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Scottish Audit of Surgical Mortality

Annual Report

2002 data

Index

	Page
Executive summary	3
All deaths	10
Operative deaths – pre-operative data	16
Operative deaths – intra-operative data	20
Operative deaths – post-operative data	23
Operative deaths – assessors' data	24
Non-operative deaths	26
Terminal care deaths	29

Executive Summary

Scottish Audit of Surgical Mortality

2002 data

Key points:

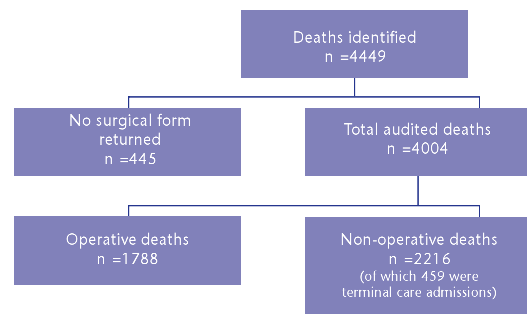
- The number of adverse events in patients who die under surgical care continues to fall for elective and emergency cases.
- The presence at operation of senior clinical staff is increasing; it is greater in patients who die following elective surgery than emergency surgery.
- There continues to be an improvement in post operative care. The number of deaths associated with failure to use High Dependency Units or Intensive Therapy Units continues to fall.
- The percentage of deaths following elective inpatient surgical admission has fallen from previous years to 0.27%. The percentage of deaths following emergency surgical admission was 2.29%.
- There is a growing issue with the pattern of care of an increasingly ageing and frail population within surgical wards. This can be seen in the provision of care for patients admitted as emergencies either with terminal malignancy, non-surgical diagnoses or post-orthopaedic care.

Introduction

This report summarises the SASM data for patients dying under surgical care during 2002.

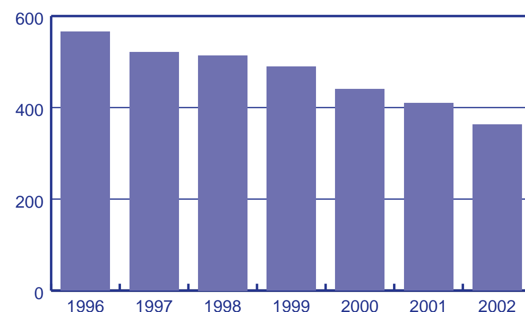
Summary

There were 4449 patients who died in Scotland while under surgical care in 2002.



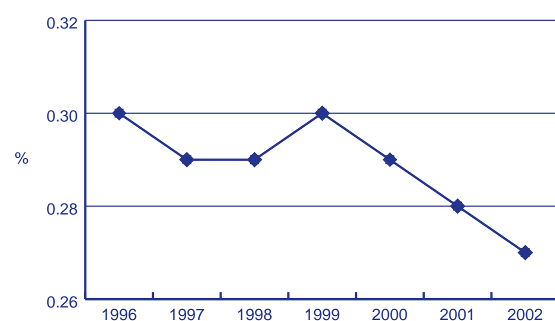
Over the period 1996-2002 the number of deaths following elective admissions for inpatient treatment has fallen.

Number of deaths reported to SASM which followed elective surgical admission, by year



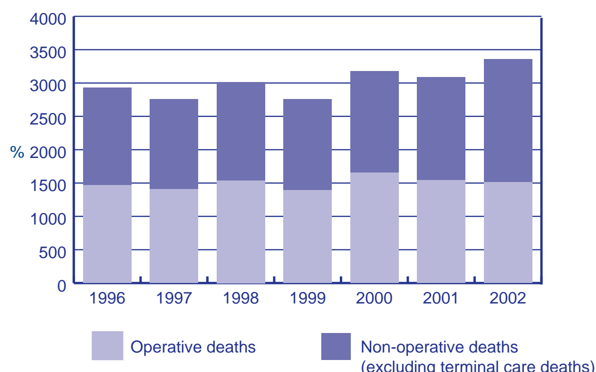
The percentage of elective surgical inpatient admissions that died has also fallen. (The chart below differs from those in previous years with the exclusion of daycase admissions). The mortality rate for elective inpatients for surgical specialities in Scotland is 0.27%.

% of elective surgical admissions who died under surgical care in Scotland, by year



More than 90% of deaths under surgical care followed emergency admission. There has been no increase in the number of operative deaths of patients admitted as an emergency.

Number of deaths reported to SASM which followed emergency surgical admission, by year



In 2002 2.29% of all patients admitted as surgical emergencies died under surgical care.

Care Pathway

Operatives cases

The commonest conditions causing admission which *leads to* post-operative death are shown in order of frequency in the table.

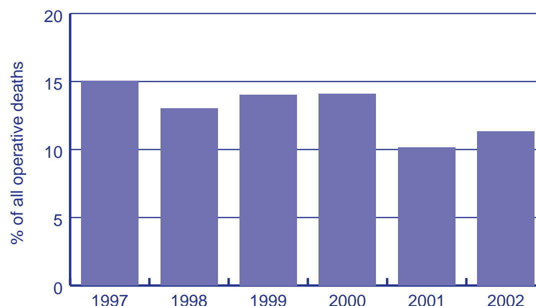
Fracture of neck of femur
Peripheral arterial occlusive disease
Ruptured abdominal aortic aneurysm
Acute intestinal vascular insufficiency
Malignant neoplasm of oesophagus
Perforated diverticulum of colon
Malignant neoplasm of sigmoid colon

These conditions predominantly cause emergency admission.

In addition to the cause for their surgical admission, significant ongoing medical conditions were present in 86% of patients who died (59% cardiovascular, 39% respiratory and 18% renal). In the audited population there was no substantial difference between elective and emergency patients.

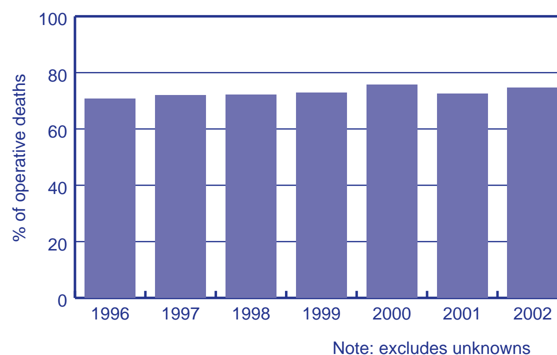
The percentage of cases where the assessors felt that the quality of pre-operative care could have been improved was similar to that for 2001. The commonest pre-operative adverse event was a delay to surgery for a wide variety of reasons.

Surgical assessor or anaesthetic assessor said that the journey of care up to the point of operation (including pre-admission) could have been improved, by year



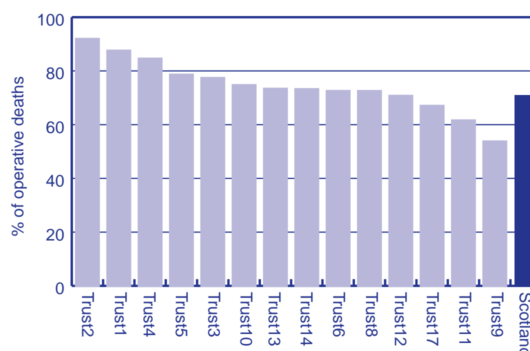
The decision to operate was taken by a consultant surgeon in elective surgery in 99% of cases and in emergency surgery in 97% of cases. In 2002 a consultant surgeon operated or assisted in 75% of cases (92% of elective operations and 71% of emergency operations where the patient subsequently died). This has remained broadly similar over the past 7 years.

Consultant operating or assisting, by year



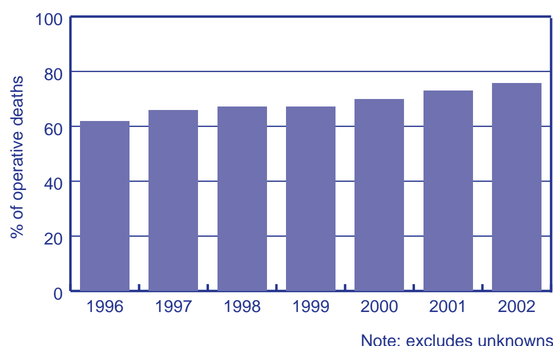
Consultant surgeon presence at the operating table varied across Scotland though the assessors criticised the seniority of the surgeon present in theatre in only 26 cases (1.5%) (60 in 1999, 30 in 2000, and 28 in 2001).

% of consultants surgeons operating or assisting, by Trust



The percentage of operations where the anaesthetic consultant was present in 2002 was 76% (89% of elective and 73% of emergency operations) which continues the upward trend from 62% in 1996.

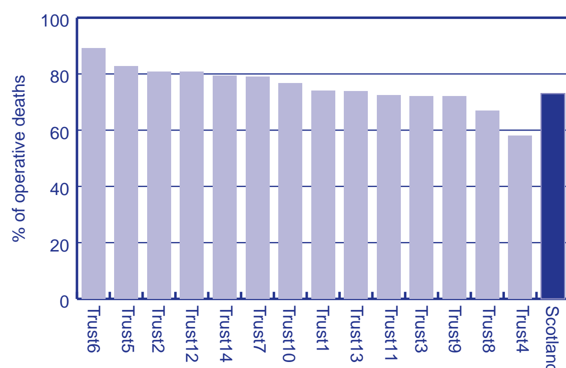
Consultant anaesthetist present, by year



Note: excludes unknowns

Again there was some variation across Trusts in Scotland though the assessors criticised the seniority of the anaesthetist in only 3 cases (11 in 2001).

Consultant anaesthetist present, by Trust



In 802 (45%) cases there was a significant post-operative complication, but of these 692 were medical rather than surgical, mirroring the high prevalence of co-morbidities. There was no delay in recognising the complication in 96% of the cases. Failure to use HDU or ITU either by omission or non availability appears to show a decline (113 cases in 2000, 65 cases in 2001 and 21 cases in 2002).

There was a degree of variability between specialties in the level of criticisms of post operative care by the assessors.

