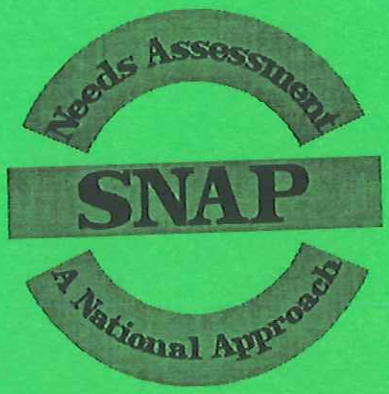
Scottish Needs Assessment Programme



Hernia Repair

SCOTTISH FORUM FOR PUBLIC HEALTH MEDICINE

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INTRODUCTORY NOTE

The comparative approach to health needs assessment has been especially important in the preparation of this report. The DHA Research Programme Report on Hernia Repair[1], published in December 1992, has been of invaluable assistance in preparation of this report.

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CONTENTS

EXECUTIVE SUMMARY

1. Inguinal and femoral hernia are the two common types of hernia. Hernias are a common and important cause of population morbidity. Inguinal hernia occurs most frequently in men and femoral hernia in women. 8,139 primary inguinal and 484 primary femoral hernia repairs were performed in Scotland in 1993.

2. The main problem is hernia associated morbidity, but both inguinal and femoral hernia may cause the life-threatening complications of bowel obstruction and strangulation.

3. Operation rates for both inguinal and femoral hernia increase with age to reach maximum values in the 75-84 year age-group. The operation rate for inguinal hernia is also high in young boys.

4. Management of hernia is primarily surgical. Conservative management is potentially dangerous and should be restricted to elderly patients with easily reducible inguinal hernia.

5. Patients should undergo surgical repair of hernia as soon as possible after assessment. The need for repair is particularly urgent in patients with femoral hernia, or in patients with irreducible inguinal hernia. Techniques of tension-free hernia repair should be employed.

6. Outcome measures of surgical management include recurrence rate, postoperative complication rate, requirement for postoperative analgesia and time before return to work.

7. There is considerable variability in standardised operation rates between health boards. It is likely that these variations reflect, in part, differences in the extent to which population need is met. Chapter 6 makes an estimate of unmet need.

RECOMMENDATIONS FOR PURCHASERS

1. Health boards should be guided in their purchasing plans for hernia by the number of cases derived from the application of the overall Scottish rates to their own populations.

2. Boards should ensure that protocols for referral are developed by general practitioners and general surgeons. Protocols should ensure that all appropriate patients who present to a general practitioner are referred for surgical assessment.

3. Boards should commission patterns of services according to need. All patients presenting with elective femoral or indirect inguinal hernia should receive urgent surgical repair. Maximum waiting periods should be specified. In most cases patients with femoral hernia should receive surgery within four weeks, and those with irreducible inguinal hernia within six weeks, of having been assessed at a surgical out-patient clinic.

4. Boards should monitor the proportion of hernia surgery performed on an emergency basis. Boards should ensure that the proportion of operations carried out as emergencies falls in the long-term.

5. Boards should purchase day-care for appropriate patients who have been screened for medical and social contraindications. Boards should aim to purchase at least 50% of primary inguinal hernia repairs in children as day cases, and 5% in adults.

6. Boards should develop outcome measures to monitor quality of services provided. Useful outcome measures can be obtained by using routinely collected data regarding recurrence or complications following primary repair. Data Linkage systems should be used to enhance the usefulness of routine data. The recurrence rate should be less than 2% at two years following primary surgery.

7. Boards should limit the purchase of laparoscopic surgical repair to cases with well-defined indications, such as bilateral hernia or recurrent hernia. Purchase of laparoscopic hernia repair more widely should await the outcome of current randomised controlled trials.

1 INTRODUCTION

1.1 Definition of hernia

A hernia is a protrusion of an organ, or part of an organ, through an abnormal opening or weakness of its containing cavity[2]. The two most common types of hernia, inguinal and femoral hernia, will be considered in this report. In both, loops of small or large bowel protrude from the abdomen within a hernial sac formed from the abdominal lining. More rarely, other abdominal organs may be included in the hernial sac.

Hernias occur at sites of congenital or acquired weakness in the abdominal wall[2] . Congenital inguinal hernia is associated with abnormal persistence of the passage by which the embryonic testis descends from the abdomen into the scrotum. Any factor associated with weakness or atrophy of the anterior abdominal muscles may cause acquired hernia. Secondary factors predisposing to hernia formation include any cause of raised intra-abdominal pressure, such as obesity, chronic cough or urinary obstruction.

The principal clinical significance of both inguinal and femoral hernia is that in both cases the hernial sac traverses a narrow anatomical canal, in which the contained bowel and its blood supply may be compressed.

1.2 Complications of hernia

Features which are important in the clinical assessment of patients with hernia are ***reducibility, obstruction and strangulation***[3].

Reducibility is the ability of the contents of a hernial sac to be returned completely to the abdominal cavity, either spontaneously, or by the patient or surgeon. An irreducible hernia is one whose contents cannot be returned to the abdomen, and where there is no evidence of other complications. Irreducibility usually results from formation of adhesions within the hernial sac, or from incarceration of faecal matter within the sac. Any degree of irreducibility predisposes to strangulation.

Obstruction occurs when loops of small or large bowel contained in a hernial sac are constricted. The vascular supply of the bowel is not impaired. Patients present as emergency cases with the clinical features of bowel obstruction.

Strangulation[4] occurs when the vascular supply of bowel is impaired because of compression in the hernial sac. Patients present with the clinical feature of gangrenous bowel and peritonitis, as well as of bowel obstruction.

All patients with inguinal or femoral hernia are at risk of bowel obstruction and strangulation. The risk is greatest for patients with femoral hernia and for those with indirect inguinal hernia.

1.3 Types of hernia

Inguinal hernia is the most common type of hernia and is most frequent in males. The hernial protrusion is defined in relation to the inguinal canal. The inguinal canal is the passage in the lower abdominal wall by which the embryonic testis descends to the scrotum, on each side. An indirect inguinal hernia passes through the inguinal canal, and may emerge into the scrotum. A direct inguinal hernia passes through an acquired weakness of the abdominal wall. Indirect inguinal hernia is liable to strangulation where the hernial sac traverses the narrow internal canal. The hernial orifice in direct hernias is larger, so that strangulation is rare. An indirect inguinal hernia may be congenital, but direct hernias are always acquired.

Femoral hernia is most common in females. The hernial sac passes through the femoral canal, alongside the sheath containing the femoral artery and veins. The neck of the femoral canal is narrow and has a sharp border on one side. For this reason, femoral hernia is particularly liable to irreducibility and strangulation[5]. Femoral hernia is almost always acquired.

1.4 Prevention

Opportunities for primary prevention of both inguinal and femoral hernia are limited. Preventive strategies should be geared to the prevention of the complications of hernia, and of recurrence after primary surgical repair.

2 EPIDEMIOLOGY

The assessment of patients with inguinal and femoral hernia presupposes the availability of sound epidemiological information on population morbidity. Incidence measures the number of new cases per unit time, or personal risk of disease. Prevalence is a measure of the burden of existing morbidity in a community. Both measures depend on carrying out accurate, time-consuming and expensive population surveys. No such surveys have been performed in Scotland. Available published epidemiological studies have been comprehensively reviewed in the DHA report[1].

2.1 Prevalence

Most prevalence studies cannot be compared, or their results applied to the Scottish population, because of differences or ambiguities in diagnostic criteria and methods of ascertainment, or because of the selected populations involved. One of the largest studies was that of Abramson, of males in Jerusalem[6]. The results of the study are summarised in Table 2.1.

TABLE 2.1
PREVALENCE OF INGUINAL HERNIA IN ADULT MALES (ABRAMSON)

	Age-Group (years)						
	25-34	35-44	45-54	55-64	65-74	over 74	Total
Current prevalence	11.9	15.1	19.7	26.1	29.5	34.1	18.3
Lifetime prevalence	5.2	19.4	28.0	34.5	39.7	46.8	24.3

Lifetime prevalence included patients with a history of successful inguinal hernia repair, as well as those with evidence of current hernia. The prevalence of current and lifetime hernia increased with increasing age-group. The usefulness of these data, in assessing need in the Scottish population, is limited. No information is available regarding prevalence of femoral hernia.

2.2 Incidence

No population-based studies of incidence of inguinal or femoral hernia have been performed. Information routinely generated from contacts of patient with services can be used as proxy measures of true incidence.

Operation rates for inguinal and femoral hernia derived from hospital activity data can be used as estimates of incidence. These rates will underestimate true population incidence considerably, because not all patients with hernia are referred to hospital or undergo surgery. A more useful proxy for population incidence rates is provided by data derived from patient contacts with general practitioners. Tables 2.2 and 2.3 show rates derived from the 1981-82 Third National Study of Morbidity Statistics for General Practice (TNSMS)[7]. These rates were used as a measure of population incidence by the authors of the DHA Project Report on Hernia Repair. It is likely that even these rates underestimate population incidence because not all patients with hernia seek help from a general practitioner.

