean six years and six months) in orthopaedics. The number of similar procedures performed in the previous 12 months ranged from two to 400 (mean 46) but these figures should be viewed with caution, since they were almost all multiples of five or ten, and it is possible that some gave the total number of procedures undertaken in that grade, rather than the number for the previous 12 months.

To put the death rate into context, data from Hospital Episode Statistics<sup>45</sup> for the same period indicate that there were 4707 Finished Consultant Episodes (FCEs) in Trauma and Orthopaedics, where the patient was 90 years or over when discharged or at the time of death, following a diagnosis of fractured neck of femur. Of these, 2207 had hemiarthroplasty or total hip replacement, with a 30-day mortality of 272 (12%), and 1640 had a sliding hip screw, with a 30-day mortality of 161 (10%).

It is interesting to note that there were 584 FCEs in which no operation was recorded and the mortality rate was 28% (162/584).

Figure 3.5: Grade of most senior surgeon and anaesthetist in theatre for fractured neck of femur (414 cases where full data available)



## Delay and organisation of trauma lists

### Key Point

- *There should be sufficient, fully-staffed, daytime theatre and recovery facilities to ensure that no patient requiring an urgent operation waits for more than 24 hours once fit for surgery. This includes weekends. There will need to be consultant expansion and a modification of job plans to ensure that trauma lists continue to be consultant led.*

The original CEPOD report of 1987<sup>46</sup> highlighted the deficiencies in provision of facilities for the management of trauma nationally, with 66% of cases operated on by non-consultants having had surgery performed out of normal working hours. This state of provision of care was rightly considered to be unacceptable, particularly considering that 73% of trauma cases had ASA grades of three or more. The response to this was the establishment of theatre lists dedicated to trauma - variously called trauma, urgent surgery or CEPOD lists. It is disappointing to note that despite 97% of orthopaedic cases being undertaken in hospitals having established daytime orthopaedic trauma lists, 50% of orthopaedic cases were still treated by non-consultants out of hours.

Whilst the increase in daytime trauma lists is welcomed, there remains a deficiency in service provision, with 87/463 (19%) orthopaedic cases undertaken in hospitals with a daytime orthopaedic trauma list having their surgery delayed for non-medical reasons, usually stated as lack of theatre time.

Most orthopaedic trauma cases are classified as urgent (not emergency) and out of hours surgery is seldom undertaken. As the trauma workload increases due to the ageing population and the increased expectations of patients and their relatives, there will be an increasing demand for dedicated trauma lists. This will be further compounded by the concentration of trauma from smaller units with minimal trauma workload into units serving populations of approximately 500 000 as envisaged in 'Provision of Acute General Hospital Services'<sup>47</sup>. In order to facilitate this rationalisation of services there will need to be considerable expansion of consultant numbers to achieve the optimal level of one consultant orthopaedic surgeon for 30 000 population.

Historically, the provision of trauma resources has been reactive rather than proactive and with long time lags. In the sphere of elective surgery this has not been the case, particularly with up to date information systems which permit accurate tailoring

of resources to need within narrow tolerances. In the trauma sphere there is no such organisation since one of the major driving forces for it is missing, namely a waiting list.

Should there be formal trauma waiting lists of patients who are medically optimised for surgery?

Should combined or shared care of elderly patients, with care of the elderly physicians, become the norm rather than being present in only 118/559 (21%) patients with fractured necks of femur as found in this report?

With modern information systems this list of medically optimised patients could be readily monitored against a waiting time standard (24 hours has been recommended by the British Orthopaedic Association<sup>48</sup> with respect to fractured neck of femur). In 289/633 (46%) urgent or emergency orthopaedic admissions, there was a delay of two days or more between the decision to operate and operation. Advisors identified 49/648 (8%) cases in which they were particularly concerned about organisational delays. In a number of cases the delay was attributed to there being no time on the next available trauma list and, since these were usually not performed at weekends, this accounted for a substantial delay in a number of cases. Of necessity there would have to be greater redundancy in provision to allow for peaks, and theatre hours available would have to be based on the statistical mode, not the mean, of workload.

## Urinary catheterisation

### Key Points

- *Fluid management is often deficient. All clinicians should understand the fluid requirements of the elderly, and ward staff should have robust systems for identifying significant deviations from expected care both pre and postoperatively.*
- *Studies need to be undertaken to establish the relative advantages and disadvantages of using urinary catheters in orthopaedic trauma patients.*

In 59/648 (9%) cases advisors were concerned about fluid management. The general level of record keeping was poor, and in many more cases it was impossible to determine either fluid intakes or outputs in the perioperative period. The fact that record keeping was so poor must raise the suspicion that fluid management was even poorer than in the 9% of cases where records were sufficiently complete to definitely identify deficiencies (see also page 71).

Only 132/633 (21%) patients had a urinary catheter inserted preoperatively in urgent and emergency orthopaedic admissions. Not only did this make the measurement of urinary output difficult but, in a number of cases, patients were noted on the fluid charts to be sitting in wet beds. In 48/501 (10%) patients who did not have a catheter inserted there was known to be pre-existing renal disease.

**CASE 31** • A patient underwent a sliding hip screw for fractured hip following a six day delay during which the bed was noted to be wet and fluid balance could not be adequately assessed.

**CASE 32** • A patient underwent a sliding hip screw for fractured hip. It was noted that the bed had been wet for three days. There was no fluid chart but the patient was hypokalaemic, incontinent, dehydrated and went into renal failure.

There appears to be a need to establish guidelines for the use of urinary catheters in the elderly, weighing up the advantages in terms of fluid balance management and the potential disadvantages of postoperative infection, both of the urinary tract and of the orthopaedic prosthesis. Of the 414 patients treated for fractured neck of femur, for whom an anaesthetic questionnaire was returned, only 279 (67%) received a general anaesthetic. Those patients who have undergone epidural anaesthesia, particularly males, are at a greater risk of developing postoperative urinary retention.

There is a paucity of research into the risk of postoperative complications in elderly orthopaedic

trauma patients who undergo urinary catheterisation. Such published work as is available is equivocal regarding the risks and benefits of urinary catheterisation in orthopaedic patients. The widespread dogma relating to increased infection rates in prostheses appears to be an extrapolation of work carried out in patients undergoing elective hip replacement to the trauma situation, which may not be valid. What is clear from this enquiry is that perioperative fluid management in orthopaedic trauma patients is deficient and could be improved by the appropriate selective use of urinary catheters.

### Management of impacted intracapsular fractures

Minimally displaced subcapital fractures represent a small but important proportion of all proximal femoral fractures.

In a number of cases patients had presented initially with hip pain or a history of a fall and had been falsely reassured:

*“It can't be broken if she can walk”*

There were cases where doctors had failed to spot the fracture on the radiograph and other cases in which no radiographs had been taken. All clinicians and others involved in the care of the elderly need to be aware of this problem and have a high index of suspicion.

**CASE 33** • A 94-year-old ASA 4 patient attended A&E following a fall at the nursing home. A radiograph did not demonstrate a fracture at that time, but two weeks later she returned because of immobility and increasing pain and was found to have a subcapital fracture of the femur. She died five days after a hemiarthroplasty. Despite the patient's physical status she received treatment in a hospital which did not have an HDU bed.