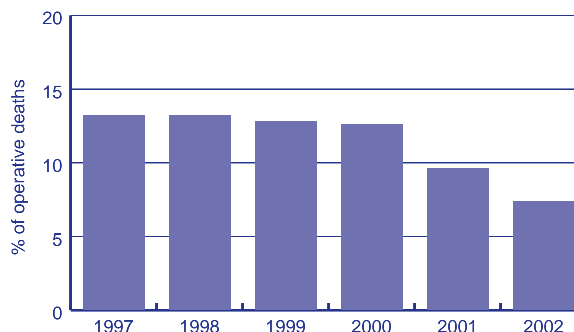
Specialty	% where post-op care could have been improved	Median Age
General surgery	7.0	77
Orthopaedic surgery	11.1	86
Vascular surgery	5.8	73
Urology	6.0	72
Neurosurgery	4.9	70

Some of the criticisms related to patterns of service provision and management of pre-existing medical illness rather than specific surgical problems. This was particularly true of elderly frail patients with fractured hips who remained in orthopaedic units for prolonged periods while awaiting rehabilitation. This group of patients with complex medical and social care needs is the subject of a more detailed targeted national audit (Scottish Hip Fracture Audit).

This issue of the most appropriate placement of patients without an on-going surgical problem is echoed in the non-operative and terminal care groups.

Overall, post-operative management continues to show an improvement from previous years with a further reduction in the percentage of cases in which the assessors believed that the post-operative management could have been improved.

Surgical assessor or anaesthetic assessor said post-operative care could have been improved, by year



The number of cases where assessors described an adverse event following operation is shown below.

	Made no difference to eventual outcome	Made significant contribution to death	Caused death in patient expected to survive
1998	394	259	30
1999	415	311	42
2000	377	286	30
2001	275	230	7
2002	235	186	10

Non-operative cases

The commonest diagnoses leading to surgical admission, in patients who did not have an operation and subsequently died, are shown in order of frequency.

Newly diagnosed malignant neoplasm
Ruptured aortic aneurysm
Intestinal obstruction
Peripheral arterial occlusive disease
Fracture of neck of femur
Acute intestinal vascular insufficiency
Perforation of intestine
Acute pancreatitis
Peritonitis

Some 55% of patients who died under surgical care do not undergo surgery. There is no evidence that this proportion has changed significantly over the period. Nearly half (45%) of these were considered to have died of a condition not thought to be surgical in nature. A further 12% were thought to be unfit for surgery due to an irreversible decline in their medical condition. Where there was a decision not to operate, the decision was taken by a consultant in nearly all cases. However, in 23 cases (1.0%) assessors believed an operation should have been done.

The number of adverse events identified in the non-operative group remains small.

	Made no difference to eventual outcome	Made significant contribution to death	Caused death in patient expected to survive
1998	80	26	2
1999	40	32	4
2000	71	48	6
2001	55	38	2
2002	52	35	2

Terminal Care

The number of patients with previously diagnosed end-stage malignant disease dying on acute surgical wards has gradually fallen over the years (667 in 1996 to 459 in 2002).

Overall deaths

For all the patients who died, who were reviewed by SASM, the percentage of cases with adverse events either making 'no difference to the outcome', or 'contributing to the outcome' has fallen.

An adverse event was deemed to have caused death on 12 occasions (0.30%) in 2002.

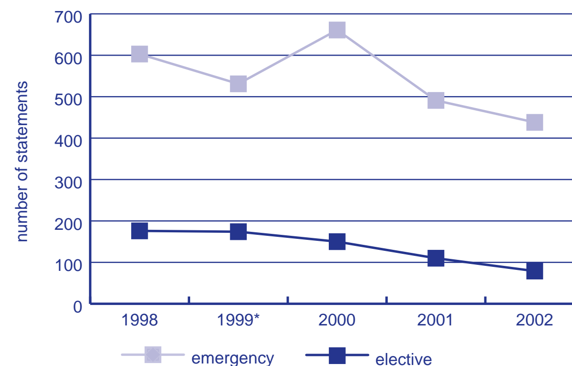
	Made no difference to eventual outcome	Made significant contribution to death
1998	474	285
1999	455	343
2000	448	334
2001	330	268
2002	287 (7.2%) *	221 (5.5%) *

	Caused death in patient expected to survive	Total no.of operative cases with adverse event statement
1998	33	792
1999	46	844
2000	36	818
2001	9	607
2002	12 (0.3%) *	520**

Denominator includes terminal care deaths.
*** This represents 13% of operative (n=1788) and "non-operative" deaths (n=2216) reported to SASM during 2002.*

The number of adverse events in patients who die following elective and emergency admission has also fallen year on year.

Adverse events statements by either surgical or anaesthetic assessors, operative deaths, by year



* excludes 139 cases - unknown status

Audit Process

Surgical issues

Deaths under surgical care are identified for the purpose of review by the patient being the responsibility of a named surgeon. The surgeon is therefore a surrogate for identification rather than as might be presumed, necessarily 'responsible' for the patient's death.

The audit process examines issues related to patient care which can and frequently do extend from before the patient is cared for by the surgeon to beyond the time of true surgical care. The Audit is not limited to the role of individual consultants and over many of the issues identified the lead clinician may have little influence.

Anaesthetic issues

The SASM process has, since 2002, attempted to identify a named consultant anaesthetist for each audited death in which the provision of anaesthesia has been part of the care pathway.

In 2002, 27% of cases had no responsible consultant anaesthetist identified to this peer-review process. Identification of such named consultants is of importance well beyond the confines of this national audit.

Training in Anaesthesia: The Royal College of Anaesthetists document *'The CCST in Anaesthesia: - A manual for trainees and trainers'* states that every trainee must at all times be responsible to a consultant who must be available to advise and assist the trainee as appropriate. It further highlights that the safety of a hospital's supervision arrangements is the concern of the departmental and hospital management.

Clinical Standards for Anaesthesia (NHS QIS): The Clinical Standards for Anaesthesia also deal with the standards required in relation to consultant responsibility for supervision. Essential criteria for the organisation of Anaesthesia Services include the following statements:-

1. There is a local protocol to define when non-consultant anaesthetists should request consultant advice and help.
2. There is an explicit mechanism to identify and contact the supervising consultant for each patient.
3. The consultant anaesthetist with overall responsibility is recorded on the anaesthesia record sheet.

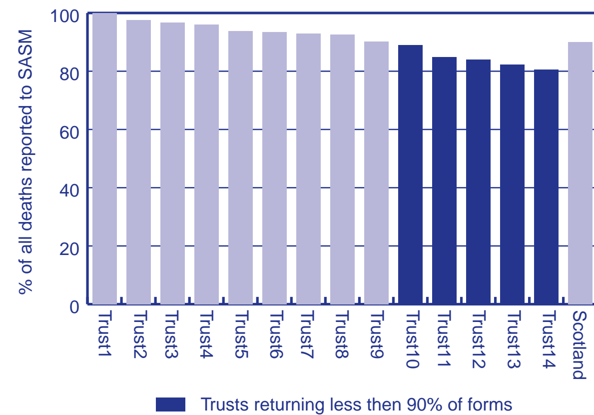
There is, therefore, an obligation from a number of sources requiring a named responsible consultant anaesthetist for every case. Identification of a consultant in every case will enable improved feedback from SASM to clinicians (including annual reviews to be used in the appraisal process) and Trusts.

Compliance

Underpinning the success of SASM is its voluntary nature with compliance by clinicians at 90%.

The Board of SASM set a level of 90% return of cases for Trusts and 85% for clinicians. At this level five Trusts did not achieve this target, this accounted for over 50% of the non returned forms nationally.

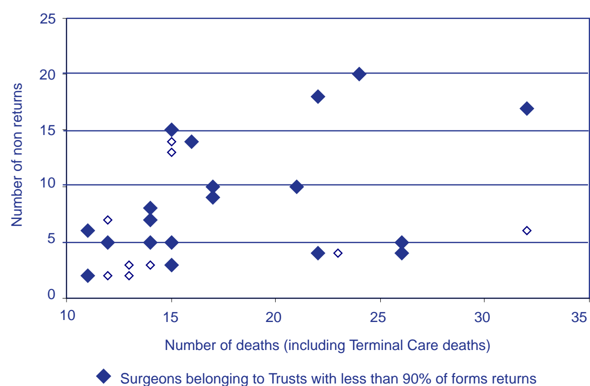
% of forms returned by September 2002, by Trust



28 consultants under whose care more than10 patients died failed to return 85% of these cases (consultants from the five Trusts unsuccessful in achieving the 90% return rate are indicated in red).

Number of forms returned by Consultant with more than 10 deaths - 2002

(excludes consultants returning 85% or more of their forms)



The above figure also shows that despite poor returns from an individual, the high compliance of colleagues can still allow a Trust to achieve the minimum percentage return.

With 445 forms not returned the findings of the audit do not take into account the circumstances surrounding the deaths of these patients. In particular a small number of consultants with a significant number of deaths in their practice have not been included within the quality assurance and feedback offered by SASM.

Chairman's Review

I am pleased to present the SASM report for 2002. The public should once again take confidence in the fact that all deaths under surgical care within Scotland are subjected to the scrutiny of other specialists working in the same field.

This process is designed to identify issues that need to be brought to the attention of consultants responsible for these patients and the Trusts where the care took place. SASM endeavours (when appropriate), to reassure the clinicians that care has been optimal despite the negative outcome and not to simply identify fault and blame. When the care has not been of the highest standard, the Audit aims to provide constructive feedback to facilitate improvement in care.

The figures show an improvement in the quality of care delivered by doctors and nurses working with surgical patients. The number of deaths following elective surgery continues to fall; there are improvements in post-operative care (especially the provision and organisation of critical care beds); direct consultant involvement remains extremely high and in anaesthetics continues to rise.

In this year's report there were 12 instances when an adverse event was assessed as having caused death in a patient otherwise expected to survive. Although each instance is a tragedy and represents significant systems failure (which have been fed back to the respective clinicians and Trusts), they were fortunately rare. This indicates a generally safe system.

This year the report contains information concerning individual Trusts, but does not identify them. In line with other national audits (Audit Scotland) this is to serve notice that next year the data presented will be on a named Trust basis.

Compliance with the Audit by clinicians is an issue. Though a praiseworthy 90% of cases are returned, some important lessons for safer and improved patient care may be lost amongst the 10% of cases not being submitted for review. A few individual clinicians and Trusts are not sufficiently availing themselves of the potential to learn from the deaths of patients in their care.

A concern voiced by consultants is the lack of time available to them to complete the SASM form. The new consultant contract carries within it the concept of time dedicated to 'support' activity (10 hours per week). Hopefully consultants and managers will see completion of SASM forms as a priority within this time.

Section 12 of '*Good Medical Practice*' published by the General Medical Council (GMC) states a doctor '*… must take part in confidential enquiries and adverse event recognition and reporting to help reduce risk to patients.*' Persistent failure to comply with SASM by consultants could be seen to be a breach of this requirement. Clarification and guidance on this matter will be sought from the GMC.