TABLE 2.2
INCIDENCE RATES OF INGUINAL HERNIA PER 10,000 PERSONS AT RISK (THIRD NATIONAL STUDY, 1981-1982 MORBIDITY STATISTICS FOR GENERAL PRACTICE)[7]

Age-groups (years)	Male	Female
Less than 5	58	13
5 - 14	7	3
15 -24	7	3
25 - 44	20	4
45 - 64	70	6
65 - 74	88	7
More than 74	150	17

TABLE 2.3
INCIDENCE RATES OF FEMORAL HERNIA PER 10,000 PERSONS AT RISK (THIRD NATIONAL STUDY, 1981-1982 MORBIDITY STATISTICS FOR GENERAL PRACTICE)[7]

Age-groups (years)	Male	Female
Less than 5		
5 - 14		
15 - 24		
25 - 44	1	2
45 - 64	1	2
65 - 74	1	2
More than 74	9	7

If these rates are applied to the Scottish population in 1993, 11,794 primary inguinal repairs and 719 primary femoral repairs would be expected. The rates should be used with caution because of the wide confidence intervals associated with them.

2.3 Mortality

Hernia is a serious condition because of the complication of obstruction and strangulation. In 1993 there were 14 deaths in Scotland associated with inguinal hernia and 7 associated with femoral hernia.

3 MANAGEMENT OF PATIENTS WITH INGUINAL AND FEMORAL HERNIA

3.1 Principles of Management

The aim of management of patients with both inguinal and femoral hernia is to provide permanent symptomatic relief, and to prevent complications, especially strangulation. Management of all patients will include general advice or treatment to address such predisposing factors as obesity, chronic cough, constipation or bladder neck obstruction.

The Royal College of Surgeons of England has set out Guidelines for Management[8]. These include the following principles:

- indirect and symptomatic direct inguinal hernias may be repaired electively and prioritised on waiting lists by employment considerations;
- repair of small, easily reducible direct inguinal hernia is not mandatory, especially in elderly patients;
- irreducible inguinal hernias, and those presenting with a history of less than four weeks, should be repaired promptly;
- all femoral hernias should be repaired urgently.

3.1.1 *Conservative management*

Developments in regional and local anaesthesia have meant that most patients with inguinal hernia are candidates for surgical repair[9]. Some patients refuse surgery, and others may not be referred because general practitioners consider the risk excessive. For these patients, a truss may be prescribed in an attempt at conservative management. Conservative management should never be offered to patients with femoral hernia, because of the high risk of strangulation. Attempts at conservative management should be restricted to elderly patients who have easily reducible hernias. Even in patients with inguinal hernia, a truss is often difficult to fit and maintain[10] Continual control of a hernia is rarely possible. When pressure is applied inadvertently adjacent to the site of the swelling, the risk of complications is increased[11]. Law et al have suggested that a surgical assessment be sought before a truss is prescribed[10].

3.1.2 *Surgical management of patients with hernia*

The modern epoch of hernia treatment began in 1884 with the operation devised by Bassini. Bassini's operation, and the large number of refinements of the original technique subsequently introduced, involved the suturing together of musculo-tendinous tissues which are not normally anatomically apposite. This caused tension in the surgical site which was associated with a high incidence of post-surgical recurrence. The search for methods of 'tension-free' repair culminated in the use of prosthetic materials at open surgery in the early 1970s, and the introduction of laparoscopic repair in the late 1980s.

The surgical management of patients with inguinal and femoral hernia can be considered in terms of the main groups of patients affected:

3.1.2.1 *Indirect inguinal hernia in infants*

Inguinal hernia in infancy and childhood is approximately nine times more common in boys than in girls. Because of the risk of strangulation, patients should always be referred for elective surgery. In infants less than three months old, the risk of testicular

atrophy is especially high, and urgent surgical repair is indicated. The treatment indicated is herniotomy. This consists of replacement of the hernial contents in the abdomen, and excision of the hernial sac. Surgery is usually performed under general anaesthesia, augmented by regional anaesthesia.

3.1.2.2 *Indirect inguinal hernia in adults*

Adult patients presenting with indirect inguinal hernia are at considerable risk of strangulation, and should be referred for elective surgery. In young adults herniotomy may suffice. Most patients, particularly among the elderly, have sustained weakness and distortion of the inguinal tissues. These patients should undergo elective herniorrhaphy, consisting of herniotomy and reconstruction of the damaged tissues. Surgery may be performed under general or local anaesthesia. There are very few patients, even among the elderly and frail, in whom surgery is absolutely contraindicated.

3.1.2.3 *Direct inguinal hernia in adults*

Many adult patients present with large, easily reducible hernias. The risk of strangulation is low, but herniorrhaphy should be performed to alleviate symptoms, which may be extreme. Surgery may be performed under general or local anaesthesia.

3.1.2.4 *Femoral hernia in adults*

Femoral hernia is more common in middle-aged or elderly women. Patients should be referred for urgent femoral herniorrhaphy because of the high risk of strangulation.

3.1.2.5 *Patients with strangulation or obstruction*

Patients with femoral hernia are at high risk of strangulation and obstruction, and those with indirect inguinal hernia are at considerable risk. Patients require emergency surgical relief of small or large bowel obstruction, or of bowel gangrene and peritonitis. Bowel excision may be required after resuscitation and fluid replacement. The post-operative complication rate and surgical mortality rate are high.

3.2 Developments in Care

Several developments may affect the way in which care is delivered to patients with hernia. These developments are at different stages of evolution but will affect the future purchasing of care. The principal developments are tension-free open repair, laparoscopic repair and day-surgery.

3.2.1 *Tension-free repair*

Developments in hernia treatment have been largely led by attempts to minimise recurrence by devising techniques of tension-free repair at open operation[12, 13, 14, 15]. The development of tension-free repair was greatly facilitated by the introduction of synthetic polypropylene mesh materials. A conventional groin incision is required, which will allow full exposure of tendons and ligaments. Sheets of mesh are used to reinforce the damaged anatomical structures at the site of hernia. Techniques using prosthetic material to plug the internal inguinal and femoral orifices have also been advocated. Low rates of recurrence[13] have been reported using tension-free techniques.

3.2.2 *Laparoscopic hernia repair*

Laparoscopic techniques have been introduced to many types of abdominal surgery in the last decade[16, 17]. Laparoscopy has been applied to hernia repair, but its place in management remains uncertain [18, 19]. The operation requires three abdominal

incisions, one for the laparoscope and two for access of surgical instruments. The site of the hernia is approached internally, across the abdominal cavity. Prosthetic mesh is sutured or stapled over the hernial defect. The advantages claimed for laparoscopic hernia repair over open repair are that it is associated with shorter hospital stays, less post-operative pain and a shorter recovery period. It has also been suggested that the clear anatomical vision of the surgical area achieved laparoscopically leads to more effective repair. However, laparoscopic repair has several serious disadvantages:[20, 21]

- General anaesthesia is always required for laparoscopic surgery[21]. Laparoscopic hernia repair is contraindicated in many elderly patients, because concomitant disease, such as ischaemic heart disease and chronic airways disease, makes them unfit to undergo general anaesthesia. Such patients are more suited to open repair under local anaesthesia.

- Because the surgical site is approached across the abdominal cavity[21, 22], complications such as infection, and gas embolism may ensue. Even in experienced hands, damage may be inflicted on structures such as bowel and aorta. Trauma of a large area of peritoneum cause fibrotic adhesions which may give rise to subsequent bowel obstruction. Meticulous surgical technique is required, as haemostasis is more difficult to secure than at open surgery.

- Laparoscopic surgery is expensive[21, 23]. Although operation time may be a function of surgical experience, theatre time is often longer than for open surgery. The costs incurred are substantial, and include capital costs, costs of expensive disposable items and costs for theatre staff, including anaesthetists.

- Laparoscopic surgery of any type is contraindicated in patients with histories of previous major abdominal surgery, because of formation of abdominal adhesions.

- Surgical anatomy is different for hernia repair performed laparoscopically and at open surgery. Surgical trainees require to be trained separately for the two types of surgery.

Several authors[20, 21, 24] have warned against the expansion of laparoscopic hernia repair, before the results of randomised control trials are available. A large randomised control trial[25] of laparoscopic and open repair, based in the West of Scotland, is in progress. A number of reports of uncontrolled series of laparoscopic repairs, and small clinical trials, have appeared[19, 22, 23]. These have suggested that laparoscopic hernia repair is associated with a low incidence of post-operative complications. It is likely that indications for laparoscopic surgery will include bilateral hernia repair,[16] in which both sites can be repaired by a single laparoscopic entry, and recurrent repair, where the operative field will be unaffected by post-surgical fibrosis.