Management decisions in this frail group of patients should not be delegated to inexperienced surgeons. A careful evaluation of patient factors and an

understanding of the fracture pattern are necessary for a proper decision to be made. The choice of *in situ* fixation or hemiarthroplasty should be made in the knowledge that if fixation of the fracture fails there is a very high mortality rate associated with a second procedure. Conservative management of an impacted fracture in this group of patients should

be used with caution. These patients are often unable to comply with an instruction to limit weight bearing and the secondary displacement will require a more major procedure than fixation *in situ*. Inevitably this will give rise to greater morbidity and mortality.

## Deaths due to cement reaction

### Key Point

- *Cement reactions, whilst infrequent, are often lethal in the elderly. Guidelines should be available for the management of cement related complications.*

Twelve patients suffered a severe intraoperative reaction following insertion of cement into the femoral shaft. There were wide variations in the management of hypotension in these cases. It is recognised that cementation of hemiarthroplasties is sometimes the preferred method of dealing with fractures of the femoral neck. The physical status

of the patient in whom cement is to be used should be optimised. Particular care should be taken to correct hypovolaemia and electrolyte imbalance preoperatively. The relative indications and contraindications for the use of cement need to be established.

## Thromboembolic prophylaxis

### Key Point

- *Studies are still required to determine the place of thromboembolic prophylaxis in orthopaedic patients.*

In only 393/648 (61%) cases were precautions taken to prevent venous thromboembolism.

In the orthopaedic sample, the number of reported cases of definite death from pulmonary embolism established at postmortem was 32, but only 32% of the orthopaedic sample underwent postmortem examination. Of these patients 22/32 (69%) had received some form of thromboembolic prophylaxis.

The debate regarding thromboembolic prophylaxis in orthopaedic surgery continues. Not only does controversy remain over the different methods and duration of thromboembolic prophylaxis, but even the basic question of whether *any* prophylaxis should be given is still unanswered.

The incidence of venous thrombosis is dependent on the assessment method used. An autopsy study<sup>49</sup>

reported an incidence of deep venous thrombosis of 83%. Studies using routine venography give incidences of 19-91%<sup>50, 51, 52</sup> and between 10-14% for pulmonary embolism when routine isotope lung scans are used<sup>53</sup>. Summation of studies which report on the incidence as diagnosed in clinical practice, give rates of venous thrombosis of about 3% and pulmonary embolism of about 1%. In summary, the 'pathological' incidence of thrombosis is high, and some degree of venous thrombosis probably occurs in all patients after a hip fracture, but the symptomatic incidence of venous thrombosis is low.

The Cochrane meta-analysis of randomised trials of heparin and physical methods for thromboembolic prophylaxis for hip fracture patients indicated that measures such as heparin will reduce the incidence of venographic thrombi from 39% to 24%, and mechanical devices from 19% to 6%. The overall mortality, however, showed a non-significant



increase from 8% to 11% for those patients allocated to receive heparin.

For mechanical devices the trend in mortality was reversed, being lower in those who were allocated to use the devices. This finding of a reduction in the incidence of thromboembolic complication for heparin, but a failure to reduce the overall mortality, has been demonstrated in previous meta-analysis<sup>54</sup>.

Consensus statements have given unequivocal recommendation that thromboembolic prophylaxis must be used for hip fracture patients<sup>55, 56, 57</sup>. These are at odds with the more recent Cochrane meta-analysis which, whilst confirming that thromboembolic prophylaxis will reduce the risk of thrombotic events, fails to establish whether this benefit is offset by other adverse events affecting the overall mortality.

For the foreseeable future thromboembolic prophylaxis will remain a controversial topic. The PEP (pulmonary embolism prevention) trial should be able to give information on the possible benefits of aspirin when the results are released.

Until large-scale randomised trials of different methods of prophylaxis are undertaken, with full reporting of all outcomes (not just thromboembolic complications), many questions on the benefits and risks of thromboembolic prophylaxis will remain unanswered.

## Audit

Sixty percent (389/648) of cases were considered at an audit meeting. In the era of clinical governance should all deaths be considered?

## Key Points

- The decision whether or not to operate on these elderly patients is frequently difficult and should be made at consultant level.
- Preoperative resuscitation and optimisation is of paramount importance, especially in terms of fluid balance.
- An accurate method of assessing the risk of surgery is required. P-POSSUM is suggested as a possibility.
- The experience of the surgeon and anaesthetist should be tailored to the needs of the patient, not just the technical skill required for the procedure.
- A number of patients, in whom the initial diagnosis from their symptoms was a hernia, were found at operation to have obstruction or peritonitis from other causes.
- More careful investigation might prevent futile major surgery in patients with disseminated malignancy.

There were 360 questionnaires returned by general, vascular and A&E surgeons. The 81 vascular procedures are described elsewhere (see page 93). The remaining 279 general surgical cases are considered in this section. The most common procedures were laparotomy (141/279, 51%) and hernia repair (35/279, 13%).

## Consultant involvement

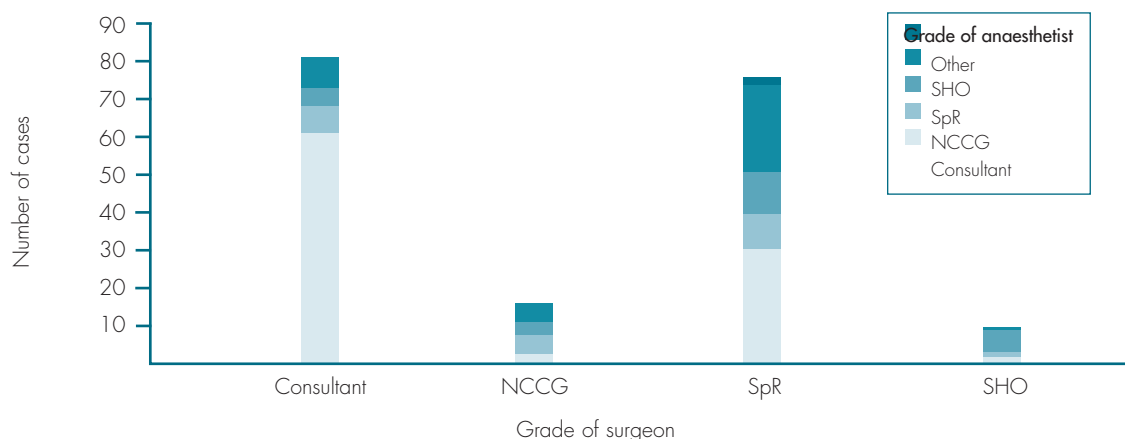
A consultant was involved in the decision to operate in 242/279 (87%) general surgical cases.

Whilst consultant involvement in decision-making was high, in these very frail and elderly patients the decision as to whether or not an operation should be performed should ideally be made at consultant level in *all* cases.

The consultant surgeon was in theatre in 160/279 (57%) cases.

The presence of the consultant in theatre in only 57% of cases certainly leaves room for improvement. General surgical consultants need to have timetables which leave them free to help with emergencies without other routine commitments, such as outpatients or elective operating lists. The level of availability of daytime emergency theatres for general surgery needs to be increased from the present level of 77%. This is a crude figure, and only indicates that daytime emergency theatres are available some of the time. In order to be effective, daytime emergency theatres should be available every day *including weekends*, and should be fully and appropriately staffed.