Illnesses requiring surgical attention are not without varying degrees of risk, but all those involved in the care of surgical patients must continuously strive to reduce that risk. Patients are entitled to know that the individual clinicians and the hospital in which they are being treated are part of an external review process that will provide a safe environment which learns from past experiences to improve patient care.

Clinicians must expect a requirement for some form of quality assurance. Many quite rightly feel crude mortality tables, which fail to take into account the nature of the illness and the risk profile of the patient, are not the way forward and may even discourage intervention in borderline cases.

The Audit will provide this assurance in an annual review of consultant data for inclusion in the appraisal process. With the inclusion of individual clinicians data within the appraisal process there is no intention and no reason to break the confidential nature of the individual clinician's participation.

Clinicians who do not comply with the audit or do not wish to use their individual report will need to provide alternative third party evidence to reassure their Trust and through this process the public.

Clinicians and hospitals which are not part of an adequate patient safety structure should not be surprised if the patients lose faith in them and the service offered.

The Scottish Audit of Surgical Mortality remains a unique audit dedicated to the principles of safe surgical and anaesthetic care. I believe it has been very successful in its task and I also believe that it will continue to develop and improve, helping to build a safe environment for patient care. Central to this success is its independence from the service and its strong clinical lead which enables difficult issues to be addressed and occasionally uncomfortable truths to be told.

This is my final Annual Report and I wish all within the Audit (participants and assessors) well for the future.

What is SASM?

The Scottish Audit of Surgical Mortality ensures that the circumstances surrounding the death of any patient who is under the care of a surgeon is subjected to an anonymous assessment by a consultant in the same specialty from a different Trust. The review considers both clinical, hospital and resource concerns. The results are fed back to the surgeon and anaesthetist. The audit is entirely voluntary and depends on the co-operation of all the participants in ensuring that confidentiality is maintained.

The non-clinical administration and organisation of the audit are now under the aegis of Information & Statistics Division (ISD) with further financial support from NHS Quality Improvement Scotland. The staff are bound by very strict confidentiality rules to preserve the integrity of the audit.

SASM Organisation

The SASM Board, which sets out the policy for the audit, is chaired by either the President of the Royal College of Surgeons of Edinburgh or the President of the Royal College of Physicians and Surgeons of Glasgow. Its membership includes representatives from other colleges, active clinical co-ordinators, NHS Scotland, ISD and the public.

The SASM Management Committee ensures the smooth running of the audit and is chaired by the lead clinician. Its membership includes the clinical co-ordinators.

The SASM Liaison group represents the interests of the members of the professions participating in the audit.

Full details of the present members of these groups can be found at the SASM website – www.sasm.org.uk

Acknowledgements

The link to ISD is invaluable providing the statistical resource for the compilation of both this and the main web-based reports and the audit is much indebted to Mr Colin Sproul.

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All deaths (n =4449)

Figure 1:

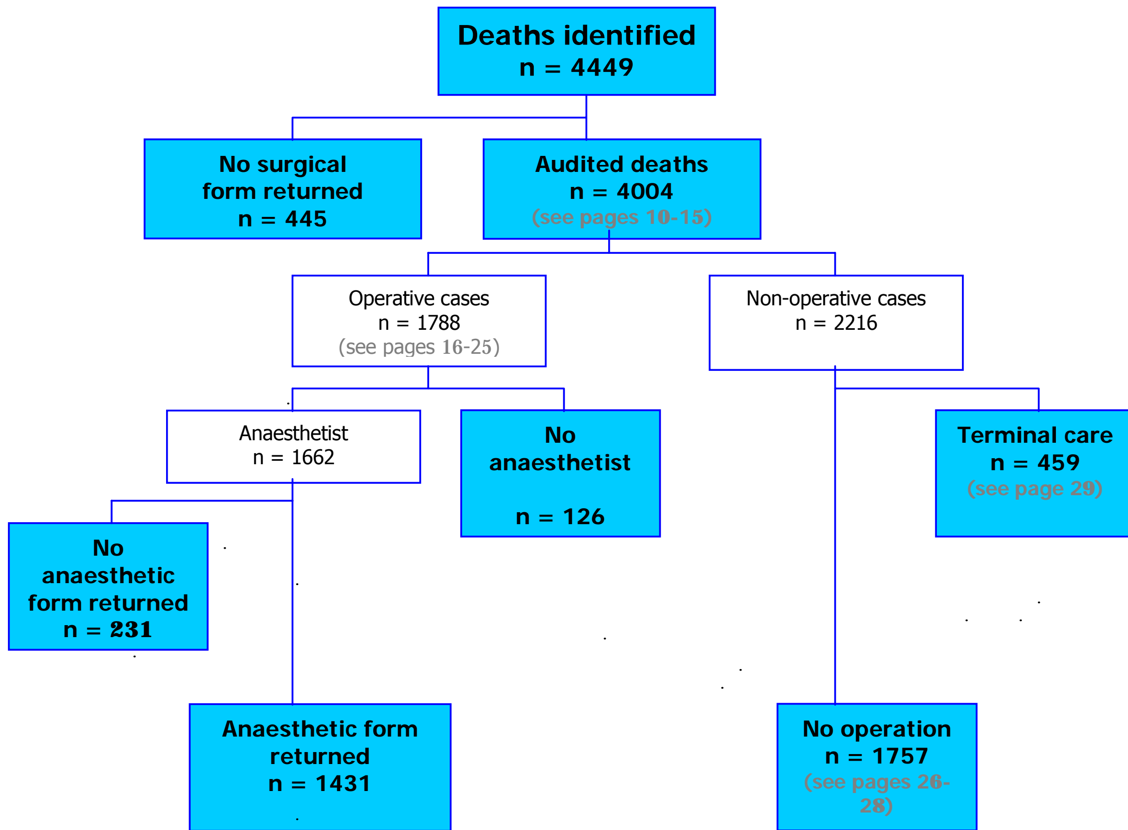
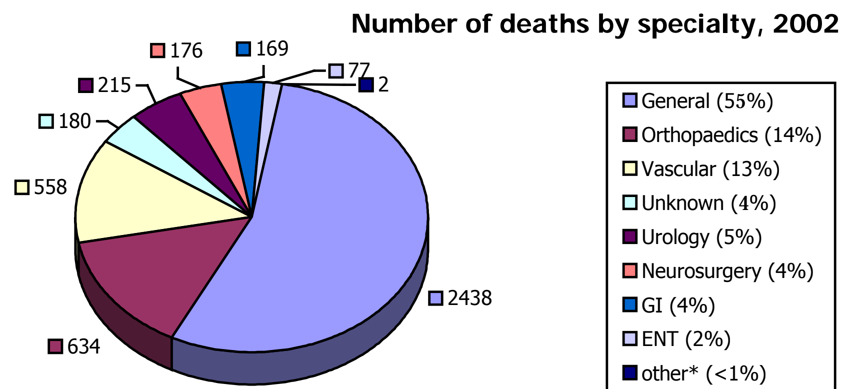


Figure 2:



* Thoracic 1, Ophthalmology 1

Figure 3:

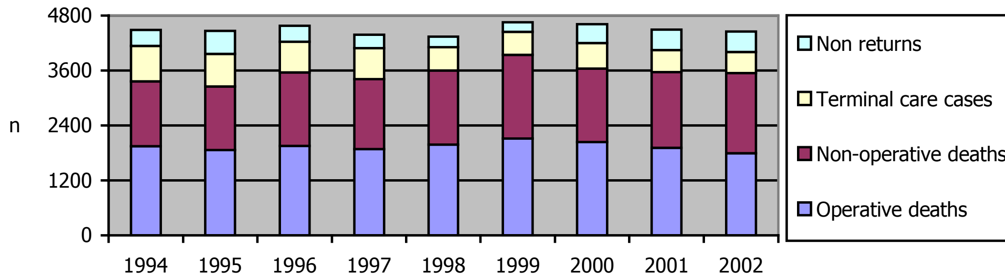


Figure 4:

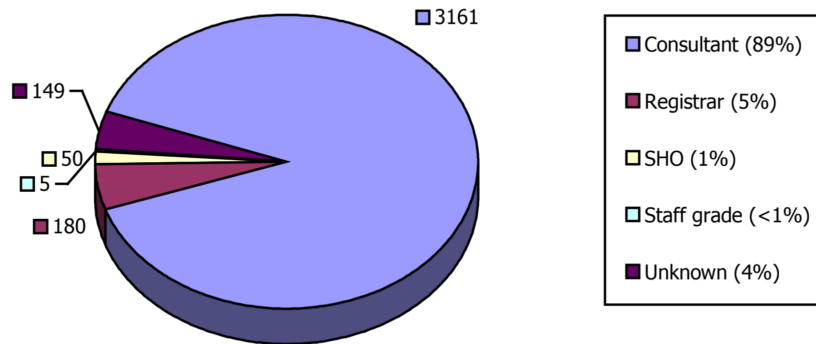
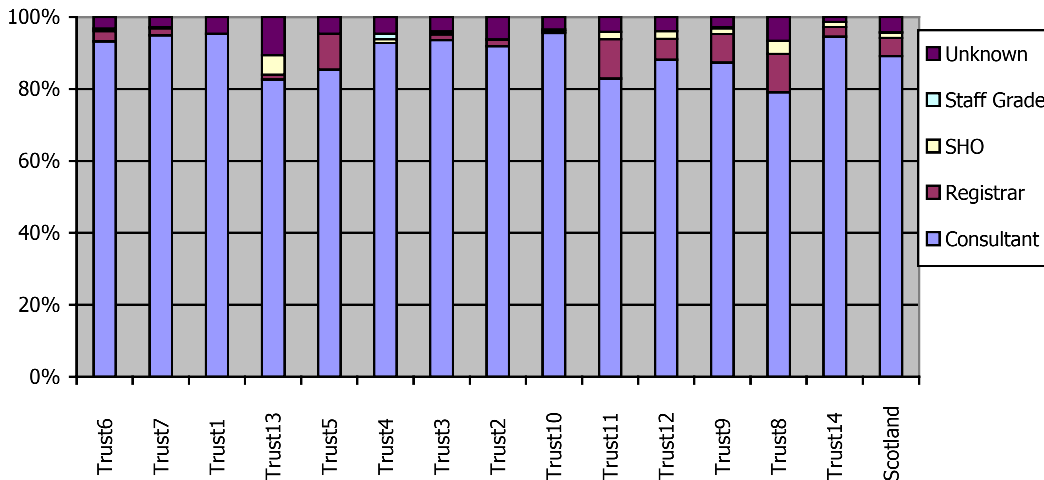


Figure 5:



*Small Health Boards, Trusts and Private Hospitals with fewer than 70 deaths during 2002

Figure 6:

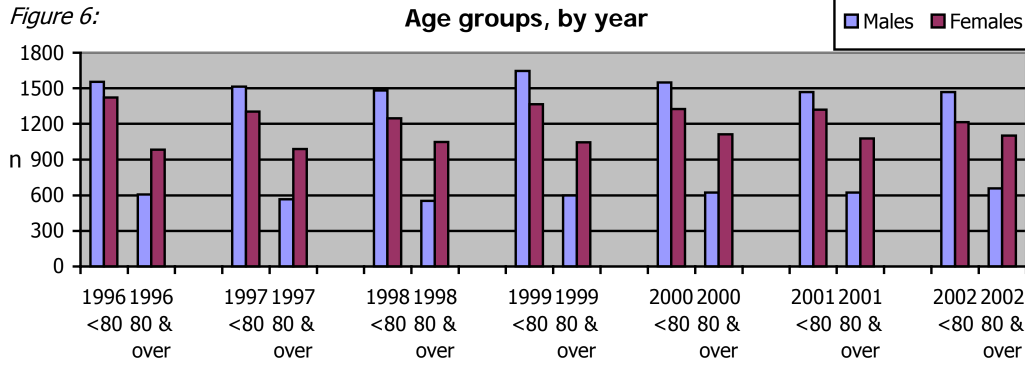
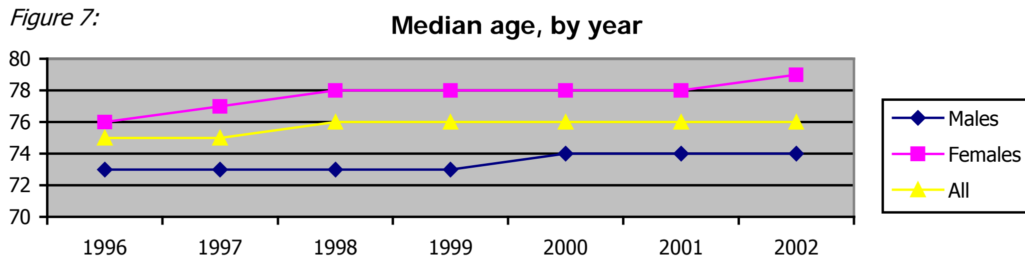


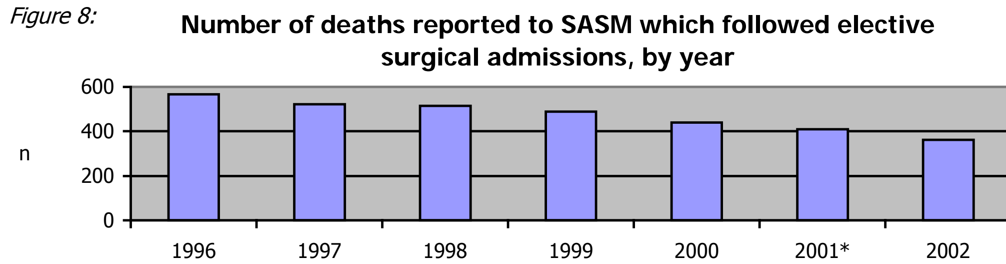
Figure 7:



Test for trend: p value <0.0001

The p value here is very significant, which suggests that a trend exists. The above charts indicate that the age is increasing slightly over the years 1996 to 2002. These indicators combined suggest that there is a strong upward trend in the age distribution over time.

Figure 8:



*Elective total includes 7 deaths where admission was "previously cancelled elective"

Figure 9:

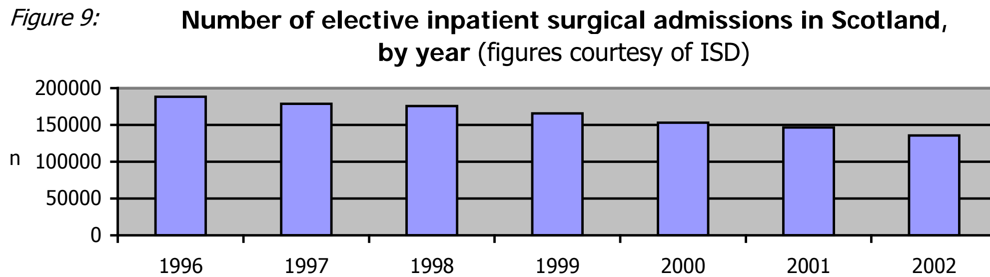


Figure 10:

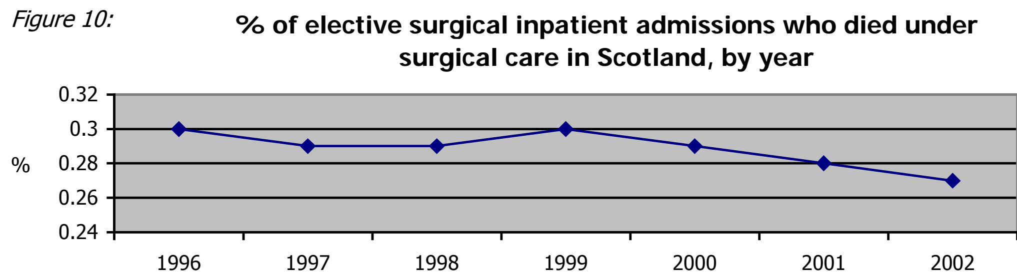


Table 1:
Type of admission, by year

	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Elective	566	16.1	521	15.9	514	14.5	489	15.0	440	12.2	440	11.7	363	9.1
Emergency	2944	83.9	2759	84.1	3021	85.5	2767	85.0	3180	87.8	3098	88.3	3646	90.9
Unknown	1069		1096		805		1401		995		985		440	

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value <0.0001

The p value is very significant, suggesting that there is a trend over the years. Figures in the table also support this and indicate that there is a downward trend in the number of elective patients who subsequently die.

Figure 11:

Number of deaths reported to SASM which followed emergency surgical admissions, by year

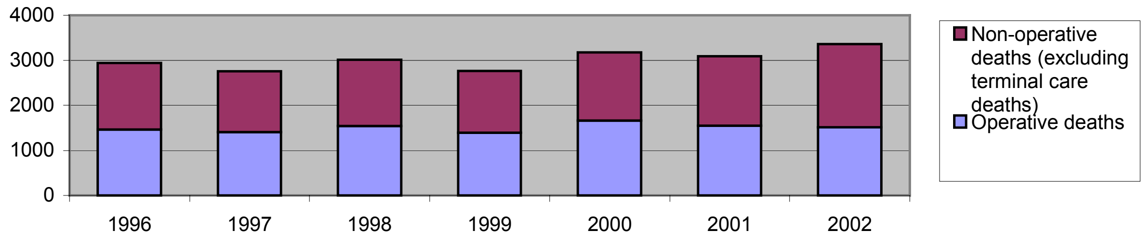


Figure 12:

Number of emergency inpatient surgical admissions in Scotland. by year (figures courtesy of ISD)

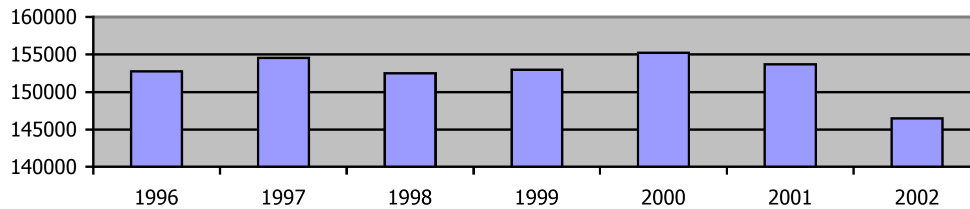


Figure 13: **% of emergency inpatinet surgical admissions who died under surgical care in Scotland, by year**

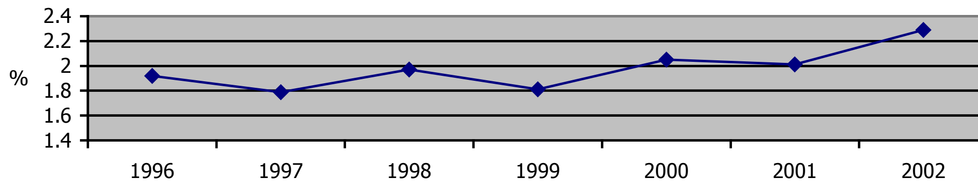


Figure 14:

Emergency admissions by timing of 1st operation

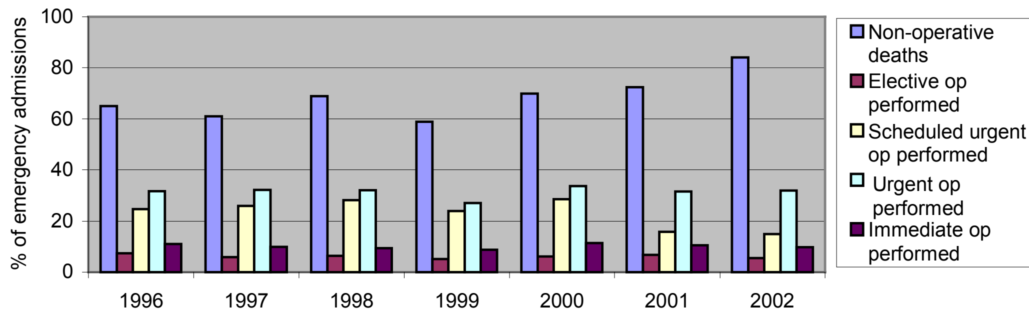


Table 2:
Surgical assessors considered that case note reviews should be performed, by year

	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	350	10.4	401	12.4	344	10.2	320	10.2	322	9.2	245	7.2	267	8.0
No	3024	89.6	2843	87.6	3014	89.8	2803	89.8	3191	90.8	3164	92.8	3051	92.0
Unknown	184		168		237		148		159		158		227	

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value <0.0001

The p value here is again significant, which suggests that a trend exists. The table (with the exception of 1997 data) suggests that there may be a downward trend in the percentage of cases where the surgical assessor considered a case note review should be performed.

Both the surgical assessor and the anaesthetic assessor are asked separately to make an overall statement describing any adverse events in management of the case. Figure 15 was derived, after excluding the terminal care cases and the non-returns, by counting firstly those cases where **either** the surgical or anaesthetic assessor said that adverse events caused death, then – of the remainder – counting those cases where **either** the surgical or anaesthetic assessor said that adverse events made a significant contribution to death, then – of the remainder – counting those cases where **either** the surgical or anaesthetic assessor said that adverse events made no difference to the outcome.