3.2.3 *Day-surgery:*

The place of day-care in hernia surgery will expand. Primary inguinal and femoral hernia repairs are operations recommended as suitable for day-surgery by the Royal College of Surgeons Commission on Day-surgery[26]. In 1993, 13.2% of patients undergoing primary inguinal hernia repair and 2% of those undergoing primary femoral hernia repair received day-care in Scotland. Two studies have shown[27, 28] no difference in outcome between patients managed as in-patients, and as day-cases in outcome of hernia surgery. There are important medical and social contraindications to day-surgery, but wide differences exist by health board of residence in proportion of elective repairs performed as day-surgery. There is considerable scope for increasing the extent of day-surgery in at least some Scottish boards.

3.3 Outcomes in Hernia Management

Health boards will require to make judgements on cost-effectiveness of different surgical treatments, as part of establishing overall management protocols. Costs of treatment will be particularly affected by operative techniques (eg Laparoscopy) and mode of delivery (eg Day-surgery). Outcomes of care will be defined by controlled trials of surgical techniques. The principal components required as outcome measures are:

3.3.1 ***Recurrence rate:*** The principal test for developments in hernia repair has been recurrence rate[22] following primary surgical repair. Quoted recurrence rates require careful interpretation because follow-up periods vary widely between studies. Published rates of recurrence, like other outcome criteria, frequently reflect optimal practice achieved in international centres of excellence.

Recurrence rates of less than 1% have been reported[13] for open 'tension-free' repairs of primary inguinal hernia. Comparable rates have been reported for open Shouldice repair[29], a modification of the Bassini technique. It seems likely that a principal determinant of outcome is surgical experience and accumulation of expertise in hernia repair. Variation in recurrence rates between Provider Units probably reflects, in part, the place of hernia surgery as the common currency of most general surgeons.

Table 3.3.1 shows the incidence of recurrent hernia repair within two years of primary surgery by health board of residence.

TABLE 3.3.1
INCIDENCE OF RECURRENT HERNIA REPAIR WITHIN TWO YEARS OF PRIMARY SURGERY BY HEALTH BOARD OF RESIDENCE.

Health Board of Residence	2 year recurrence rate (%)	
	Inguinal Hernia	Femoral Hernia
Ayrshire and Arran	1.06	1.52
Borders	0	0
Argyll and Clyde	1.14	0
Fife	.95	1.45
GGHB	.62	0
Highland	1.33	0
Lanarkshire	.42	.99
Grampian	.92	.93
Orkney	1.79	0
Lothian	1.71	0
Tayside	1.34	0
FVHB	.98	1.92
Western Isles	0	0
Dumfries/Galloway	.84	0
Shetland	1.59	0
Total	**.99**	**.51**

In Scotland overall, the incidence of recurrent inguinal repair was almost 1% and for femoral hernia, .51%. The incidence did not exceed 2% for any health board of residence.

3.3.2 ***Post-surgical complications***: Post-surgical complications of hernia repair are an important measure of outcome[30]. Complications specific to open herniorrhaphy include testicular atrophy and neuralgia, usually transient, resulting from damage to the ilioinguinal nerve. Complications associated with laparoscopic repairs include damage to bowel, major arteries, and lateral cutaneous and genitofemoral nerves. More general complications include wound infection and acute urinary retention.

3.3.3 ***Requirements for analgesia***: Management of post-operative pain[23] is an important aspect of hernia surgery. Requirement for post-operative analgesia has been used as one component of clinical outcome.

3.3.4 ***Period before return to work***: Return to work or normal activities is an indicator of the patient's resumption of normal activities. It has been claimed that laparoscopic surgery allows an earlier return to work than open surgery.

4 DEMAND FOR HERNIA SURGERY

Demand reflects expectations for services, on the part of both public and health professionals, and may become manifest in many ways. For elective hernia repair, numbers waiting for surgery have been used as an index of demand. Since 1992, information regarding numbers of patients waiting for elective operations has been recorded on a quarterly basis in the SMR3 system. Data are only collected for patients waiting for operations which are covered by a national or local guarantee.

Table 4.1 shows numbers of patients waiting for inguinal and femoral hernia repair in March 1994.

TABLE 4.1
NUMBERS OF PATIENTS WAITING FOR INGUINAL AND FEMORAL HERNIA REPAIR, BY HEALTH BOARD OF RESIDENCE, MARCH 1994

Health Board of residence	Type of Surgery	
	Inguinal Hernia	Femoral Hernia
Ayrshire and Arran	170	4
Grampian	144	4
GGHB	300	7
Lanarkshire	235	6
Tayside	146	2

Figures 4.1 and 4.2 show quarterly SMR3 data since 1992 for inguinal hernia and femoral hernia repair respectively. In general, monitoring of the numbers of patients waiting for surgery will indicate whether current levels of supply are meeting demand for the service. Data for GGHB have only been collected since June 1993. Monitoring of temporal trends in numbers waiting for hernia repair may give warning of an increase or decrease in the demand for surgery. No overall trends are apparent in the data presented in Figures 4.1 and 4.2

FIGURE 4.1

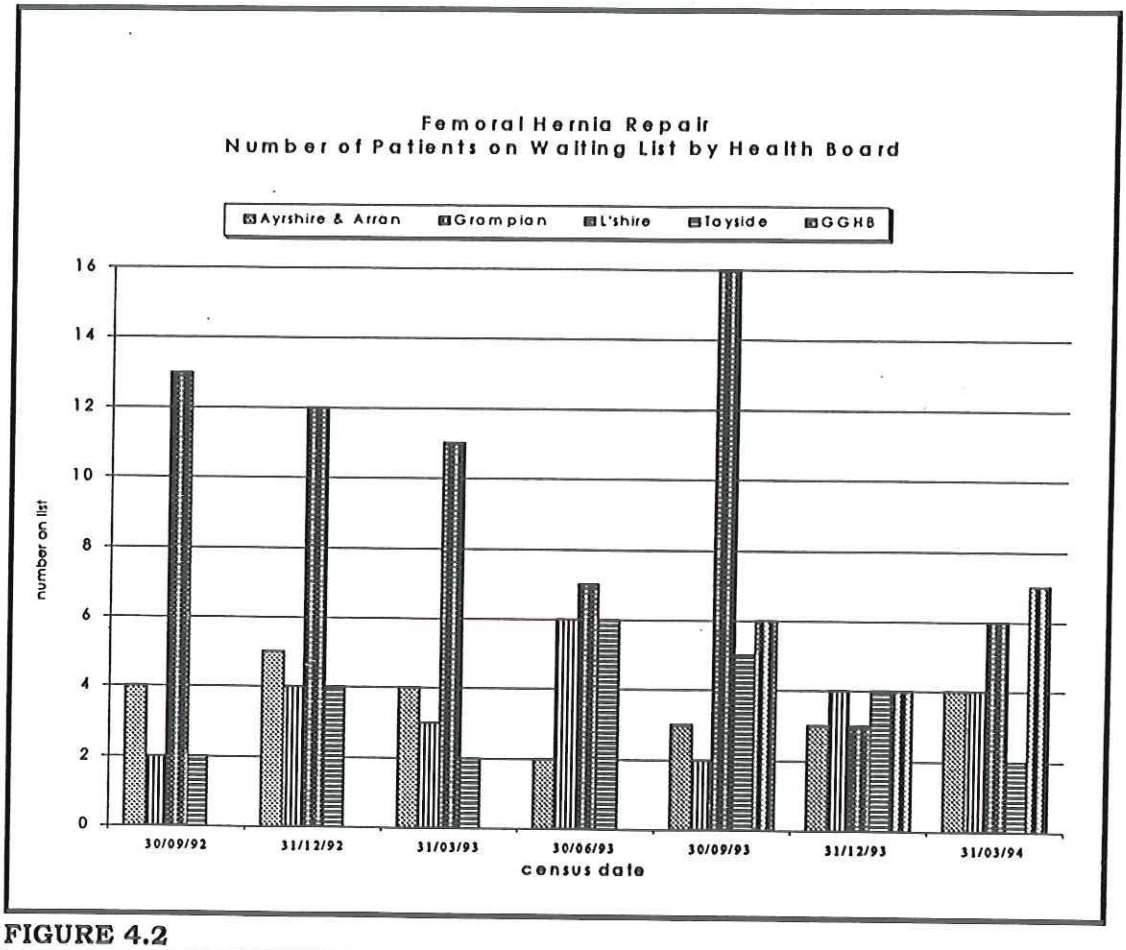
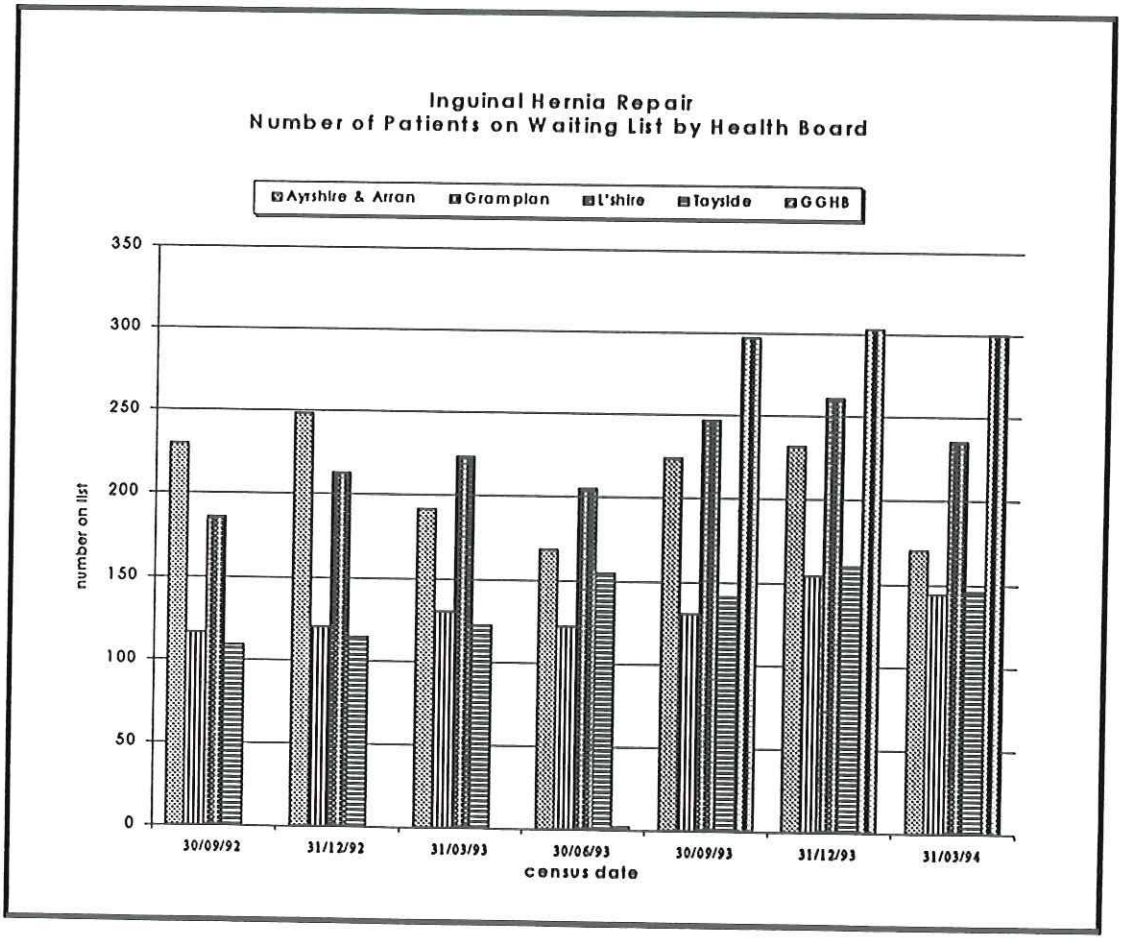