Figure 3.6: Grade of most senior surgeon and anaesthetist in theatre for general surgical cases (185 cases where full data available)





## ASA status

ASA grade	Number
ASA 1	1
ASA 2	38
ASA 3	138
ASA 4	86
ASA 5	14
Not answered	2
<b>Total</b>	<b>279</b>

The majority of the patients were assessed as ASA grades 3 or 4. Whilst this is a useful method of assessing the physical status of a patient it was never intended to predict the likely outcome of surgery. The Physiological and Operative Severity Score for Enumeration of Mortality and Morbidity (POSSUM) provides a possible better tool for risk adjustment<sup>58</sup>. A revised method of prediction of death, the Portsmouth Predictor Equation (P-POSSUM)<sup>59</sup> has also been proposed. This has been found particularly applicable to predicting outcome in vascular surgery<sup>60</sup>.

The advisors felt that P-POSSUM is probably the best predictive scoring system available and would be useful for patient information to allow comparisons between individual surgeons and units and to give appropriate weight to case mix considerations.

**CASE 34** • A 92-year-old lady had an anterior resection for carcinoma of the rectum, following which she had a myocardial infarction, atrial fibrillation and hypotension. She developed a respiratory infection, congestive cardiac failure and a low serum albumin when she had an anastomotic leak. She died following a subsequent laparotomy for this.

P-POSSUM would predict a 99% risk of mortality for this second operation.

**CASE 35** • A 92-year-old man, with no other medical problems (ASA 1), had a palliative right hemicolectomy.

P-POSSUM would still predict a 37% risk of mortality.

## Delays in referral or admission

In 20 general surgical cases there was a perceived delay in either referral or admission (Table 3.26).

Reason	Number
Delayed diagnosis or referral by medical team	8
Delay in referral by GP	6
Patient initially refused admission	1
Delay in obtaining CT scan	1
No bed available for transfer of patient	1
Insufficient information given	3
<b>Total</b>	<b>20</b>

## Preoperative preparation

Preoperative preparation was frequently less than ideal, particularly from the point of view of fluid balance, given that 244/279 (87%) patients were either emergency or urgent admissions.

Of the urgent and emergency admissions, 196/244 (80%) had coexisting medical problems other than the main diagnosis. Only 29/196 (15%) of these patients had formal shared care.

A quarter (14/56) of patients with pre-existing respiratory problems did not have any appropriate preoperative precautions or therapeutic manoeuvres undertaken. The importance of optimising a patient's condition, and in particular ensuring adequate oxygen delivery prior to major surgery, has recently been highlighted<sup>61</sup>.

Seven patients admitted as urgent or emergency cases had no preoperative preparation at all. Given their ASA status, the fact that all of these patients had pre-existing medical problems, and the surgical diagnosis and procedure undertaken, some preoperative preparation might have been appropriate in these patients. The cases were as follows:

ASA	Operation	Diagnosis
3	Removal of skin cancer and skin graft	Squamous cell carcinoma leg
4	Flexible sigmoidoscopy	Pseudo-obstruction
3	Right hemicolectomy for carcinoma	Carcinoma of ascending colon
3	Left groin exploration for obstructed inguinal hernia	Obstructed left inguinal hernia
2	Mastectomy, latissimus dorsi flap and skin graft	Carcinoma right breast

ASA	Operation	Diagnosis
3	Gastroscopy and dilatation	Benign oesophageal stricture
3	Upper GI endoscopy	Oesophageal stricture

The reader is referred particularly to the section on perioperative fluid management on page 65.

## Femoral hernia

The 1991/92 NCEPOD report<sup>6</sup> dealt with the surgical management of strangulated hernia. This was defined as a hernia in which the contents of a sac had interrupted the blood supply leading to impaired viability of the contents. At that time 5000 primary femoral hernia repairs were performed on adults over the age of 16 each year. One hundred and twenty deaths occurred in England in 1990 as a result of femoral hernia complications and the comment was made that “despite the fact that these patients were elderly and ill, resuscitation was often inadequate and surgery hasty”. Forty-four percent of procedures were performed out of hours and consultants were rarely involved in management.

In the 1991/92 report, 70 questionnaires relating to the management of hernia were analysed. Of

these, 39 were femoral, 14 inguinal, 7 umbilical, five incisional and five other.

That report highlighted *inter alia* the need for consultant input, because of the predominantly elderly age group and high incidence of comorbidity, the need for adequate preoperative resuscitation and the need to consider whether surgery is appropriate at all.

### Femoral hernia in the elderly today

Twenty-one patients in this sample had operation for repair of femoral hernia. The operative approach was a local femoral incision in ten patients, in two patients a pararectus (McEvedy) approach was used and in nine patients a laparotomy. Twelve of these patients also had resection of small bowel. The details are shown in Table 3.27.

Strangulated femoral hernia is a dangerous condition and is particularly common in elderly females. The sooner the patient is taken to theatre the more likely it is that bowel will be viable and resection avoided. However, this must be balanced against the need to get patients fit for theatre, particularly their fluid and electrolyte balance and the management of heart failure, to maximise their chances of surviving the operation. There is sometimes a place for preoperative admission to the HDU for close supervision of resuscitation.

Table 3.27: Femoral hernia repair

ASA grade	Grade of surgeon	Grade of anaesthetist	Emergency /Urgent	Operative approach	Bowel resection
5	Consultant	SHO 2	Urgent	Femoral	No
5	Consultant	Not known	Urgent	McEvedy	No
5	Clinical assistant	Not known	Urgent	Laparotomy	Not known
4	SpR 1	SHO 2	Urgent	Femoral	Yes
4	Senior SHO	SHO 2	Urgent	Femoral	Yes
4	SpR 4	Consultant	Urgent	Laparotomy	No
4	Associate specialist	SHO 2	Urgent	Femoral	No
4	SpR 3	Consultant	Urgent	Femoral	No
4	Visiting SpR	Staff grade	Urgent	Laparotomy	Yes
3	Visiting SpR	SHO 1	Urgent	Pararectus	Yes
3	SHO 2	Not known	Urgent	Femoral	Yes
3	SpR 2	Consultant	Urgent	Laparotomy	Yes
3	Staff grade	Staff grade	Emergency	Femoral	No
3	Other registrar	Not known	Urgent	Laparotomy	Yes
3	Accredited SpR	Not known	Urgent	Femoral	No
3	SpR 4	Consultant	Urgent	Laparotomy	Yes
3	Consultant	Consultant	Urgent	Laparotomy	Yes
3	Staff grade	Not known	Urgent	Laparotomy	No
3	Staff grade	SpR 1	Urgent	Femoral	Yes
3	Staff grade	SHO 2	Urgent	Laparotomy	Yes
3	Locum consultant	Consultant	Urgent	Femoral	Yes

## Incidental hernia

There were ten patients in whom the initial diagnosis of the cause of the symptoms appeared to be a hernia, but who actually had some other pathology with the hernia being merely incidental. Five were femoral, two inguinal, one umbilical, one incisional and one parastomal (Table 3.28).

**CASE 36** • An ASA 4 patient was referred by a general practitioner with a history of abdominal pain and a diagnosis of femoral hernia. The hernia was explored and found to contain omentum only. Twelve days later the obstruction persisted and a left hemicolectomy was performed for a diverticular abscess.

**CASE 37** • An ASA 3 patient was referred by a general practitioner to the general physicians who made a diagnosis of femoral hernia. A laparotomy demonstrated large bowel obstruction secondary to a rectal carcinoma and a Hartmann's procedure was performed.

It can be difficult to tell whether or not the hernia is the cause of the problem, as judged by the fact that there was consultant input in the diagnosis of all these patients. Nevertheless, it is worth bearing in mind that a hernia may not always be the cause of a patient's obstruction or peritonitis.