Figure 15:

Statements by *either* surgical or anaesthetic assessor describing the adverse events in management of deaths, by year

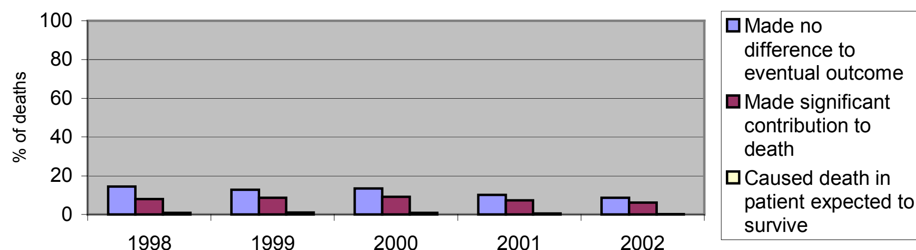


Table 3:
Numbers of adverse events statements by either surgical assessors or anaesthetic assessors, operative and non-operative deaths, by year

Statement	1998	1999	2000	2001	2002
Made no difference to eventual outcome	474	455	448	330	287
Made significant contribution to death	285	343	334	268	221
Caused death in patient expected to survive	33	46	36	9	12
Total number of operative and non-operative cases with an adverse event statement	**792**	**844**	**818**	**607**	**520***

*This represents 13% of operative (n=1788) and non-operative deaths (n=2216) reported to SASM during 2002. Adverse events may be related to clinical, resource or other factors; (excludes terminal care and non-returns).

Operative deaths (n =1788)

Pre-operative data

Figure 16:

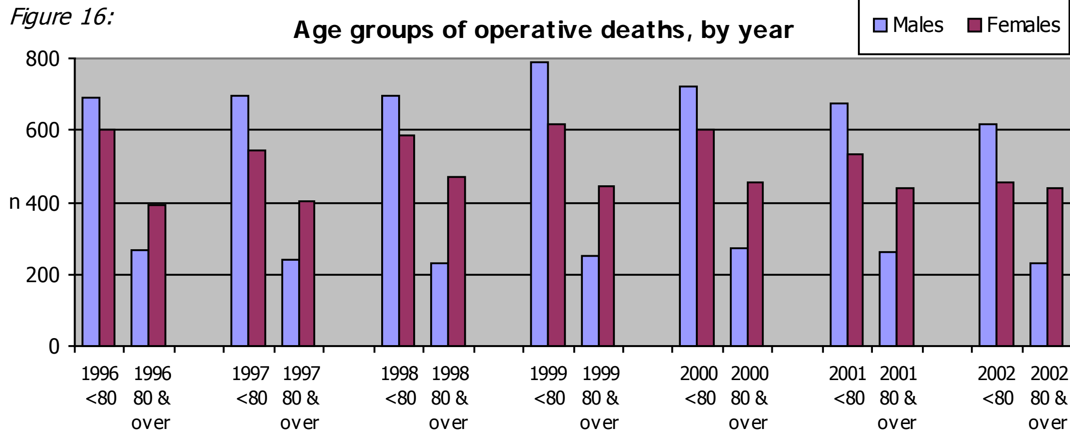
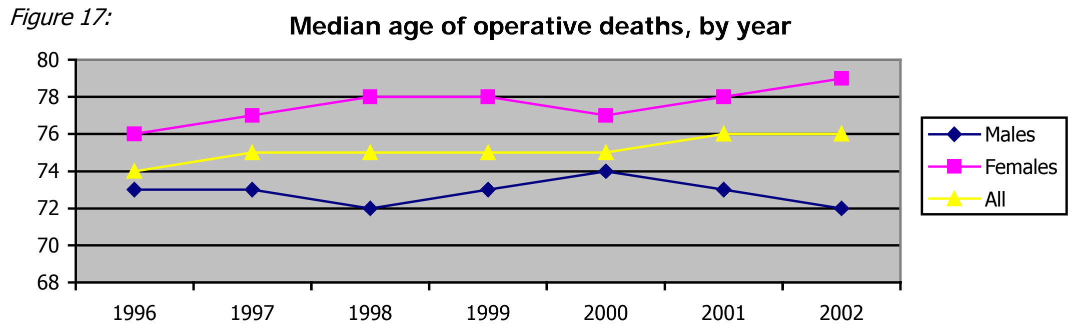


Figure 17:

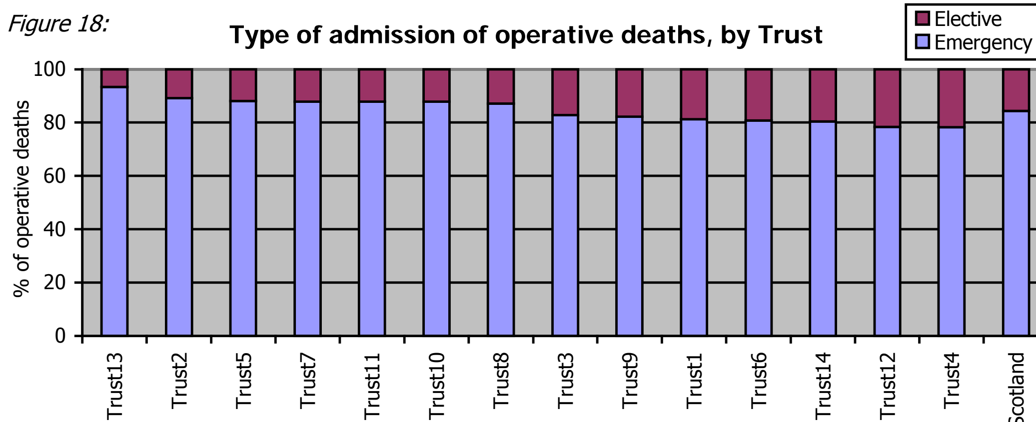


Test for trend: p value = 0.247

The p value here is rather high, suggesting that there is not a significant change in the age distribution over the years. This is reflected in the chart showing the median age over time.

Table 4:

Most common confirmed diagnoses operative deaths, 2002	n
Fractured neck of femur	144
Peripheral vascular disease	80
Abdominal aortic aneurysm - ruptured	74
Intestinal obstruction	59
Cls#prox femur,subcapital, Garden grade unspec.	47
Closed fracture of femur, intertrochanteric	44
Peripheral vascular disease NOS	33
Acute intestinal vascular insufficiency	32
Malignant neoplasm of oesophagus NOS	30
Perforated diverticulum of colon	24



NB – Excludes small Health Boards, Trusts and private hospitals with fewer than 70 deaths during 2002
(Where totals are not 100%, the remaining values were not declared)

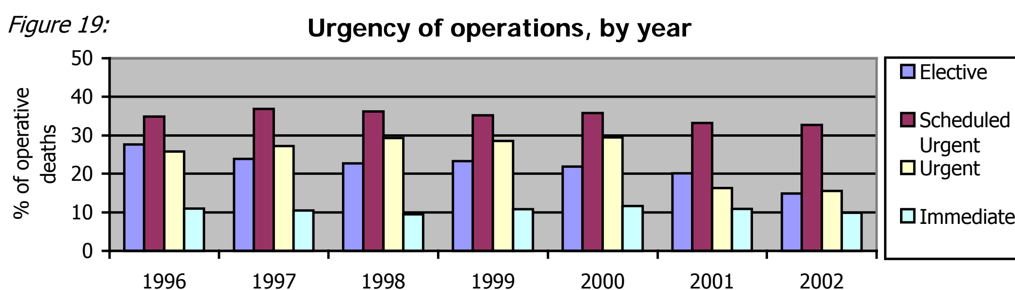


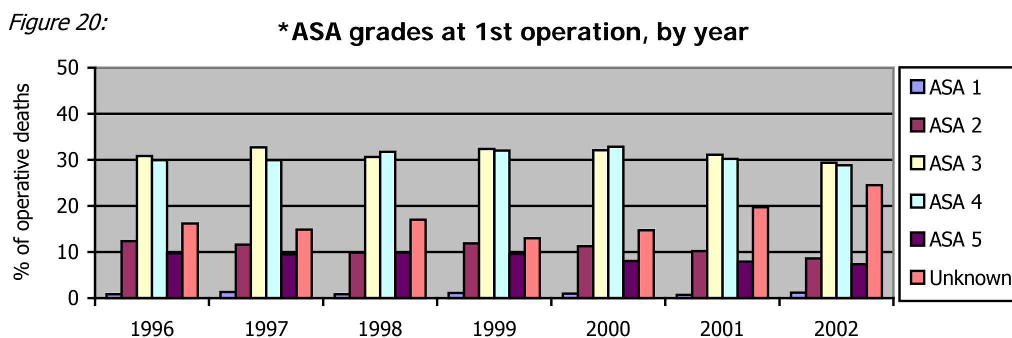
Table 5:
Urgency of operations, by year

	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Elective	541	27.8	449	24.2	449	23.2	491	23.8	450	22.2	385	25.0	261	20.5

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value = 0.0001

Here, the p value is significant, which suggests that a trend exists. With the exception of 2001 the figures in the table also suggest that there is a downward trend in the percentage of elective operations.



* ASA grades are a classification of the pre-operative severity of illness of the patient, ranging from ASA 1 - an otherwise fit patient, - to ASA 5 - a moribund patient with little chance of survival

Table 6:
ASA grades at 1st operation, by year

	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
ASA 4	585	35.7	563	35.1	629	38.3	675	36.8	676	38.6	576	37.7	503	38.2

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value = 0.167

The p value is not significant and suggests there is not a trend. Figures from the table do fluctuate and so show no clear trend in the percentage of patients in ASA grade 4.