FIGURE 4.2



5 HEALTH ECONOMIC ISSUES

Health economic analysis supports Purchasers in maximising health gain from the limited resources available.

An economic appraisal attempts to assess the costs and consequences (ie benefits) of given health care interventions.

5.1 Costs of Surgical Treatment

Williams et al (1992)[1] used samples of charges from several NHS Trusts to estimate the average cost to purchasers of hernia repair. The costs of the operation episode and of two out-patient attendances were included in charges for in-patient and day-case surgery (Table 5.1.1).

TABLE 5.1.1
ESTIMATED COSTS OF PRIMARY SURGICAL INTERVENTIONS IN HERNIA PATIENTS IN SCOTLAND, 1993

	Average cost per intervention	Total number of interventions	Total hospital costs
In-patient Surgery	£779	7,639	£5,950, 781
Day-case Surgery	£544	984	£ 535,296

The total costs of primary hernia surgery in Scotland in 1993 are estimated to be £6,486,077. The proportion of all operations performed as day-surgery is 11%. If the proportion of day-surgery were increased to 15%, 20% and 25%, the proportional savings would be respectively 1.1%, 2.7% and 4.2%. An increase in day-case rates to 25% would release resources valued at approximately £275,000.

5.2 Benefits from Treatment

The benefits of hernia intervention have been largely assessed in narrow clinical terms, with few studies measuring the impact of intervention in terms of patients' quality of life. The measure of clinical effectiveness most usually adopted is rate of hernia recurrence. This is of limited use within a priority setting framework, where purchasers are required to choose between a wide range of health activities. Many evaluations of the effectiveness of different techniques of hernia repair have been retrospective with inadequate follow-up periods. Furthermore, a number of these studies have been non-comparative so that the relative benefits of alternative interventions cannot be ascertained. More recent studies have compared specific surgical techniques using prospective randomised designs.[31, 32]

5.3 Care setting for Hernia Repair

The economic studies that have been carried out with regard to hernia repair have addressed the question of appropriate care settings, specifically day case or in-patient care.

Economic appraisals show that the cost savings associated with day care outweigh the additional costs associated with community support from general practitioners and community nurses. There was no offsetting loss of benefit in any of the evaluations.[27,28,33] The introduction of day surgery for hernia repair, by increasing patient throughput, could reduce existing waiting times. The median waiting time

for inguinal hernia repair in Scotland was 56 days in 1993. An apparent preference for day care is expressed by patients.[32, 33]

The implementation of day care will require Purchasers to overcome a number of barriers. One problem identified was the lack of NHS data for the effective monitoring of the service. This was reflected in the findings of a recent study, that significantly more medical care was required after discharge for day cases than for in-patients, but that most of the wound complications found in patients were unreported to the hospital[34]. As with all potential procedures, when considering expanding or introducing day care for a group of patients, it is vital that attention be paid to local margins in terms of both benefits and costs.

5.4 Areas for further work

- Deficiencies in the information available will require to be addressed for health boards in Scotland to engage in the effective purchasing of health care.

- Estimating the costs of providing specific types of care within different care settings will require detailed marginal analysis. Economic evaluations carried out by individual purchasers may not apply without qualification to all health boards.

- Accurate measurement of benefits need to be developed for the economic implications of committing resources to different programmes of healthcare. The current literature has focused narrowly on clinical effects associated with different interventions. Disease specific and general measures of health status have also been developed.

- There have been no economic appraisals comparing surgery and conservative interventions, or between different surgical techniques in patients with hernia[1] . An important issue in hernia surgery is the place of laparoscopy. Laparoscopic hernia repair is currently being evaluated in an MRC funded trial[25], largely based in the central belt of Scotland. This trial will determine both the marginal costs and benefits associated with the introduction of laparoscopy.

- Clinical trials comparing day-case and in-patient surgery for specific patient groups such as the elderly should be considered. As less independent groups are considered, careful attention should be paid to the post-discharge care of patients under each option.

6 UNMET NEED

Needs Assessment, in its most pure sense, should be based on large-scale community surveys of population morbidity by health boards. Such surveys would be expensive and time-consuming to plan and execute. In the absence of more robust epidemiological evidence, appropriate levels of service provision cannot be defined in absolute terms. As in previous Health Needs Assessment reports, a comparative approach will be used. For each Scottish board, two possible levels of service provision will be considered:

- The average Scottish operation rates for 1993 will be applied to board catchment populations by age-group and sex. The number of operations currently purchased for residents of each board can be compared with the number expected if the average Scottish rates are accepted as an appropriate level of supply.
- In 1993 the operation rates for primary inguinal hernia were highest for residents of Borders Health Board, reflecting a greater level of supply. The Borders rates, reflecting the highest level of supply in Scotland, will be applied to the population of each Board. The numbers of operations currently purchased in each board will be compared with the number which will be expected if the service supplied were equivalent to that in Borders Health Board. Because of the relatively small number of femoral hernia repairs carried out, this approach will be applied only in the case of primary inguinal hernia repair.