A consultant should be involved in the diagnosis, which may often be misleading, particularly in the elderly.

## Diagnosis of intestinal obstruction in the elderly

Full assessment and accurate diagnosis are essential if unnecessary or ultimately futile surgery is to be avoided in the elderly. The importance of

hernia has been discussed above. Surgeons should have a high index of suspicion for underlying malignancy in this age group. In suspected large bowel obstruction an unprepared barium enema should be undertaken before surgery, to exclude pseudo-obstruction and confirm mechanical obstruction.

**CASE 38** • An ASA 4 patient in rapid atrial fibrillation underwent decompression of pseudo-obstruction through an appendectomy approach despite a preoperative potassium level of 2.8 mmol/l. Should the consultant surgeon have resisted pressure, in this case from the physicians, to operate?

## Laparotomy for disseminated malignancy

Forty-five patients underwent laparotomies where disseminated malignancies were found. In the majority the indication for surgery was intestinal or gastric outlet obstruction. In these patients laparotomy was performed to relieve obstruction despite the known presence of metastases. Symptomatic relief of intestinal obstruction in patients with widespread malignancy may sometimes be achieved by non-surgical means and consideration should be given to involving the palliative care team.

There were seven patients in whom the indication for surgery, other than "exploratory" was unclear, and in whom the finding was simply one of widespread metastatic cancer (Table 3.29).

Whilst there was a high proportion of consultant input into the management of these patients, the advisors felt that in most of them an ultrasound

Table 3.28: Incidental hernia and other pathology

Type of hernia	Other pathology	Specialty of consultant	Most senior surgeon consulted	Most senior surgeon in theatre
Femoral	Carcinoma of caecum	General and vascular	Consultant	SHO 2
Femoral	Mesenteric ischaemia and bowel infarction	General and colorectal	Consultant	SpR 4
Femoral	Stenosing carcinoma of upper rectum	General and vascular	Consultant	Accredited SpR
Femoral	Diverticular abscess	General and gastroenterology	Consultant	Consultant
Femoral	Gastric carcinoma	General and vascular	Consultant	Consultant
Incisional	Perforated colonic carcinoma	General and gastroenterology	Consultant	Consultant
Inguinal	Perforated duodenal ulcer	General and vascular	Consultant	Visiting SpR
Inguinal	Perforated sigmoid colon	General	Consultant	SpR 3
Parastomal	Abdominal adhesions	General and gastroenterology	Consultant	Consultant
Umbilical	Mesenteric embolus	General and vascular	Consultant	Consultant

scan, and perhaps in some a CT scan, might have established the diagnosis and prevented an unnecessary laparotomy.

Early involvement of the palliative care team might also have prevented the need for a surgical approach to symptom relief in some patients.

## Bowel resection

Of 67 patients undergoing bowel resection only 35 (52%) received preoperative prophylactic antibiotics. There is strong evidence to support the use of antibiotic prophylaxis where bowel resection is planned or probable<sup>62</sup>. Table 3.30 summarises the 32 cases where no antibiotic prophylaxis was used.

Table 3.29: Laparotomy for disseminated malignancy

Finding on laparotomy	Specialty of surgeon	Most senior surgeon consulted	Most senior surgeon in theatre
Metastatic carcinoma of stomach	General and hepatobiliary	SpR 3	SpR 3
Metastatic carcinoma of gall bladder	General and gastroenterology	Consultant	Consultant
Widespread metastases, ? primary	General and breast	Consultant	Consultant
Widespread metastases, ? primary	General and gastroenterology	Consultant	Consultant
Widespread metastases, ? primary	General and gastroenterology	Consultant	Consultant
Advanced carcinoma of colon and other metastases	General and gastroenterology	Consultant	Consultant
Widespread metastases, ? primary	General and vascular	Consultant	Consultant

Table 3.30: Patients undergoing bowel resection without preoperative antibiotic prophylaxis

Diagnosis	Operation
Caecal cancer with abscess	Extended right hemicolectomy (en bloc abdominal wall and bladder), sigmoid colectomy
Sigmoid colon carcinoma	Sigmoid colectomy
Major rectal bleed	Gastroscopy. Proceed to laparotomy with intraoperative colonic irrigation and colonoscopy to identify site of bleeding. Right hemicolectomy.
Strangulated right femoral hernia	Exploration and repair through pararectus approach of strangulated femoral hernia and small bowel resection
Bowel obstruction, near perforation	Extended right hemicolectomy
Bowel obstruction	Limited right hemicolectomy
Carcinoma of caecum	Right hemicolectomy
Peritonitis	Right hemicolectomy, end ileostomy and mucous fistula
Perforated ulcer	Extended right hemicolectomy
Caecal volvulus	Laparotomy, right hemicolectomy
Large bowel obstruction/perforation	Laparotomy, right hemicolectomy
Peritonitis perforated intra-abdominal viscus	Sigmoid colectomy (Hartmann's procedure)
Carcinoma of colon and bowel obstruction	Right hemicolectomy
Small bowel obstruction	Right hemicolectomy
Caecal carcinoma (on barium enema and colonoscopy)	Right hemicolectomy
Intestinal obstruction	Sigmoid colectomy
Intestinal obstruction	Untwisting of volvulus of sigmoid and sigmoid colectomy
Small bowel obstruction	Laparotomy, small bowel resection for strangulated internal hernia secondary to adhesions
Small bowel obstruction	Laparotomy, freeing of band adhesion, small bowel resection and anastomosis
Small bowel obstruction	Laparotomy and freeing of small severe radiation enteritis of small bowel
High intestinal obstruction ? pyloric stenosis	Laparotomy, small bowel resection, repair left femoral hernia
Carcinoma of ascending colon	Right hemicolectomy for carcinoma of ascending colon
Small bowel obstruction due to caecal carcinoma	Right hemicolectomy
Large bowel obstruction with local perforation to caecum	Subtotal colectomy and ileorectal anastomosis
Bowel obstruction	Extended right hemicolectomy, division of adhesions
Sigmoid colon diverticular perforation with abscess formation	Left hemicolectomy for right femoral hernia
Fluid depletion, irreducible right femoral hernia, causing small bowel obstruction	Exploration of right femoral hernia under LA, converted to general anaesthesia. Laparotomy and resection of necrotic Meckel's diverticulum with end-to-end small bowel anastomosis

Diagnosis	Operation
Small bowel obstruction	Division of adhesions, small bowel resection
Carcinoma rectosigmoid	Sigmoid colectomy
Intestinal obstruction pneumonia	Right hemicolectomy
Small bowel obstruction, probably secondary to strangulated right femoral hernia	Laparotomy, small bowel resection and repair right femoral hernia
Right strangulated femoral hernia	Exploration right femoral hernia, resection of small bowel and femoral herniorrhaphy

## Denominator figures

A previous criticism has been the lack of denominator data available for use by NCEPOD. The surgical advisors performed an audit of those patients aged 90 years or over operated on between 1 April 1997 and 31 March 1998 in their own hospitals. The overall 30-day death rate was approximately 20%.

Since this group of vulnerable patients is a small percentage of the total treated in any one unit each year, it is important that local audit is performed over several years, and compared with national standards, to avoid drawing invalid conclusions. Until good quality denominator data are available, any conclusions drawn with regard to comparative study of death rates should be viewed with extreme caution. The heterogeneity of surgical practice in different units means that qualitative peer review remains important in identifying deficiencies in the standard of care.