Figure 21:

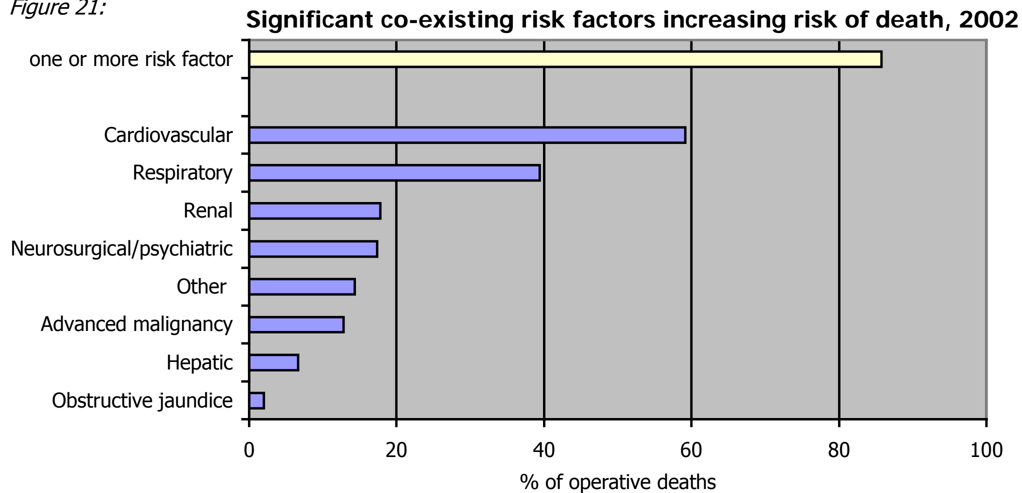


Table 7:
% of consultants deciding on operation, by year

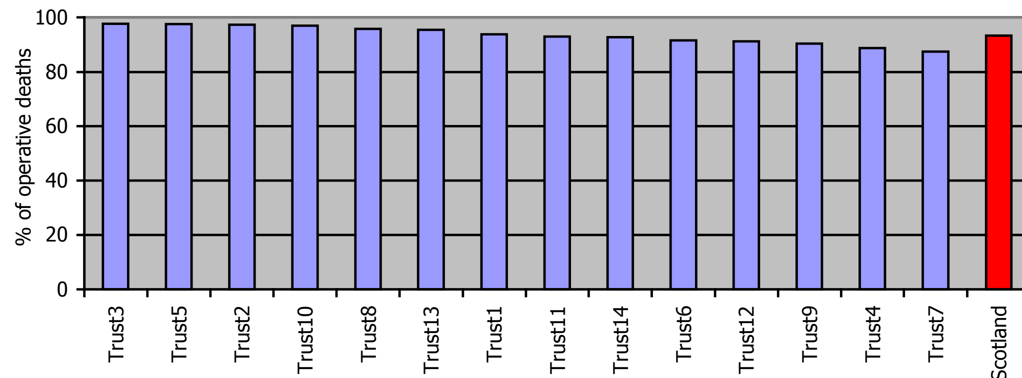
	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	1819	94.3	1738	94.0	1862	96.2	1991	96.2	1966	96.9	1803	97.3	1670	97.0
No	110	5.7	110	6.0	74	3.8	78	3.8	62	3.1	50	2.7	52	3.0
Unknown	27		34		45		40		27		51		66	

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value <0.0001

Here the p value is highly significant, which strongly suggests that a trend exists. Figures from the table also suggest that the trend is upwards.

Figure 22:



NB – Excludes small Health Boards, Trusts and private hospitals with fewer than 70 deaths during 2002

Figure 23: **Surgical assessor or anaesthetic assessor said that the journey of care up to the point of operation (including pre-admission) could have been improved, by year**

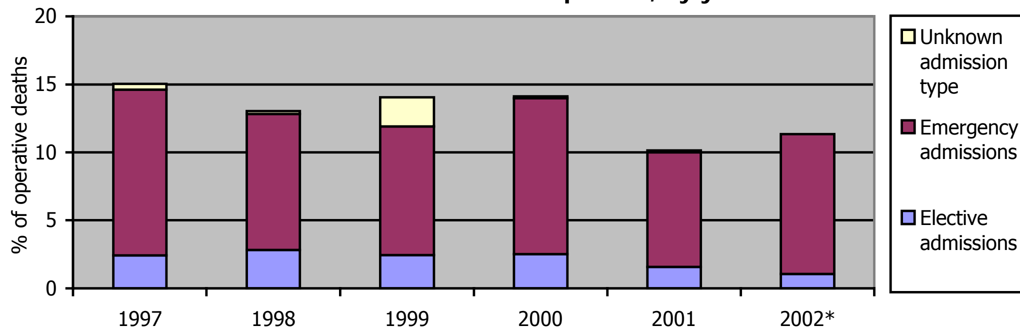


Table 8:
*** Most common adverse events during 2002 where surgical assessor or anaesthetic assessor said that the journey of care up to the point of operation (including pre-admission) could have been improved.**

Adverse event	n
Delay to surgery ie earlier op desirable	35
Delay in transfer to surgeon by medics	18
Delay in transfer to surgical unit	16
Pre-operative assessment inadequate	16
Op should not have been done or was unnecessary	13
Delay to diagnosis	8
Delay to operation caused by missed diagnosis	8

Operative deaths (n = 1788)

Intra-operative data

Table 9:
Consultant surgeons operating or assisting, by year

	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	1307	70.8	1275	72.0	1358	72.2	1475	72.8	1502	75.7	1337	72.6	1271	74.7
No	540	29.2	495	28.0	524	27.8	550	27.2	481	24.3	505	27.4	431	25.3
Unknown	109		112		99		84		72		62		86	

Percentages shown exclude "unknown" cases, i.e. missing values.

Chi-squared test: p value <0.0001

Despite the fall in the percentage of operative cases where a consultant surgeon operated or assisted in 2002, the p value here is highly significant, which strongly suggests that an upward trend exists.

Table 10:
Surgical assessor criticised the grade/experience of surgeon operating, by year

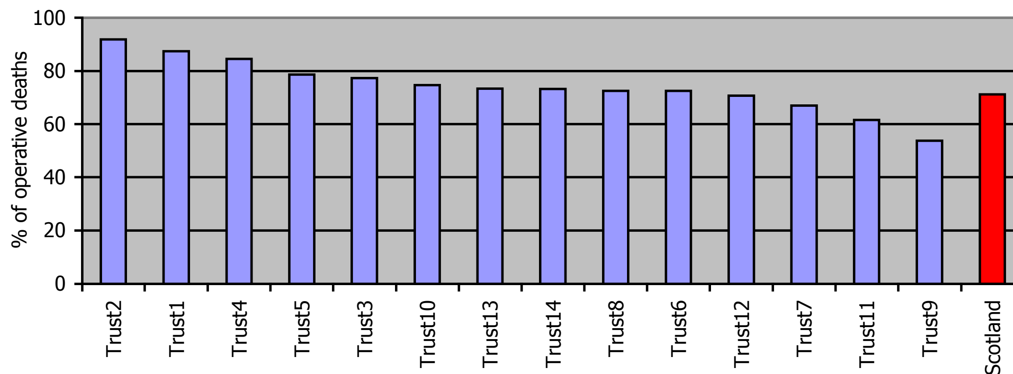
	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	48	2.8	56	3.4	52	3.1	60	3.1	30	1.7	28	1.7	26	1.9
No	1672	97.2	1588	96.6	1610	96.9	1845	96.9	1762	98.3	1576	98.3	1341	98.1
Unknown	236		238		319		204		263		300		421	

Percentages shown exclude "unknown" cases, i.e. missing values.

Chi-squared test: p value = 0.005

Here the p value is significant and indicates that a trend exists. The figures in the table suggest that there seems to be a trend possibly within the first 3 years before leveling off in 1998/1999 and then falling dramatically in the year 2002.

Figure 24: **Consultant surgeons operating or assisting, by Trust**



NB – Excludes small Health Boards, Trusts and private hospitals with fewer than 70 deaths during 2002

Table 11:
Consultant anaesthetist present, by year

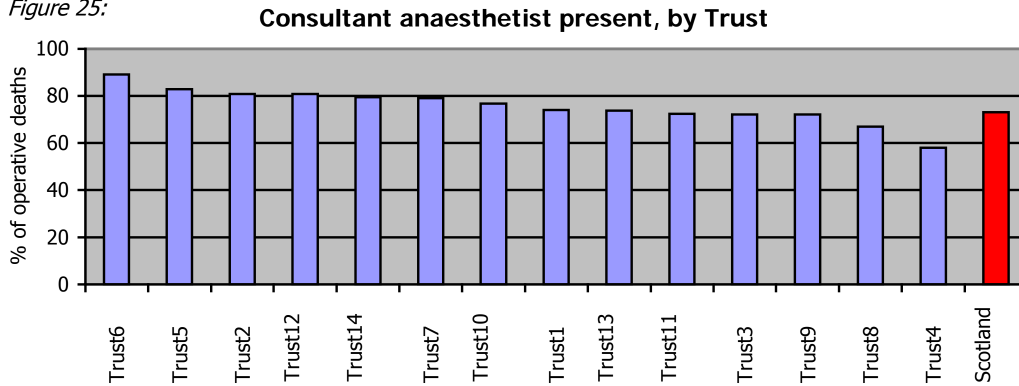
	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	1020	61.8	1060	65.9	1103	67.1	1227	67.0	1222	69.9	1117	73.0	1045	75.7
No	631	38.2	548	34.1	540	32.9	603	33.0	525	30.1	413	27.0	334	24.3
Unknown	305		274		338		279		308		374		409	

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value <0.0001

Here the p value is highly significant which strongly suggests that a trend exists. Figures in the table also indicate that there is an upward trend in the percentage of operative cases where an anaesthetist was present.

Figure 25:



NB – Excludes small Health Boards, Trusts and private hospitals with fewer than 70 deaths during 2002

Figure 26:

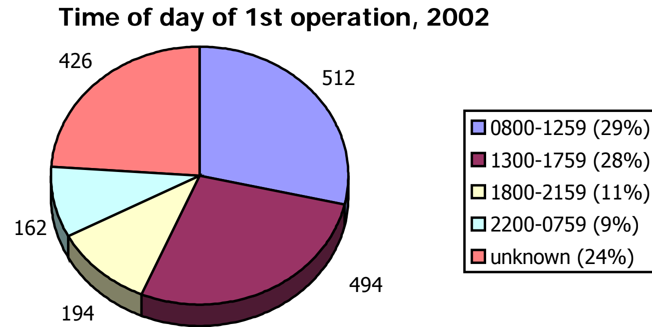
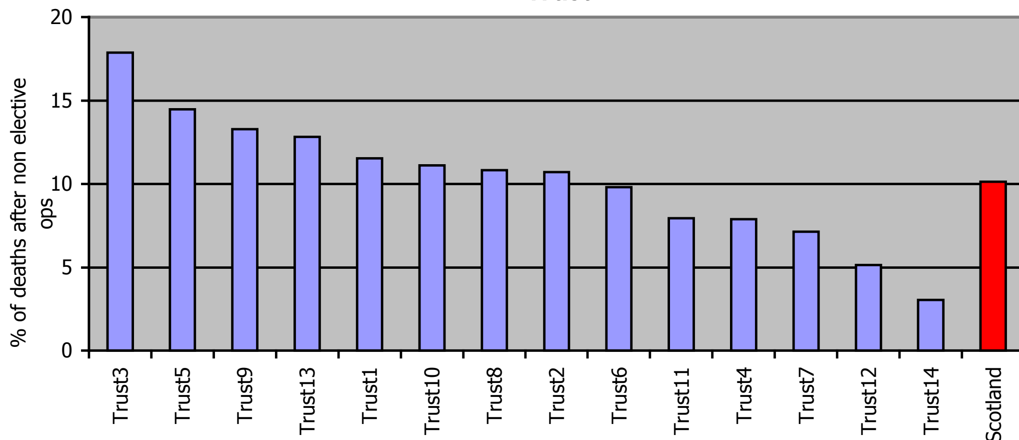


Figure 27:



This graph may be a product of the type of cases a Trust receives (e.g. neurosurgery for a large population) or the availability of dedicated emergency operating theatres and the necessary staff to man them.