6.1 Primary Inguinal Hernia

TABLE 6.1
EXPECTED NUMBERS OF PRIMARY INGUINAL HERNIA REPAIRS BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Numbers of operations in 1993				
	Observed	Expected (Scottish Rates)	Difference	Expected (Borders Rates)	Difference
ARGYLL & CLYDE	702	688.1	-13.9	910.2	208.2
AYRSHIRE & ARRAN	602	610.8	8.8	801.6	199.6
BORDERS	234	181.6	-52.4	234	0
DUMFRIES & GALLOWAY	286	255	-31	329.7	43.7
FIFE	500	562.3	62.3	742	242
FORTH VALLEY	402	432.8	30.8	573.1	171.1
GRAMPIAN	771	826.5	55.5	1107.5	336.5
GREATER GLASGOW	1393	1426.7	33.7	1892.4	499.4
HIGHLAND	332	338.4	6.4	446.2	114.2
LANARKSHIRE	831	862.3	31.3	1155	324
LOTHIAN	1320	1169.7	-150.3	1559.9	239.9
ORKNEY	34	33.5	-0.5	43.9	9.9
SHETLAND	26	36.4	10.4	48.9	22.9
TAYSIDE	657	651.1	-5.9	850.3	193.3
WESTERN ISLES	36	50.8	14.8	66.3	30.3
TOTAL	8126	8126	0	10761	2635

Table 6.1 shows the observed numbers of primary inguinal hernia repairs in 1993, and the respective numbers expected if the average Scottish and Borders Health Board rates of supply are assumed. Applying the average Scottish rates, six boards purchased more than the expected number of operations. Lothian Health Board purchased approximately 13% more than the expected number of operations, and Fife 11% less. If the Borders rates are accepted as an appropriate level of service provision, then an additional 2,635 operations, 32.4% more than are currently supplied, would be required for the Scottish population.

6.2 Primary Femoral Hernia

TABLE 6.2
EXPECTED NUMBERS OF PRIMARY FEMORAL HERNIA REPAIRS BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Numbers of operations in 1993		
	Observed	Expected (Scottish Rates)	Difference
ARGYLL & CLYDE	35	41.1	6.1
AYRSHIRE & ARRAN	36	36.8	0.8
BORDERS	10	11.7	1.7
DUMFRIES & GALLOWAY	18	15.5	-2.5
FIFE	30	33.2	3.2
FORTH VALLEY	22	25.4	3.4
GRAMPIAN	58	47.2	-10.8
GREATER GLASGOW	93	86.7	-6.3
HIGHLAND	18	19.7	1.7
LANARKSHIRE	40	47.8	7.8
LOTHIAN	68	70.1	2.1
ORKNEY	2	2	0
SHETLAND	3	2	-1
TAYSIDE	47	40.6	-6.4
WESTERN ISLES	3	3.2	0.2
TOTAL	483	483	0

If the average Scottish rates of primary femoral hernia repair were supplied, then five boards would purchase more than the expected number of operations. Grampian Health Board would purchase approximately 23% more than the expected number of operations, and Lanarkshire Health Board 16% less.

6.3 Implications for Purchasing

Operation rates reflect the supply of a surgical service to a health board population. Operation rates, standardised for age and sex, vary widely between boards for both inguinal and femoral hernia repair. These differences in rates reflect differences in levels of need, demand and supply factors. To assess relative levels of population need, it would be necessary to perform population surveys of incidence. As none have been performed, it is impossible to assess the contribution of variations in need or incidence of hernia to variation in operation rates between boards. In the absence of this information, boards are required to adopt a framework for purchasing. It is likely that at least part of the variations in operation rates for hernia reflect differences in demand and in factors determining supply, such as numbers of operating theatre sessions, surgical beds and medical staff

It is likely, from the available evidence, including that of Tables 6.1 and 6.2, that considerable unmet needs exists for surgical treatment of hernia.

Surgery is the treatment of choice for all patients with femoral and indirect inguinal hernia, and for most with direct inguinal hernia. The following broad guidelines for purchasing can be offered.

- Boards should plan to purchase minimum numbers of primary inguinal and femoral hernia repair operations determined by applying overall Scottish surgical rates to board populations. Current levels of surgery may be less than mean Scottish levels because of failure of referral by general practitioners to surgical services. Purchasers may wish to consider negotiating guidance on referral patterns with Local Medical Committees.

- Planning for provision of hernia surgery will depend on its place in the overall priorities of each board. Boards may consider increasing the amount of inguinal hernia surgery purchased to a maximum determined by the Borders Health Board operation rates.

7 BIBLIOGRAPHY

1. Williams M et al (1992), DHA Project: Epidemiologically based needs assessment, Report 13: Hernia repair, NHS Management Executive.

2. Bailey and Love, Short Practice of Surgery, Sixteenth Edition (1975): 1059 - 1060.

3. Bailey and Love, Short Practice of Surgery, Sixteenth Edition (1975): 1061

4. Gallegos NC et al. Risk of strangulation in groin hernias. Br. J. Surg. 1991; 78: 1171-3.

5. Waddington R T, Femoral Hernia: a recent appraisal. Br.J.Surg. 1971; 58:920-2.

6. Abramson J H et al. The epidemiology of inguinal hernia. A survey in Western Jerusalem. J. Epidemiol. Community Health 1978; 32: 59-67.

7. Royal College of General Practitioners. OPCS. 1981 - 82. Morbidity Statistics from general practice. Third National Study, London: HMSO, 1986.

8. Royal College of Surgeons of England (1993). Clinical guidelines on the management of Groin Hernia in Adults. London: Royal Coll. of Surg. of England, July 1993.

9. Baskerville PA et al. Day case inguinal hernia repair under local anaesthetic. Ann. R. Coll. Surg. Engl. 1983; 65; 224-225.

10. Law NW, Trapnell JE. Does a truss benefit a patient with inguinal hernia. Br Med J, 1992: 304: 1092.

11. Condon RF, Nyhus L D. Complications of groin hernia repair. Surg. Clin. N.Am. 1971; 51; 1325 - 1336.

12. Lichtenstein IL, Shulman AG, Amid PK et al. The tension-free hernioplasty Am. J. Surg. 1989; 157: 188 - 193.

13. Lichtenstein IL, Shulman AG, Amid PK. The cause, prevention and treatment of recurrent groin hernia. Surg. Clin. North Am. 1993; 73: 529 - 44.

14. Shulman AG et al. The safety of mesh repair for primary inguinal hernias: results of 3019 operations from five diverse surgical sources. Am. Surg. 1992; 58: 255-7.

15. Robbins AW, Ruthnow IM. The mesh-plug hernioplasy. Surgical clinics of North America 1993; 73: 501 - 511.

16. Manson JRT. Advanced techniques in abdominal surgery. Br Med. J. 1993; 307: 1346 - 1350.

17. Soper NJ et al. Laparoscopic general surgery. Medical Progress, 1994; 330: 6: 409 - 419.

18. Arregui ME et al. Laparoscopic inguinal herniography. Surgical clinics of North America 1993; 73: 513 - 527.

19. Brooks DC. A prospective comparison of laparoscopic and tension-free open Herniorrhaphy. Arch. Surg. 1994; 129: 361 - 366.

20. Wexner SD. Laparoscopic hernia repair: a plea for science and statistics. Surg. Endosc. (1993) 7: 150 - 151.

21. Notaras MJ. No benefit in hernia repair. Br. Med. J. (1994) 308: 199.

22. Kavic MS. Laparoscopic hernia repair. Surg. Endosc 1993; 7: 163 - 167.

23. Stoker DL. Laparoscopic versus open inguinal hernia repair: randomised prospective trial. Lancet 1994; 343: 1243 - 1245.

25. O'Dwyer P J. Personal Communication, 1994.

26. Commission on the provision of surgical services. Guidelines for day-case surgery, Royal College of Surgeons 1985.

27. Russell IT et al. Day-case surgery for hernias and haemorrhoids. Lancet 1977; 844-7.

28. Prescott RJ et al. Economic aspects of daycare after operations for hernia or varicose veins. J. Epidemiol. Community Health 1978; 32 : 222 - 5.

29. Devlin HB et al. Short stay surgery for inguinal hernia: Experience of the shouldice operation, 1970 - 1982. Br. J. Surg. 1986; 73: 123-4.

30. MacFadyen BV et al. Complication of laparoscopic herniography. Surgical endoscopy 1993; 7: 155 - 158.

31. Kingsnorth AN et al. Prospective randomised trial comparing the Shouldice technique and plication darn for inguinal hernia repair. Br. J. Surg. 1992; 79(10): 1068 - 70.

32. Panos RG et al. Preliminary results of a prospective randomised study of Cooper's ligament versus Shouldice herniorrhaphy technique. Surgery, Gynaecology and Obstetrics 1992; 175 (4): 315 - 319.

33. Alder MW et al. Randomised controlled trial of early discharge for inguinal hernia and varicose veins. J. Epid. and Comm. Health 1978; 32: 136 - 142.

34. Michaels JA. Case-control study of patient satisfaction with day case and in-patient inguinal hernia repair . Journal of The Royal College of Surgeons of Edinburgh. 37 (2): 99-100.