## Thromboembolic prophylaxis

Thromboembolic prophylaxis was used in 212/279 (76%) of the general surgery patients.

These were very elderly patients and should all have had some form of prophylaxis against venous thromboembolism.

## Audit

A total of 74% (207/279) of general surgery deaths in this sample were considered in an audit meeting.

This is a commendably high figure but, with the introduction of clinical governance, should all deaths now be considered at an audit meeting?

## Pathways of care

The advisors felt that one way of improving postoperative management of patients might be by the use of 'pathways of care', particularly in relation to overcoming difficulties surrounding information handover caused by the limitations on junior doctors' hours.

Could 'pathways of care' help identify deviations from the expected progress of patients and assist in prioritisation of care, particularly where multiple nursing and medical staff changes occur?

## Key Points

- Consultants were involved in the care of all patients.
- Sixty-six percent of patients were operated on by a consultant, but in only half of these were trainees present. Is this a missed training opportunity?
- General anaesthesia was used for a number of simple procedures where local anaesthesia might have been preferable in these frail patients.
- Check cystoscopy guidelines should take into account the risks due to the high incidence of comorbidity in the elderly.

Thirty questionnaires were received from urologists. The quality of care was generally high; criticisms are relatively minor. Consultant involvement in care was 100% and only one non-medical delay was reported.

Table 3.31: Urological procedures

Procedure	Number
Cystoscopy, no other procedure	8
TURBT	7
TURP	5
Revision TURP	1
Cystodiathermy	2
Insertion of prostatic stent	1
Urethral dilatation and removal of calculi	1
Clot evacuation	1
Urethroscopy and bladder neck incision	1
Urethrotomy	1
Deflation of catheter balloon	1
Urethroscopy and litholopaxy	1
<b>Total</b>	<b>30</b>

Twenty operations were performed by a consultant, and consultants were involved in decision-making in all 30 cases. There was some concern that in only 50% of cases where a consultant was operating was a trainee present and benefiting from training in the management of this difficult group of elderly patients.

The majority of cases (18/30) were considered at audit meetings.

There was some concern that general anaesthesia was employed too often in the elderly where local anaesthesia might have been more appropriate.

**CASE 39** • A 92-year-old ASA 3 patient underwent general anaesthesia to deflate a catheter balloon. Was this appropriate?

**CASE 40** • A 90-year-old ASA 3 patient had a general anaesthetic

(GA) administered by an SHO 1, for a urethral stricture. The patient died of a post operative MI. Could GA have been avoided here? Was the anaesthetist suitably experienced?

Bleeding from transitional cell bladder carcinoma was the most common indication (9/30) for surgery closely followed by outflow obstruction (8/30).

The advisors wondered if a policy of check cystoscopy was always appropriate.

**CASE 41** • A 94-year-old ASA 3 patient underwent check cystoscopy and biopsy under general anaesthetic. She had already had radiotherapy and further treatment other than palliation was unlikely to be available.

In a few cases the diagnosis could probably have been made using non-invasive imaging modalities rather than submitting the patient to procedures under GA or sedation.

**CASE 42** • A 91-year-old ASA 4 patient underwent GA cystoscopy for haematuria and a pelvic mass. The diagnosis could probably have been established without recourse to a general anaesthetic procedure.

As in the 1994/95 NCEPOD report<sup>9</sup>, the most common cause of death was cardiovascular (8/30), with bronchopneumonia and renal failure being the cause in five each. This is not surprising, since 17/30 had pre-existing cardiovascular disease. Perhaps it is a little surprising then that only 7/26 patients with comorbidity enjoyed the benefit of shared care.

## NEUROSURGERY

### Key Point

- *In elderly patients with confusion, if the diagnosis is unclear, a CT or MRI scan of the head should be performed promptly, so that surgically remediable intracranial conditions can be identified.*

Two deaths were reported in this specialty; both cases were admitted to medical wards. In one patient there was a delay of eight days between the request and obtaining a CT scan. In the other patient a CT scan was not requested for ten days in an elderly confused patient.

Although this counsel is often recognised by practitioners, the general lack of resources for CT and MRI scanning in many hospitals leads to delays.

## VASCULAR SURGERY

### Key Points

- *The decision whether or not to operate on these elderly patients is frequently difficult and should be made at consultant level.*
- *It is questionable whether any patient of 90 years or over should have a ruptured aortic aneurysm repaired.*
- *It is important for an anaesthetist of suitable experience to be present during embolectomy under local anaesthetic, for appropriate sedation, monitoring and resuscitation.*
- *Embolectomy should be performed by surgeons who have sufficient vascular experience and expertise to be able to perform an arterial bypass operation if required.*

Eighty-one questionnaires were received concerning patients who died following vascular procedures. The full list of procedures is shown in Table 3.32.

Table 3.32: Vascular procedures  
(81 cases; procedures may be multiple)

Procedure	Number
Repair of leaking abdominal aortic aneurysm	4
Femoral embolectomy	22
Brachial embolectomy	5
Axillofemoral bypass	1
Femorofemoral crossover graft	1
Femoropopliteal bypass	4
Femorotibial bypass	2
Femoral endarterectomy	1
Above knee amputation	26
Critti-Stokes (supracondylar) amputation	1



Procedure	Number
Below knee amputation	6
Amputation of toes	6
Debridement of toe wound	1
Debridement of BK amputation stump	1
Debridement of heel ulcer	1
Debridement of leg ulcer	1
Debridement of leg for necrotising fasciitis	1

## Leaking abdominal aortic aneurysm

Table 3.33: Repair of leaking abdominal aortic aneurysm

Age	ASA grade	Comorbidity	Grade of surgeon making decision	Grade of most senior surgeon at operation	Grade of most senior anaesthetist	Length of operation	Number of days from surgery to death	Place of death
91	3	Cardiac and renal disease	Consultant	Consultant	Consultant	2 h	0	Operating theatre
92	3	Chest infection	Consultant	Consultant	Consultant	1 h 30 min	3	Ward
90	4	Cardiac disease	Consultant	SpR with CCST	Not known	3 h 30 min	1	ICU
91	4	Renal disease	Consultant	Consultant	SpR 3, consultant came to theatre later	3 h 30 min	5	ICU

There was good consultant input from both surgeons and anaesthetists and no operation was unduly long. However, it is questionable whether any patient of 90 years or over should have a ruptured aortic aneurysm repaired, especially if there is significant comorbidity.

performed under local anaesthetic. The anaesthetist is needed for proper management of sedation, performance of appropriate monitoring, control of acidosis, particularly at the time of restoration of the circulation when the clamps are released, and for resuscitation.

## Embolectomy

Nearly all embolectomies were performed under local anaesthetic, with four patients receiving a general anaesthetic and one a plexus block. In only seven out of the 22 local anaesthetic operations was an anaesthetist present (32%). An anaesthetist should always be present during an embolectomy even though the majority in this age group are

### *Success of embolectomy and specialty of surgeon*

Five patients had a femoral embolectomy, performed by a surgeon who did not profess to have a special interest in vascular surgery, where the procedure failed to restore the circulation and no further therapeutic manoeuvre was undertaken (Table 3.34).