Table 12:
Surgical assessors commented adversely on timing of operation, by year

	1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%
Yes	79	4.8	76	4.6	83	4.3	74	4.1	72	4.5	68	5.0
No	1574	95.2	1590	95.4	1826	95.7	1716	95.9	1534	95.5	1298	95.0
Unknown	229		315		200		265		298		422	

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value = 0.971

The p value here is rather high, indicating that there is not a significant change over the years in the percentage of surgical assessors who commented adversely on the timing of the operation.

Table 13:
Surgical assessors commented adversely on choice of operation, by year

	1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%
Yes	45	2.5	42	2.2	71	3.6	36	1.9	51	2.9	42	2.6
No	1782	97.5	1844	97.8	1919	96.4	1864	98.1	1705	97.1	1602	97.4
Unknown	55		95		119		155		148		144	

Percentages shown exclude "unknown" cases, i.e. missing values

Chi-squared test: p value = 0.811

The p value here is not significant and suggests no significant change over the years in the percentage of surgical assessors commenting adversely on the choice of operation.

Operative deaths (n = 1788)

Post-operative data

Figure 28: **Surgical assessor or anaesthetic assessor said post-operative care could have been improved, by year**

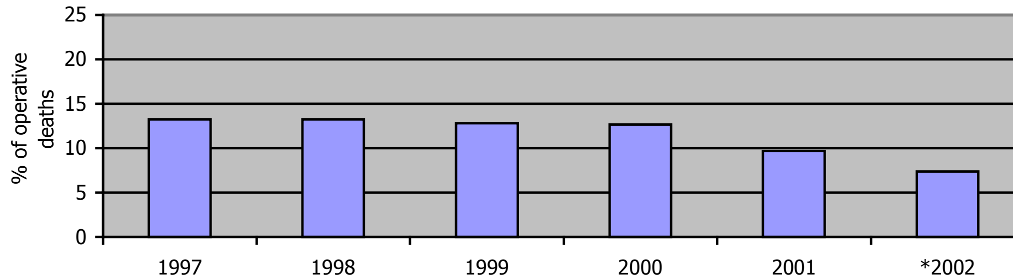


Table 14:
*** Specialty of cases where surgical assessor or anaesthetic assessor said post-operative care could have been improved during 2002**

Specialty	n	Number of operative deaths in specialty	% where post-op care could have been improved
General surgery	61	842	7.2
Orthopaedics	41	368	11.1
Vascular surgery	17	291	5.8
Urology	4	89	4.5
GI	3	50	6.0
Neurosurgery	4	82	4.9

Table 15:
*** Most common adverse events where surgical assessor or anaesthetic assessor said post-operative care could have been improved during 2002**

Adverse event	n
Post-operative care unsatisfactory	13
Delay to surgery ie earlier op desirable	10
Delay in recognising complications	8
Failure to use HDU Post-operatively	8
HDU not used post-op, no HDU in hospital	8
Poor documentation	6
Pre-operative assessment inadequate	6
HDU not used post-operatively, HDU full	5
Delay to op caused by missed diagnosis	4
Post-operative fluid balance unsatisfactory	4

Operative deaths (n = 1788)

Assessors' data

Both the surgical assessor and the anaesthetic assessor are asked separately to make an overall statement describing any adverse events in management of the case. Figure 30 was derived by counting firstly those cases where **either** the surgical or anaesthetic assessor said that adverse events caused death, then – of the remainder – counting those cases where **either** the surgical or anaesthetic assessor said that adverse events made a significant contribution to death, then – of the remainder – counting those cases where **either** the surgical or anaesthetic assessor said that adverse events made no difference to the outcome.

Figure 29:

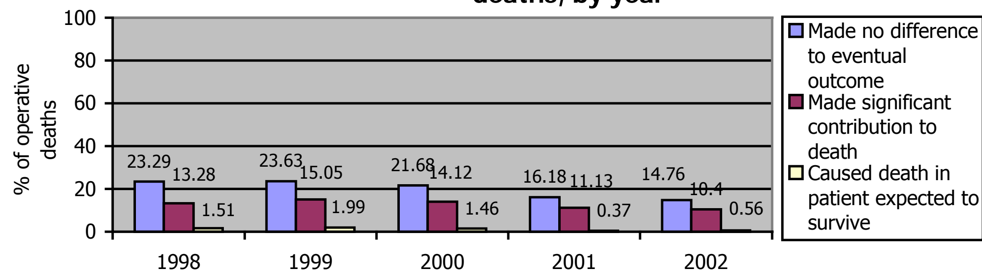


Table 16:
Adverse events statements by either surgical or anaesthetic assessors, operative deaths, by year

Statement	1998	1999	2000	2001	2002
Made no difference to eventual outcome	394	415	377	308	235
Made significant contribution to death	259	311	286	212	186
Caused death in patient expected to survive	30	42	30	7	10
Total	**683**	**768**	**693**	**527**	**431**

Table 17:
Adverse events statements by surgical assessors, operative deaths, by year

Statement	1998	1999	2000	2001	2002
Made no difference to eventual outcome	294	283	255	195	158
Made significant contribution to death	203	255	230	188	145
Caused death in patient expected to survive	29	38	24	6	9

Table 18:
Adverse events statements by anaesthetic assessors, operative deaths, by year

Statement	1998	1999	2000	2001	2002
Made no difference to eventual outcome	251	288	270	182	145
Made significant contribution to death	116	130	132	94	83
Caused death in patient expected to survive	5	10	11	4	2

Table 19:

Most common adverse events – operative deaths, 2002

Surgical assessors' opinions	n
Delay to surgery ie earlier operation desirable	43
Surgeon too junior	20
Operation should not have been done or was unnecessary	17
Delay in transfer to surgical unit	12
Delay in transfer to surgeon by medics	11
Wrong operation performed	11
Delay in recognising complications	10
Post-operative care unsatisfactory	9
Pre-operative assessment inadequate	9
Delay to operation caused by missed diagnosis	9
Delay to diagnosis	6
Poor documentation	5
Diagnosis missed by medical unit	5
Open operation/organ related technical	5

Table 20:

Most common adverse events – operative deaths, 2002

Anaesthetic assessors' opinions	n
Delay to surgery ie earlier operation desirable	21
Delay in transfer to surgeon by medics	10
Post-operative care unsatisfactory	10
Pre-operative assessment inadequate	10
Anaesthetist too junior	7
HDU not used post-operatively, no HDU in hospital	7
CVP not used	7
Operation should not have been done or was unnecessary	6
Delay in transfer to surgical unit	5
Poor documentation	5
Failure to use HDU Post-operatively	5
Resuscitation inadequate	5
Fluid balance unsatisfactory	5
Inadequate monitoring	5

Non-operative deaths (n = 1757)

(excluding terminal care deaths)

Figure 30:

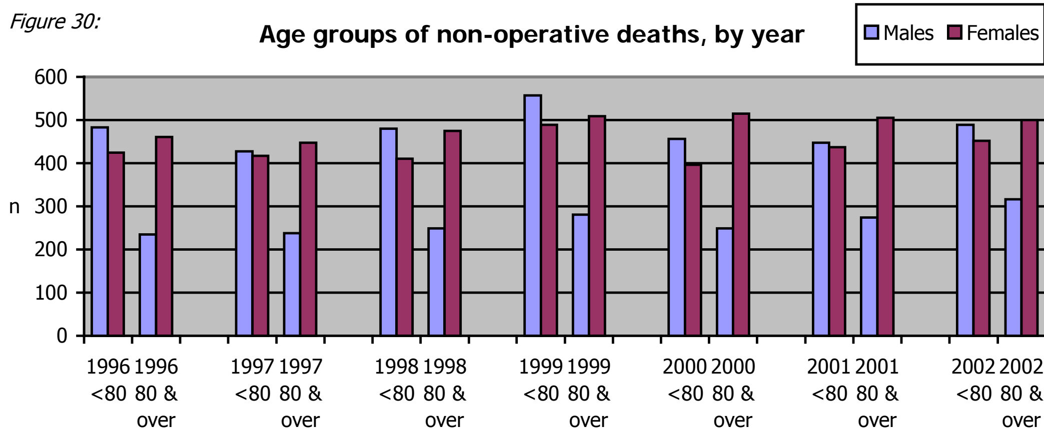
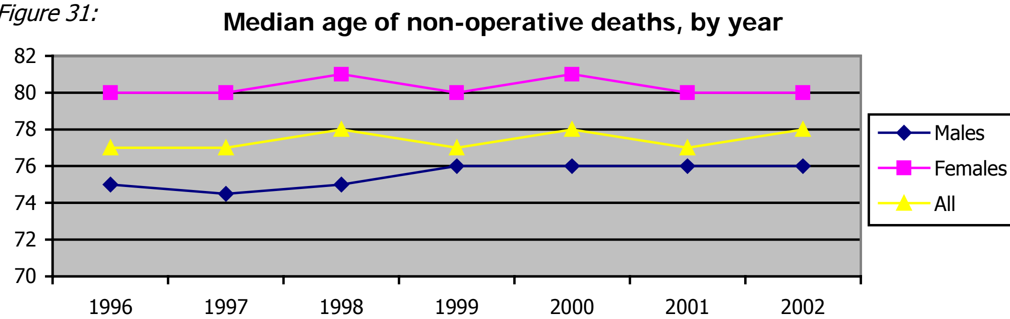


Figure 31:



Test for trend: p value <0.0001

The p value suggests that there is a trend, however the charts indicate that figures are rather erratic over the years.