APPENDIX

PROFILE OF HOSPITAL SERVICES IN SCOTLAND

1.1 Inguinal Hernia Repair

1.1.1 *Scottish Inguinal Hernia Repairs, 1993*

In 1993 in Scotland, a total of 8,139 primary inguinal hernia repairs were performed, and 404 recurrent hernia repairs. 95.4% of primary repairs were performed as single procedures, with no other operation performed during that episode of care. 90% of recurrent hernia repairs were performed as single procedures. Table 1 shows numbers of operations performed by Health board of residence

The median ages at operation for primary inguinal hernia repair for elective and emergency in-patients, were 49.3 years and 39.0 years respectively (Table 2). The median age of patients receiving day-surgery was 6.2 years.

Over 92% of all operations for primary inguinal hernia were performed in men (Table 3). This is consistent with the well recognized higher male incidence of inguinal hernia. Among males, over 21% of operations were performed in children aged less than 15 years. The number of primary repairs fell among young adults. Over 36% of repairs in male patients were in the 55-74 year age-group

Tables 1 and 3 include 13 patients undergoing primary repair, who were either of no fixed abode or resident outwith Scotland. These cases have been omitted, where appropriate, from subsequent analysis.

1.1.2 *Age and sex specific operation rates*

Age and sex specific Scottish operation rates for primary inguinal hernia repair are shown in Table 4. These rates include repairs carried out both electively and as emergencies. The overall operation rate for males in 1993 was 305.2 per 100,000, and for females 21.8 per 100,000. These rates can be considered as proxy measures of incidence. Rates for males exceed those for females at all ages. Rates are high in the 0 - 4 year age -group, 710.2 per 100,000 in boys and 52.9 per 100,000 in girls, reflecting the incidence of congenital inguinal hernia. Rates decrease in both sexes in young adulthood, before increasing to maximum values in the 75-84 year age-group.

1.1.3 *Standardised operation rates*

The crude Scottish rate for primary inguinal hernia repair was 159.0 per 100,000. Age and sex standardisation allows comparison of surgical rates in different health board populations with the effects of these variables removed. The standardised operation rates showed large variations by different boards of residence from 141.2 per 100,000 for Fife to 204.3 per 100,000 for Borders Health Board (Table 5). Standardisation has been carried out for the mainland boards only because of the small number of cases associated with island boards.

The crude Scottish operation rate for recurrent inguinal hernia repair was 7.5 per 100,000. Standardised operation rates varied from 3.5 per 100,000 in Lanarkshire to 9.6 per 100,000 in Lothian Health Board.

Standardised operation rates for hernia reflect the supply of surgical services for populations. The rates reflect a complex interplay of determinants including population need, demand and supply factors.

1.1.4 *Emergency surgery*

8.8% of patients underwent primary inguinal hernia repair as emergencies (Table 6). The proportion of patients treated as emergencies varied from 7.0% in Dumfries and

Galloway residents, to 11.8% in residents of Orkney Health Board (Table 7). The proportion of patients treated as emergencies may partly reflect the availability of services for elective surgery. The extent of emergency hernia surgery should be minimised because of the excess mortality associated with patients presenting with bowel obstruction and strangulation.

1.1.5 *Day surgery*

In Scotland in 1993, over 91%, of primary inguinal hernia repairs were performed electively (Table 6) and 13.2% of all patients who underwent elective primary inguinal hernia repair received day-surgery (Table 8). Excluding the three island boards, the day-surgery rate varied from 21.8% in residents of Greater Glasgow Health Board, to 3.3% in residents of Tayside Health Board. It is likely that the extent of day-surgery for hernia repair is underestimated because of under-reporting of day-cases.

A major difference in the management of primary inguinal hernia, in adults and children respectively, lay in the proportion who underwent day-surgery (Table 9). 51.4% of children, but only 3.2% of adults, underwent primary repair as day-cases. This suggests that surgeons are less prepared to submit adult than child patients to day-surgery. Although day-surgery will be contra-indicated for many elderly patients because of concurrent disease, there is likely to be considerable scope for expanding the extent of day-surgery in adult patients.

Table 10 shows proportions of children and adults who received elective primary inguinal hernia repair as day-cases in 1993. In all boards, more paediatric than adult day-surgery was performed. For residents of Lothian Health Board, 86.7% of children received day-surgery, but only 4.2% of adults.

The use of day-surgery in adult patients is limited by medical and social factors, but it is likely that Purchasers could purchase more hernia repairs as day-cases in appropriate adult patients.

1.1.6 *In-patient resources*

The median Scottish length of stay for inguinal hernia repair was 4.0 days. As might be expected, the median stay for emergency operations, 6.0 days, was greater than that for elective in-patient surgery, 3.0 days (Table 11). There was considerable variation between board of residence in median length of stay for both categories of patient.

1.1.7 *Waiting times*

The median waiting time for all patients for primary inguinal hernia repairs in 1993 was 56.0 days (Table 12). The waiting time for in-patient surgery, 59.0 days, was greater than that for day-surgery, 46.0 days. Considerable variation was apparent between health boards of residence in waiting time for both elective and day-surgery, reflecting differences in access to treatment.

1.2 Femoral Hernia Repair

1.2.1 *Scottish femoral hernia repairs, 1993*

In 1993 , 484 primary and 16 recurrent femoral hernia repairs were performed in Scotland. Approximately 93% of both primary and recurrent operations were performed as single procedures. Table 13 shows numbers of operations performed by health board of residence.

The median age of patients undergoing primary femoral hernia repair was 69 years (Table 14). Patients who underwent emergency procedures were older than those who underwent elective in-patient repairs. Although only small numbers of patients underwent day-surgery, younger patients were selected for this procedure.

Over 72% of primary femoral hernia repairs were performed in women (Table 15). This is consistent with the expected higher female incidence of femoral hernia. Over 27% of operations were in patients aged 75 - 84 years.

Tables 13 and 15 include one patient resident outwith Scotland who underwent primary femoral hernia repair. This case has been omitted from subsequent analysis where appropriate.

1.2.2 *Age and sex specific operation rates*

Age-specific operation rates were greater in females than in males in all age-groups, except the under 25-year group (Table 16). The rates increased with increasing age in both groups. The operation rate was highest in elderly females.

1.2.3 *Standardised operation rates*

Table 17 shows operation rates for primary femoral hernia repair standardised for age and sex by health board of residence. The rates are based on activity for 2 years, 1992 and 1993, and have been calculated only for the mainland health boards. The rate varied from 10.4 per 100,000 in Dumfries and Galloway Health Board, to 6.1 per 100,000 in that of Borders Health Board. These differences are likely to reflect differences in factors determining population need, demand and supply.

1.2.4 *Emergency surgery*

Most patients underwent elective and emergency in-patient repair in equal proportions (Table 18). Only 1.6% of patients received day-surgery 47.9% of patients underwent primary femoral hernia repair as emergencies (Table 19). This proportion is much higher than for inguinal hernia repair, and reflects the well-recognized predisposition of femoral hernia to strangulation and obstruction. Among mainland boards, the rate varied from 42.6% in Ayrshire and Arran Health Board to 54.8% in Forth Valley Health Board. Because of the relatively small numbers of patients treated annually, data for the years 1991, 1992 and 1993 have been aggregated to construct the table.

1.2.5 *Day surgery*

Even smaller proportions of primary femoral hernia repair were performed in day-surgery, than of primary inguinal repair (Table 20). Only 2.2% of elective repairs were performed as day-surgery, compared with 13.2% of cases of elective primary inguinal hernia repair. In mainland boards, the day-surgery rate varied from 1.7% in Tayside to 6.7% in Borders Health Board.

1.2.6 *In-patient resourses*

The median Scottish length of stay for patients undergoing primary femoral hernia repair as in-patients was 4 days. The stay for elective cases was 3 days, and for emergency cases, 6 days. The variation in length of stay by health board of residence is shown in Table 21.

1.2.7 *Waiting times*

The average waiting time for elective primary femoral hernia repair in Scotland was 40.0 days (Table 22). The waiting time varied from 126 days for residents of Fife to 21 days for residents of Orkney Health Board. The waiting time for primary femoral hernia repair should be as short as possible, because of the high risk of strangulation.

1.3 Historical Trends in Hernia Surgery

1.3.1 *Primary inguinal hernia repair*

- The total number of primary inguinal repairs performed in Scottish residents increased from 6,890 in 1980 to 8,139 in 1993 (Table 23). This reflects a modest increase in Scottish standardised operation rate from 1.34 per 1,000 in 1980 to 1.59 per 1,000 in 1993 (Figure 1).

- The median stay has declined from 5 days in 1980 to 3 days in 1993 (Figure 2). This change may reflect changes in the balance of elective and emergency surgery provided and also changes in supply factors, such as falling numbers of general surgical beds.

- The median waiting-time for patients undergoing primary inguinal hernia repair has shown little overall change during the last decade (Figure 3). Median waiting-time reflects accessibility of surgical services.

- The proportion of primary repairs performed as emergencies fell from 10.7% in 1980 to 8.8% in 1993 (Figure 4).