Table 3.34: Failure of embolectomy to restore circulation

Age	ASA grade	Grade of surgeon making decision	Specialty of surgeon making decision	Grade of surgeon at operation
94	3	Consultant	General and gastroenterology	SpR 3
93	3	Consultant	General, breast and gastroenterology	Consultant
92	4	Consultant	General and gastroenterology	Consultant
93	4	Staff grade	General and urology	Staff grade
93	4	Locum registrar	General and gastroenterology	Locum registrar



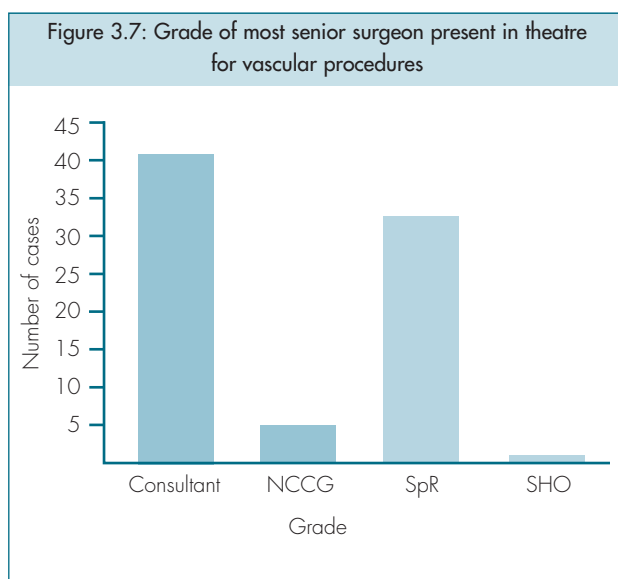
In these five patients embolectomy failed to restore the circulation and it is likely that the operation was inappropriate, since the problem was probably an arterial thrombosis rather than an embolus. Whilst there is an argument for trying embolectomy under local anaesthetic in a very frail and elderly patient, the advisors considered that the surgeon should at least have the experience to know when a patient might benefit from a bypass procedure at the same operation, and should have the expertise to be able to proceed to this if necessary. In none of the five cases in Table 3.34 was this done.

## Amputation

Amputation was the most common vascular procedure and it is interesting to note that of the lower limb amputations 26 were above the knee while only six were below knee level. This is in contrast to amputations in younger age groups. The Scottish Vascular Audit Group has also shown a higher incidence of above, compared with below, knee amputations in those aged over 80 years, compared with younger patients<sup>63</sup>; it also showed that increasing age was an independent risk factor for 30-day mortality. However, although amputation does carry a high mortality risk, it is frequently the only way of obtaining satisfactory pain relief.

## Surgical consultant involvement

In 72/81 (89%) cases a consultant surgeon was involved in the decision to operate. This is highly commendable, but the proportion of patients where the consultant either performed the operation or was present in the operating theatre was only 41/81 (51%); this proportion should have been higher.



## Anaesthetic consultant involvement

In 24/50 (48%) cases where an anaesthetic questionnaire was received the anaesthetic was given by a consultant.

## Decision-making

The decision whether or not to operate in these very old and often frail patients is frequently a difficult one, requiring experience, and should therefore be made at consultant level. Further help may be obtained using the Portsmouth Predictor Equation (P-POSSUM), which is particularly applicable for use in vascular surgery<sup>59, 60</sup> (see also page 87).

## Thromboembolic prophylaxis

Fifty-five of the 81 patients (68%) were given thromboembolic prophylaxis. The incidence should be 100% in elderly patients having vascular surgery.

## High dependency units

**Question 3.10: Does your hospital have an age-related policy for admission to HDU/ICU? (SQ41)**

Yes .....	3
No .....	75
Not answered .....	3
<b>Total .....</b>	<b>81</b>

**Question 3.11: If the patient's condition warranted an admission to an HDU/ICU, were you at any time unable to transfer the patient into an HDU/ICU within the hospital in which the surgery took place? (SQ45)**

Yes .....	2
No .....	26
Condition did not warrant admission to HDU/ICU .....	38
Not answered .....	15
<b>Total .....</b>	<b>81</b>

There should be no age limit for admission to an HDU or ICU. HDU care is desirable for patients following treatment for acute limb ischaemia. If it is considered appropriate to perform a major vascular operation then it is usually also appropriate to have HDU care.

## Audit

Twenty percent of these patients were not considered at local surgical audit meetings. In these days of clinical governance close to 100% should be considered at such meetings.

## OTHER SPECIALTIES

### Key Points

- *Consultant involvement in the care of patients in these specialties is uniformly high.*
- *Involvement in audit appears low, and this is unchanged from the 1994/95 NCEPOD report.*

### Gynaecology

Two gynaecology cases were reviewed from the total of 1077 surgical questionnaires received in this age group.

Consultants operated in both these cases.

In one case, a laparotomy was undertaken on a 93-year-old ASA 3 patient with known malignant ascites from an ovarian carcinoma. Would paracentesis have been a simpler palliative procedure? This case was not considered at an audit meeting.

### Ophthalmology

Eleven ophthalmology cases were reviewed from the total of 1077 surgical questionnaires received in this age group. Consultants were involved in the care of all patients and performed 9/11 procedures. In only one case was a consultant not present in theatre.

Table 3.35: Ophthalmology procedures

Procedure	Number
Unilateral cataract	6
Bilateral cataract	2
Drainage of nasolacrimal duct	1
Evisceration of orbital contents	1
Resuture corneal dehiscence	1
Total	11

In five cases local anaesthesia was administered by the surgeon. In only one case was a general anaesthetic administered, in an ASA 2 patient for drainage of a lacrimal abscess.

Advisors were surprised that one ASA 3 patient, with angina and arrhythmias, underwent bilateral cataract surgery, undertaken by an SpR 1 under local anaesthesia.

In all other cases the level of care was felt to be appropriate.

Only one case was considered at an audit meeting. A low audit rate was also noted in the 1994/95 NCEPOD report.

### Oral and maxillofacial surgery

One case was reviewed from the total of 1077 surgical questionnaires received in this age group. This case demonstrated high quality care. The consultant was involved.

**CASE 43** • A 91-year-old ASA 3 patient was admitted via A&E with facial lacerations. Formal shared care was undertaken between the surgeons and the care of the elderly team. The lacerations were repaired under local anaesthetic, but the patient died of a myocardial infarction five days later.

The case was not, however, considered at an audit meeting. The low involvement in audit of this specialty was highlighted in the 1994/95 NCEPOD report.

### Otorhinolaryngology

Nine questionnaires were received from otorhinolaryngologists from the total of 1077 surgical questionnaires received in this age group.

Consultants were involved in the care of 6/9 patients.

Table 3.36: Otorhinolaryngology procedures

Procedure	Number
Laryngoscopy/pharyngoscopy	4
Oesophageal dilatation and insertion Souttar tube	1
Removal of oesophageal foreign body	1
Laser pharyngeal pouch	1
Tracheostomy and repair neck laceration	1
Tru-Cut biopsy parotid gland	1
Total	9

One case was considered at an audit meeting. The low involvement in audit of this specialty was noted in the 1994/95 NCEPOD report.

## Plastic surgery

Nine questionnaires were received from plastic surgeons from the total of 1077 surgical questionnaires received in this age group.

Consultants were involved in the care of all patients. Consultants operated in 5/9 cases.

Procedure	Number
Mastectomy, latissimus dorsi flap and skin graft	2
Excision skin tumour	2
Wound/burn debridement	2
Above knee amputation	1
Finger amputation	1
Inguinal node dissection	1
<b>Total</b>	<b>9</b>

In one case there was delay in referring an ASA 3 patient with a wrist wound from the primary sector.