Table 21:

Most common surgical diagnoses (not necessarily cause of death) non-operative deaths, 2002	n
Other peripheral vascular disease	91
Acute intestinal vascular insufficiency NOS	90
Abdominal aortic aneurysm which has ruptured	81
Intestinal obstruction NOS	71
Acute pancreatitis NOS	68
Fracture of neck of femur	60
Leaking abdominal aortic aneurysm	53
Perforation of intestine	41
Secondary malignant neoplasm of liver	36
Peritonitis NOS	33
Disseminated malignancy NOS	31
Malignant neoplasm of oesophagus NOS	26
Malignant neoplasm of ovary	25
Septicaemia NOS	24
Malignant neoplasm of pancreas	23

Figure 32:

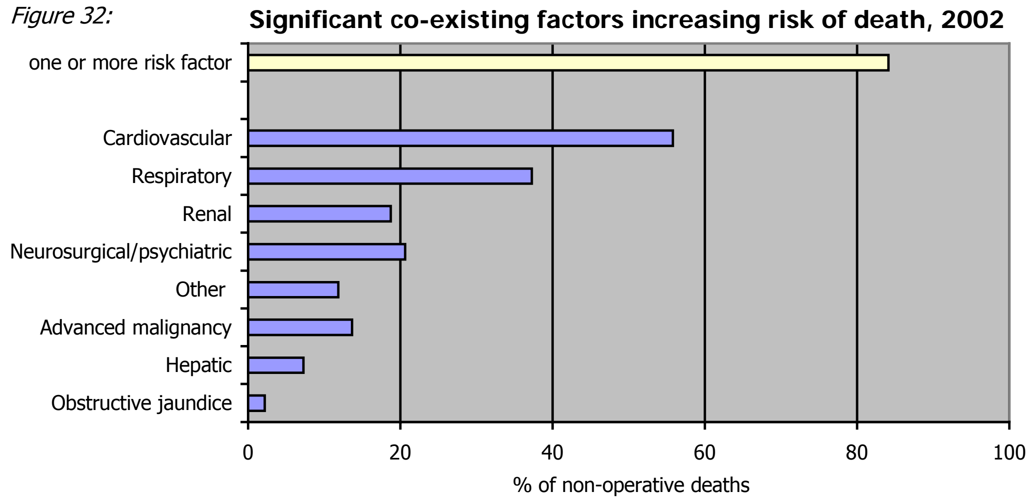
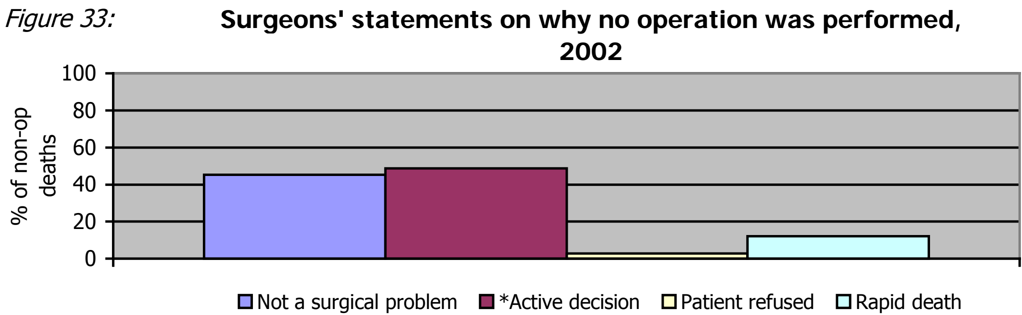


Table 22:
Most common diagnoses for non-operative cases with no risk factors

Most common diagnoses	n
Malignancy	47
Head injury	9
Aortic aneurysm	8
Infection	5

Figure 33:



*This decision was taken by a consultant surgeon in 93% of cases

Table 23:
Surgical assessors considered that an operation should have been performed, by year

	1996		1997		1998		1999		2000		2001		2002	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	28	1.8	19	1.3	20	1.4	20	1.9	19	1.2	23	1.5	23	1.5
No	1516	98.2	1427	98.7	1441	98.6	1044	98.1	1503	98.8	1492	98.5	1544	98.5
Unknown	59		84		153		98		95		148		190	

Percentages shown exclude “unknown” cases, i.e. missing values

Chi-squared test: p value = 0.633

The p value here is not significant, which suggests that no trend exists.

The surgical assessor is asked to make an overall statement describing any adverse events in management of the case. Figure 35 was derived by counting firstly those cases where the surgical assessor said that adverse events caused death, then – of the remainder – counting those cases where the surgical assessor said that adverse events made a significant contribution to death, then – of the remainder – counting those cases where the surgical assessor said that adverse events made no difference to the outcome.

Figure 34: **Surgical assessors' statements describing the adverse events in management of non-operative deaths, by year**

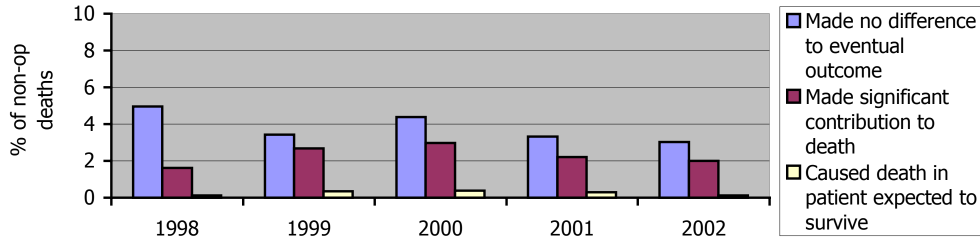


Table 24:
Actual numbers of adverse events statements by surgical assessors, non-operative deaths, by year

Statement	1998	1999	2000	2001	2002
Made no difference to eventual outcome	80	40	71	55	52
Made significant contribution to death	26	31	48	38	35
Caused death in patient expected to survive	2	4	6	2	2*

Table 25:
*** The adverse events attributed to these deaths are**

Case	*Adverse event (1)	*Adverse event (2)
1	Surgeon too junior	Operation should have been done
2	Care unsatisfactory (not otherwise specified)	

Table 26:
Surgical assessors stated that there were adverse events in management of non-operative cases, and the percentage of this group where the adverse events caused death or contributed to death

	1998		1999		2000		2001		2002	
Adverse event caused/contributed	n	%	n	%	n	%	n	%	n	%
	28	25.9	35	46.7	54	43.2	40	42.1	37	41.6

Percentages shown exclude "unknown" cases, i.e. missing values.

Chi-squared test: p value = 0.835

The statistics do not suggest that, where there was an adverse event in management, there is any trend in the percentage of those which caused or contributed to the death of the patient.

Table 27:

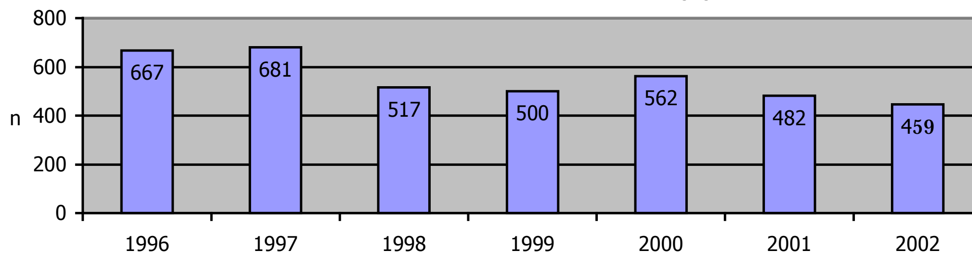
Surgical assessors – most common adverse events non-operative deaths, 2002	n
Inappropriate surgical admission	10
Delay to surgery ie earlier operation desirable	6
Failure to use DVT prophylaxis	6
Operation should have been done	6
Diagnosis missed	3
Poor documentation	3
Pre-operative assessment inadequate	3
SASM form incomplete	3
Transfer should not have occurred	3

Terminal care deaths (n = 459)

(Cases admitted for terminal care under the care of a surgeon)

Figure 35:

Number of terminal care deaths, by year



There must be a question as to whether an acute surgical ward is the appropriate environment for these patients

Figure 36:

Age groups of terminal care deaths, by year

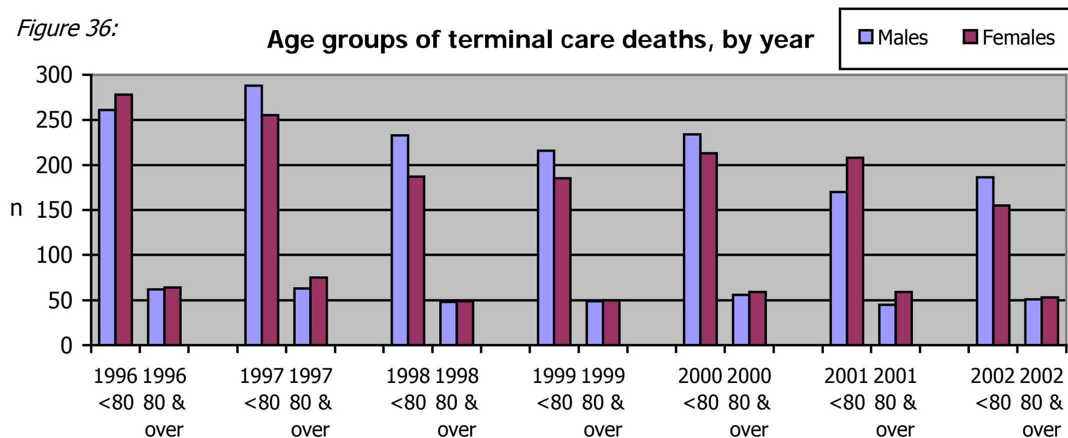
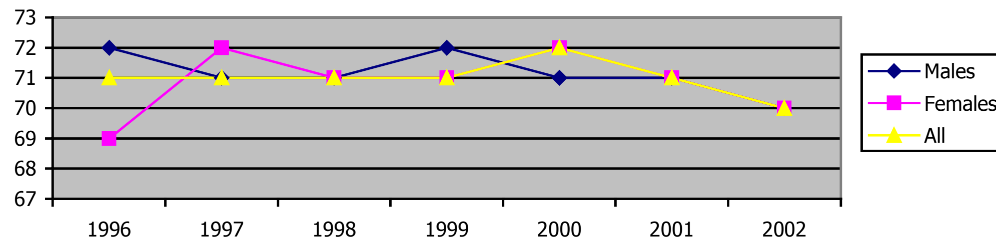


Figure 37:

Median age of terminal care deaths, by year



Test for trend: p value = 0.387

The p value here suggests that there is no trend.

Table 28:

Most common sites of cancer (terminal care deaths, 2002)	n
Ovary	40
Prostate	37
Colon, and rectum	37
Bladder	34
Oesophagus	26
Stomach	24
Breast	21
Pancreas	19