- The proportion of primary elective repairs carried out as day surgery increased from 2% in 1980 to 13.2% in 1993 (Figure 5). Part of this increase may be apparent, reflecting greater completeness of data collection for day-cases.

1.3.2 *Primary femoral hernia repair*

- The total numbers of primary femoral hernia repairs performed in Scottish residents decreased from 518 in 1980 to 484 in 1993 (Table 23). Standardised operation rates have remained unchanged over this time (Figure 6).

- The median stay has declined from 7 days in 1980, to 4 days in 1993 (Figure 7).

- The median waiting-time for patients undergoing primary elective repairs has shown no consistent change between 1980 and 1993 (Figure 8).

- There has been no consistent trend in the proportion of primary repairs performed as emergency procedures (Figure 9). 46.5% of repairs were performed as emergencies in 1980, and 49.2% in 1993.

- No definite trend is apparent for the proportion of elective primary femoral hernia repair carried out as day-surgery (Figure 10). In 1980, 0.4% of cases were performed as day-cases. By 1993 this proportion had increased to 3.3%

TABLE 1
NUMBERS OF PRIMARY AND RECURRENT OPERATIONS PERFORMED BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	No. of Primary Operations	No. of Recurrent Operations
Ayrshire and Arran	602	33
Borders	234	1
Argyll and Clyde	702	26
Fife	500	21
GGHB	1,393	95
Highland	332	12
Lanarkshire	831	15
Grampian	771	39
Orkney	34	2
Lothian	1,320	72
Tayside	657	46
FVHB	402	27
Western Isles	36	0
Dumfries/Galloway	286	10
Shetland	26	5
Others	13	0
Total	**8,139**	**404**

TABLE 2
MEDIAN AGE OF PATIENTS HAVING PRIMARY INGUINAL HERNIA REPAIR, SCOTLAND 1993

Type of patient	Median age at operation		
	Males	Females	All
Elective in-patient	58	55	58
Emergency in-patient	50	74	53
Day-cases	4	5	4
All patients	54	50	54

TABLE 3
NUMBERS OF PRIMARY INGUINAL HERNIA REPAIR OPERATIONS IN SCOTLAND, 1993 BY AGE-GROUP AND SEX

Age Group (years)	Male	Female	Total
less than 5	1,178	84	1,262
5 - 14	466	55	521
15 - 24	279	16	295
25 - 34	411	34	445
35 - 44	566	69	635
45 - 54	950	57	1,007
55 - 64	1,280	69	1,349
65 - 74	1,464	86	1,550
75 - 84	826	80	906
more than 84	144	25	169
Total	**7,564**	**575**	**8,139**

TABLE 4
PRIMARY INGUINAL HERNIA - AGE AND SEX SPECIFIC OPERATION RATES FOR SCOTLAND, 1993 (RATE PER 100,000).

Age-Group (years)	Male (rate per 100,000)	Female (rate per 100,000)
less than 5	710.2	52.9
5 - 14	140.3	17.4
15 - 24	77.4	4.6
25 - 34	98.9	8.3
35 - 44	164.0	19.8
45 - 54	313.0	18.2
55 - 64	504.3	24.6
65 - 74	743.0	33.9
75 - 84	936.3	49.8
more than 84	837.3	44.7
Total	**305.2**	**21.8**

TABLE 5
PRIMARY AND RECURRENT INGUINAL HERNIA REPAIR, 1993 - AGE AND SEX STANDARDISED OPERATION RATES BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Primary Inguinal Hernia Repair (Rate per 100,000)	Recurrent Inguinal Hernia Repair (Rate per 100,000)
Ayrshire and Arran	156.5	6.7
Borders	204.3	1.2
Argyll and Clyde	161.9	5.3
Fife	141.2	5.8
GGHB	154.7	8.4
Highland	156.2	6.1
Lanarkshire	153.2	3.5
Grampian	148.2	7.9
Lothian	178.8	9.6
Tayside	160.1	10.4
FVHB	147.5	11.0
Dumfries and Galloway	177.9	5.5
Total	**159.0**	**7.5**

TABLE 6
TYPE OF CARE RECEIVED BY PATIENTS UNDERGOING PRIMARY INGUINAL HERNIA REPAIR IN SCOTLAND, 1993

Type of Care	% of patients
Elective in-patient	6,445 (79.2%)
Emergency in-patient	718 (8.8%)
Day-cases	976 (12.0%)
Total	**8,139**

TABLE 7
PRIMARY INGUINAL HERNIA REPAIR 1993 - PROPORTION OF PATIENTS TREATED AS EMERGENCIES BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Total Cases	Emergency Cases	Proportion treated as emergencies (%)
Ayrshire and Arran	602	51	8.5
Borders	234	20	8.5
Argyll and Clyde	702	52	7.4
Fife	500	38	7.6
GGHB	1,393	121	8.7
Highland	332	24	7.2
Lanarkshire	831	77	9.3
Grampian	771	71	9.2
Orkney	34	4	11.8
Lothian	1,320	142	10.8
Tayside	657	47	7.2
FVHB	402	39	9.7
Western Isles	36	4	11.1
Dumfries/Galloway	286	20	7.0
Shetland	26	3	11.5
Total	**8,126**	**713**	**8.8**

TABLE 8
PRIMARY INGUINAL HERNIA REPAIR, 1993 - PROPORTION OF ELECTIVE PATIENTS TREATED AS DAY-CASES BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Total Elective Cases	Day Cases	Proportion treated as Day-cases (%)
Ayrshire and Arran	551	28	5.1
Borders	214	10	4.7
Argyll and Clyde	650	70	10.8
Fife	462	49	10.6
GGHB	1,272	277	21.8
Highland	308	33	10.7
Lanarkshire	754	20	15.9
Grampian	700	69	9.9
Orkney	30	1	3.3
Lothian	1,178	236	20.0
Tayside	610	0	3.3
FVHB	363	43	11.8
Western Isles	32	0	0
Dumfries/Galloway	266	14	5.3
Shetland	23	6	26.1
Total	**7,413**	**976**	**13.2**

TABLE 9
TYPE OF ELECTIVE SURGERY BY AGE-GROUP - CHILDREN AND ADULTS

Type of patient	Elective In-patient	Day-case
Children (aged under 15 years)	743 (48.6%)	786 (51.4%)
Adults (aged 15 years or more)	5,702 (96.8%)	190 (3.2%)

TABLE 10
ELECTIVE PRIMARY INGUINAL HERNIA REPAIR, 1993 - PROPORTION OF CHILDREN AND ADULTS TREATED AS DAY-CASES (%)

Health Board of Residence	Proportion treated as day cases %	
	Children aged (14 years or less)	Adults (aged 15 years or more)
Ayrshire and Arran	4.3	0.23
Borders	25.6	0
Argyll and Clyde	50.0	1.3
Fife	48.5	0
GGHB	63.6	8.1
Highland	39.7	2.5
Lanarkshire	56.9	4.3
Grampian	32.5	3.6
Orkney	50.0	0
Lothian	86.7	4.2
Tayside	17.0	0.7
FVHB	51.4	1.7
Western Isles	0	0
Dumfries/Galloway	28.3	0.5
Shetland	42.9	5
All	51.4	3.2

TABLE 11
MEDIAN LENGTH OF STAY FOR PATIENTS UNDERGOING PRIMARY INGUINAL HERNIA REPAIR AS IN-PATIENTS

Health Board of Residence	Elective In-patients	Emergency In-patients	All In-patients
Ayrshire and Arran	3.0	4.0	4.0
Borders	3.0	8.5	8.0
Argyll and Clyde	3.0	7.0	5.0
Fife	2.0	8.0	3.0
GGHB	3.0	5.0	4.0
Highland	3.0	6.0	5.0
Lanarkshire	3.0	7.5	5.5
Grampian	2.0	5.0	3.0
Orkney	3.0	17.0	9.5
Lothian	2.0	5.0	3.0
Tayside	2.0	7.0	3.0
FVHB	2.0	11.0	3.5
Western Isles	3.0	48.0	4.0
Dumfries/Galloway	2.0	6.0	3.5
Shetland	2.0	0.0	2.5
Total	**3.0**	**6.0**	**4.0**

TABLE 12
PRIMARY INGUINAL HERNIA REPAIR 1993 - MEDIAN WAITING-TIME BY HEALTH BOARD OF RESIDENCE FOR ELECTIVE SURGERY

	Median Waiting-Time (days)		
Health Board of Residence	**Elective In-patients**	**Day Cases**	**All Patients**
Ayrshire and Arran	121.0	113.0	120.5
Borders	57.0	13.0	54.5
Argyll and Clyde	67.0	59.0	67.0
Fife	99.5	27.0	84.0
GGHB	43.0	53.0	47.0
Highland	47.0	43.5	47.0
Lanarkshire	64.0	58.5	63.0
Grampian	50.0	29.0	48.0.
Orkney	17.0	11.0	16.5
Lothian	59.0	35.0	52.0
Tayside	49.0	61.0	49.5
FVHB	91.0	50.0	83.5
Western Isles	31.0	2.0	31.0
Dumfries/Galloway	47.0	36.0	46.0
Shetland	40.5	43.0	41.5
Total	**59.0**	**46.0**	**56.0**