In a further patient undergoing mastectomy and latissimus dorsi flap reconstruction, no ICU/HDU facility was available in the hospital. Is it appropriate to be undertaking major cancer and reconstructive surgery without HDU/ICU facilities?

In all other cases care was felt to be appropriate.

Three cases were considered at audit meetings. The 1994/95 NCEPOD report noted the low involvement in audit of this specialty.

## Cardiothoracic surgery

Four questionnaires were received from cardiothoracic surgeons out of the total of 1077 surgical questionnaires received in this age group.

Consultants were involved in the care of all patients.

In all but one patient, undergoing oesophagoscopy and dilatation, operations were performed by consultants.

Table 3.38: Cardiothoracic surgery procedures

Procedure	Number
Aortic valve replacement	1
OGD and insertion NG tube	1
OGD and dilatation	1
Pharyngeal pouch stapling	1
<b>Total</b>	<b>4</b>

Care was felt to be appropriate in all cases. Two out of four cases (50%) were considered at audit meetings.

# PATHOLOGY

## Key Points

- *Systems need to be established to ensure that clinicians always receive copies of Coroner's or hospital postmortem reports.*
- *The patient's medical records should always be available to the pathologist at the time of postmortem.*
- *The Royal College of Pathologists' guidelines may now need expansion and updating, with inclusion of guidance on OPCS formatting for cause of death and examination of the locomotor system.*
- *Clinically unsuspected gastrointestinal complications are commonly found to be the cause, or contribute to the cause, of death following surgery in the elderly.*

## GENERAL

Of the 1077 surgical questionnaires received, 60% (648/1077) were from orthopaedic surgeons. Two hundred and sixty-four (25%) of the returned questionnaires stated that a postmortem (PM) had been performed. Only 140 (53%) postmortem reports were available for scrutiny (127 Coroner's PMs and 13 hospital/consent PMs). The low postmortem rate is not surprising considering the age of the patient group and is not strictly comparable to PM rates in previous years. Six hundred and sixty-seven (62%) cases were reported to the Coroner and a postmortem was ordered in 244 (37%) cases. A further 20 cases had a hospital postmortem performed. No cases were performed by non-pathologists, but one was undertaken by a haematologist.

## THE POSTMORTEM EXAMINATION REPORT

### Clinical history

A clinical history was provided in 83% of Coroner's PMs and 100% of the hospital cases. In 97% of cases the history was satisfactory or better, with only 3% deemed poor or totally inadequate.

### Description of external appearances

Most reports had an adequate description of the external appearances with only five (4%) falling below an acceptable standard. Scars and incisions were measured in 85 (61%) cases.

## Gross description of internal organs

The majority of descriptions of the internal organs were deemed satisfactory or better (89%). In 15 cases (11%) the gross description of the internal organs was thought to be poor or inadequate, or inappropriate to the clinical problem. In the majority of cases (87%), five or more organs were weighed (paired organs counting as one). In eight cases (6%) the skull and brain were not examined. The operation site was described in 100/138 (72%) cases where it was applicable.

## Description of the operation site

Table 3.39: Description of the operation site

Operation site described	Orthopaedic cases		Other cases		Total	
Yes	73	71%	27	73%	100	72%
No	30	29%	8	22%	38	27%
Not applicable	0	–	2	5%	2	1%
Total	103		37		140	

The operation site was less frequently and adequately described in orthopaedic operations than in operations of other types. A high proportion of the postmortem cases were following orthopaedic operations, the majority of which were for fractured necks of femur. In many cases the pathological cause of the fracture was not commented upon and the method used by pathologists to assess bones for osteoporosis was unclear and inconsistent.

## Postmortem histology

Seventeen cases (12%) had postmortem histology performed (13 (10%) of the Coroner's cases and four

(31%) of the hospital cases). In six further Coroner's cases and two hospital cases it was felt by the advisors that histology should have been taken. In only eight (five Coroner's and three hospital) of the 140 cases was a histology report included with the postmortem report. All of these eight reports were graded satisfactory or better. In the majority of the cases histology would have added little or nothing to the value of the postmortem and in only 14 cases was the absence of a histology report thought to detract from the value of the postmortem report.

## Summary of lesions

A summary of the lesions was present in 38 (27%) cases, which in 92% (35/38) of cases corresponded with the text report. In the six hospital cases where a summary was included it was an accurate record of the findings of the PM.

## Clinicopathological correlation and OPCS cause of death

A clinicopathological correlation was present in only 76 (54%) cases. Eleven percent of these were felt to

be poor or inadequate. The majority of the reports (94%) included an OPCS cause of death but in 14% of cases this did not correspond to the text report and in 13% it did not follow OPCS 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 a lack of a clinicopathological correlation or a well formulated OPCS cause of death.

**Table 3.40: Cases where OPCS cause of death given**

OPCS cause of death	1997/98	1996/97	1994/95	1993/94*	1992/93
Yes	131 94%	94%	96%	91%	82%
No	9 6%	6%	4%	9%	18%
<b>Total</b>	<b>140</b>				

\* *The 1993/94 report did not specifically mention an OPCS cause of death but asked "Is a certified cause of death present?"*

In only 64/140 (46%) cases was the operation mentioned in the OPCS cause of death (Table 3.41). Even when death occurred within the first week following operation, only 38/85 (45%) pathologists mentioned the operative procedure in the cause of death.

**Table 3.41: Record of operation in OPCS cause of death**

Day of death	Number of cases		Operation in OPCS cause of death	
Day of operation	15	11%	9	60%
Day 1-7	70	50%	29	41%
Day 8-30	55	39%	26	47%
<b>Total</b>	<b>140</b>		<b>64 46%</b>	

## Overall score for postmortem examinations

**Table 3.42: Quality of postmortem examinations**

Quality of postmortem	1997/98	1996/97	1994/95	1993/94	1992/93	1991/92	1990
Unacceptable, laying the pathologist open to serious professional criticism	4 3%	2%	2%	2%	3%	4%	5%
Poor	23 16%	11%	10%	13%	25%	13%	19%
Satisfactory	59 42%	36%	43%	41%	43%	66%*	56%**
Good	44 31%	37%	41%	39%	25%	66%*	56%**
Excellent, meeting all standards set by RCPATH guidelines	10 7%	13%	4%	5%	4%	17%	20%
<b>Total</b>	<b>140</b>						

\* *the 1991/92 report grouped good and satisfactory.*

\*\* *the 1990 report had a grouping of adequate/satisfactory. Good was not a grouping.*

Table 3.43: History, antemortem clinical diagnosis and cause of death compared with postmortem findings  
(140 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	5	0	5
A discrepancy in the cause of death or in a major diagnosis which, if known, would probably not have affected treatment, outcome or prognosis	15	1	16
A minor discrepancy	1	0	1
Confirmation of essential clinical findings	99	9	108
An interesting incidental finding	12	0	12
A failure to explain some important aspect of the clinical problem, as a result of a satisfactory autopsy	8	2	10
A failure to explain some important aspect of the clinical problem, as a result of an unsatisfactory autopsy	14	3	17

Table 3.42 shows that only four (3%) of the 1997/8 reports were thought to be of a very low standard, often because of their brevity and lack of correlation with the clinical history. Twenty-three (16%) of the cases had a poor report. One hundred and thirteen (81%) were graded satisfactory or better.

Table 3.43 shows that the detection of unexpected findings at postmortem reiterates the findings of previous years with 21 cases (15%) where a major discrepancy between clinical diagnosis and postmortem examination was found and a further 13 cases (9%) where a minor discrepancy or interesting incidental finding was found. In 27 (19%) cases there was a failure to explain some important aspect of the case, but in ten of these the autopsy was felt to have been conducted satisfactorily.

It was not known whether the full medical records

were available to the pathologist at the time of postmortem but it was thought by the advisors that this might improve the clinicopathological correlation, particularly in the more complex cases.

### ATTENDANCE OF THE SURGICAL TEAM AT THE POSTMORTEM

An analysis of all 264 questionnaires indicating that a postmortem had taken place showed that only 53 (20%) surgical teams reported that they had been informed of the time and place of the postmortem. Only 14 clinicians indicated attendance at the postmortem. Lack of attendance was mainly due to unavailability of the surgeon or other commitments (47%) or a feeling that nothing was to be gained from the PM as the diagnosis was already known (8%).

### COMMUNICATION OF THE POSTMORTEM RESULT TO THE SURGICAL TEAM

Table 3.44: Communication of postmortem results to the clinical team

Communication of PM results	1997/98	1996/97	1994/95	1993/94	1992/93	1990
Yes	191 72%	76%	36%	36%	79%	78%
Informal report/verbal message	10 4%	7%	N/A	N/A	N/A	N/A
No	51 19%	15%	52%	55%	18%	19%
Not answered	11					
Not known	1					
<b>Total</b>	<b>264</b>					

N/A denotes information not available. No information available for 1991/92 or 1995/96.



Table 3.45: Time taken for first information to be received by clinical team

Days after patient's death	Coroner's		Hospital		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Less than 8 days	51	29%	5	42%	56	29%
8 days to 30 days	33	19%	2	17%	35	18%
31 days to 60 days	11	6%	0	–	11	6%
More than 60 days	12	7%	1	8%	13	7%
Not answered	72		4		76	
<b>Total</b>	<b>179</b>		<b>12</b>		<b>191</b>	

In 51 (19%) cases the postmortem result was not communicated to the surgeons (Table 3.44). The majority of those who answered the question (91/115) indicated that the reports were received within one calendar month (Table 3.45). The pathological information was thought by the surgeons to confirm the clinical impression in 201 cases. This data is comparable to previous years.

## CAUSE OF DEATH ASSIGNED BY PATHOLOGIST

Table 3.46: Cause of death assigned by pathologist

Cause of death	Number
Cardiovascular disease	62
Pulmonary embolism	7
Pneumonia (excluding aspiration)	39
Aspiration pneumonia	6
Cerebrovascular disease	1
Malignant disease (as cause of death)	3
Gastrointestinal disease	16
Sepsis	2
Other, including old age	4
<b>Total</b>	<b>140</b>

The majority of deaths were due to cardiovascular disease (62) and infective pneumonias (39) which together made up 72% of the causes of death. Pulmonary embolism was uncommon and caused only seven deaths (5%). Two of these were in cases with malignant disease (carcinoma of the colon), three followed procedures for fractured neck of femur, one had a vascular bypass operation and one an amputation for a septic fracture of the arm. Malignant disease was the direct cause of death in only three cases, but was a contributory factor in another seven (Table 3.47). Death was attributed primarily to old age in only two cases, and in one case the term “senile degeneration of the heart” was recorded which was regarded by the advisors as outdated. Only one patient died from a stroke and one was thought to have died from obstructive airways disease.

Table 3.47: Malignant disease as direct or contributory cause of death

Tumour type	Cause of death	Reason for surgery
Carcinoma of ovary	Direct	Large bowel obstruction
Carcinoma of bladder	Direct	Fractured neck of femur
Carcinoma of prostate	Direct	Pathological fractured neck of femur
Carcinoma of stomach	Contributory	Bleeding malignant ulcer
Carcinoma of lung	Contributory	Fractured neck of femur
Carcinoma of lung	Contributory	Fractured neck of femur
Carcinoma of colon	Contributory	Obstructed hernia
Carcinoma of prostate	Contributory	Fractured neck of femur
Carcinoma of colon	Contributory	Large bowel obstruction
Chronic lymphatic leukaemia	Contributory	Fractured neck of femur

## GASTROINTESTINAL COMPLICATIONS

Table 3.48: Gastrointestinal complications in patients undergoing orthopaedic procedures

Orthopaedic condition	OPCS cause of death (1)	Contributory cause of death	Clinical suspicion of GI complication
Fractured neck of femur	Perforated duodenal ulcer	-	Suspected
Fractured neck of femur	Intestinal infarction	-	Suspected
Fractured neck of femur	Perforated diverticular disease	-	Suspected
Fractured neck of femur	Perforated duodenal ulcer	-	Suspected
Fractured humerus	Perforated diverticulitis	-	Suspected
Fractured femur/amputation	Infective colitis	-	Suspected
Fractured neck of femur	Bleeding diverticular disease of colon	-	Suspected
Fractured neck of femur	Ischaemic colitis	-	Suspected
Fractured neck of femur	Pseudomembranous colitis	-	Suspected
Fractured neck of femur	Ischaemic heart disease	Perforated sigmoid diverticulitis	Suspected
Fractured neck of femur	Ischaemic heart disease	Bleeding duodenal ulcer	Suspected
Fractured neck of femur	Aspiration pneumonia	Small bowel volvulus	Suspected
Fractured ankle	Perforated duodenal ulcer	-	Unsuspected
Fractured neck of femur	Perforated diverticulitis	-	Unsuspected
Fractured neck of femur	Perforated oesophageal ulcer	-	Unsuspected
Fractured neck of femur	Pneumonia	Pancreatitis	Unsuspected
Fractured neck of femur	Ischaemic heart disease	Peritonitis due to jejunal diverticulitis	Unsuspected
Fractured neck of femur	Aspiration pneumonia	Perforated pseudomembranous colitis	Unsuspected
Fractured neck of femur	Bronchopneumonia	Perforated duodenal ulcer	Unsuspected
Fractured neck of femur	Old age	Antibiotic associated colitis	Unsuspected

Forty patients had operations for gastrointestinal disease, or had gastrointestinal complications postoperatively, causing or contributing to death. Twenty of these operations were orthopaedic procedures and in eight of these the complications were clinically unsuspected. In three cases these were the direct cause of death as indicated in the pathologist's report (Table 3.48).

### COMMENT

The Royal College of Pathologists' guidelines<sup>31</sup> are in general being followed, with most postmortem reports being of a good standard. A clinicopathological correlation, however, was not present in almost half of the cases studied.

OPCS 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 OPCS 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 OPCS rules may help address this in the future.

The examination of the locomotor system by

pathologists is not as well performed as examination of other organ systems. The site of fracture is not always adequately examined and there is no agreed method of assessing osteoporosis.

Histology would often add little information in the types of case covered by this sample. However, histology should be performed in cases of pathological fracture thought to be due to neoplastic disease.

Very few postmortem examinations are attended by the surgical team, but the majority of clinicians are informed of the cause of death in a timely manner.

Pulmonary embolism appears to be an infrequent cause of death, with cardiovascular disease being the most common cause of death assigned by pathologists in this age group.

'Senile degeneration of the heart' is not an acceptable cause of death, whereas 'old age', when there are no other findings, is at least honest and may well be appropriate in this age group when no other cause is found.

Gastrointestinal complications are a common cause, or contribute to the cause, of death after operations in the elderly. Many of these are unsuspected clinically, particularly after orthopaedic procedures.