TABLE 13
NUMBERS OF PRIMARY AND RECURRENT OPERATIONS PERFORMED BY HEALTH BOARD OF RESIDENCE IN 1993

Health Board of Residence	No. of Primary Operations	No. of Recurrent Operations
Ayrshire and Arran	36	-
Borders	10	-
Argyll and Clyde	35	1
Fife	30	-
GGHB	93	2
Highland	18	
Lanarkshire	40	2
Grampian	58	2
Orkney	2	-
Lothian	68	4
Tayside	47	1
FVHB	22	1
Western Isles	3	-
Dumfries/Galloway	18	-
Shetland	3	-
Others	1	1
Total	**484**	**16**

TABLE 14
MEDIAN AGE AT SURGERY OF PATIENTS HAVING PRIMARY FEMORAL HERNIA REPAIR, SCOTLAND 1993

Type of patient	Median age at operation		
	Male	Female	All
Elective in-patient	62.5	60	61
Emergency in-patient	60	77	70
Day-cases	25	53	46.5
All patients	67.5	70	69

TABLE 15
NUMBERS OF PRIMARY FEMORAL HERNIA REPAIR OPERATIONS IN SCOTLAND, 1993 BY AGE-GROUP AND SEX

Age-Group (years)	Male	Female	Total
Less than 5	0	1	1
5 - 14	4	1	5
15 - 24	2	2	4
25 - 34	4	13	17
35 - 44	6	29	35
45 - 54	11	45	56
55 - 64	29	53	82
65 - 74	36	62	98
75 - 84	28	106	134
More than 84	12	40	52
Total	**132**	**352**	**484**

TABLE 16
PRIMARY FEMORAL HERNIA - AGE AND SEX SPECIFIC OPERATION RATES FOR SCOTLAND 1993 (RATE PER 100,000)

Age-group in years	Male (rate per 100,000)	Female (rate per 100,000)
Less than 25	0.7	0.5
25 - 34	1.0	3.2
35 - 44	1.7	8.3
45 - 54	3.6	14.4
55 - 64	11.4	18.9
65 - 74	18.3	24.5
75 - 84	31.7	65.4
More than 84	69.8	71.5
Total	**5.3**	**13.3**

TABLE 17
PRIMARY FEMORAL HERNIA REPAIR, 1993 - AGE AND SEX STANDARDISED OPERATION RATES BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Primary Femoral Hernia repair (rate per 100,000)
Ayrshire and Arran	8.7
Borders	6.1
Argyll and Clyde	9.4
Fife	8.4
GGHB	9.5
Highland	9.6
Lanarkshire	6.5
Grampian	10.3
Lothian	8.9
Tayside	8.7
FVHB	8.0
Dumfries and Galloway	10.4

TABLE 18
TYPE OF CARE RECEIVED BY PATIENTS UNDERGOING PRIMARY FEMORAL HERNIA REPAIR, SCOTLAND 1993

Type of care	Nos. of patients (%)
Elective in-patient	238 (49.2%)
Emergency in-patient	238 (49.2%)
Day-care	8 (1.6%)
Total	**484**

TABLE 19
PRIMARY FEMORAL HERNIA REPAIR - PROPORTION OF PATIENTS TREATED AS EMERGENCIES BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Proportion treated as emergency (%)
Ayrshire and Arran	42.6
Borders	46.4
Argyll and Clyde	44.6
Fife	47.2
GGHB	50.6
Highland	46.6
Lanarkshire	47.9
Grampian	50.0
Orkney	25.0
Lothian	52.3
Tayside	45.5
FVHB	54.8
Western Isles	44.4
Dumfries/Galloway	42.2
Shetland	14.3
Total	**47.9**

TABLE 20
PRIMARY FEMORAL HERNIA REPAIR - PROPORTION OF ELECTIVE REPAIRS PERFORMED AS DAY-SURGERY BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Total Elective Cases	Day Cases	Proportion treated as Day Cases %
Ayrshire and Arran	54	1	1.9
Borders	15	1	6.7
Argyll and Clyde	67	0	0
Fife	47	0	0
GGHB	125	4	3.2
Highland	31	0	0
Lanarkshire	62	0	0
Grampian	90	3	3.3
Orkney	6	0	0
Lothian	94	2	2.1
Tayside	60	1	1.7
FVHB	33	0	0
Western Isles	5	0	0
Dumfries/Galloway	26	2	7.7
Shetland	6	2	33.3
Total	**721**	**16**	**2.2**

TABLE 21
MEDIAN LENGTH OF STAY FOR PATIENTS UNDERGOING PRIMARY FEMORAL HERNIA REPAIR, 1993

Health Board of Residence	Median Stay	
	Elective in-patients	Emergency in-patients
Ayrshire and Arran	3.0	4.0
Borders	2.0	8.5
Argyll and Clyde	3.0	7.0
Fife	2.0	8.0
GGHB	3.0	5.0
Highland	4.0	6.0
Lanarkshire	3.0	7.5
Grampian	3.0	5.0
Orkney	2.0	17.0
Lothian	2.0	5.0
Tayside	2.0	7.0
FVHB	2.5	11.0
Western Isles	3.5	48.0
Dumfries/Galloway	3.0	6.0
Shetland	2.5	-
Total	**3.0**	**6.0**

TABLE 22
PRIMARY FEMORAL HERNIA REPAIR, 1993 - MEDIAN WAITING TIME FOR ELECTIVE SURGERY BY HEALTH BOARD OF RESIDENCE

Health Board of Residence	Median Waiting Time
Ayrshire and Arran	42.0
Borders	57.5
Argyll and Clyde	35.0
Fife	126.0
GGHB	36.0
Highland	38.0
Lanarkshire	47.0
Grampian	38.5
Orkney	21.0
Lothian	32.5
Tayside	23.0
FVHB	69.0
Western Isles	60.5
Dumfries/Galloway	37.0
Shetland	87.0
Total	**40.0**

TABLE 23
NUMBERS OF SCOTTISH RESIDENTS UNDERGOING PRIMARY HERNIA REPAIR, 1980 - 1993

Year	No. of Primary Repairs	
	Inguinal	Femoral
1980	6890	518
1981	6652	466
1982	4850	414
1983	7505	503
1984	7111	499
1985	7165	461
1986	7152	498
1987	7097	474
1988	7338	514
1989	7708	471
1990	7885	463
1991	7776	479
1992	7878	431
1993	8139	484

FIGURE 1
PRIMARY INGUINAL HERNIA REPAIR IN SCOTLAND
STANDARDISED OPERATION RATES 1980 TO 1993

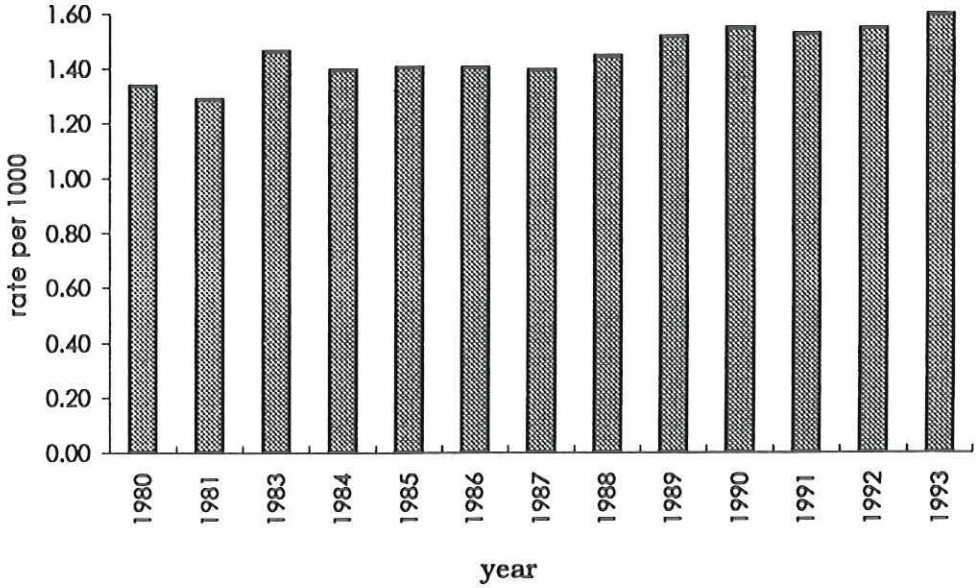


FIGURE 2
PRIMARY INGUINAL HERNIA REPAIR IN SCOTLAND
MEDIAN STAY BY YEAR

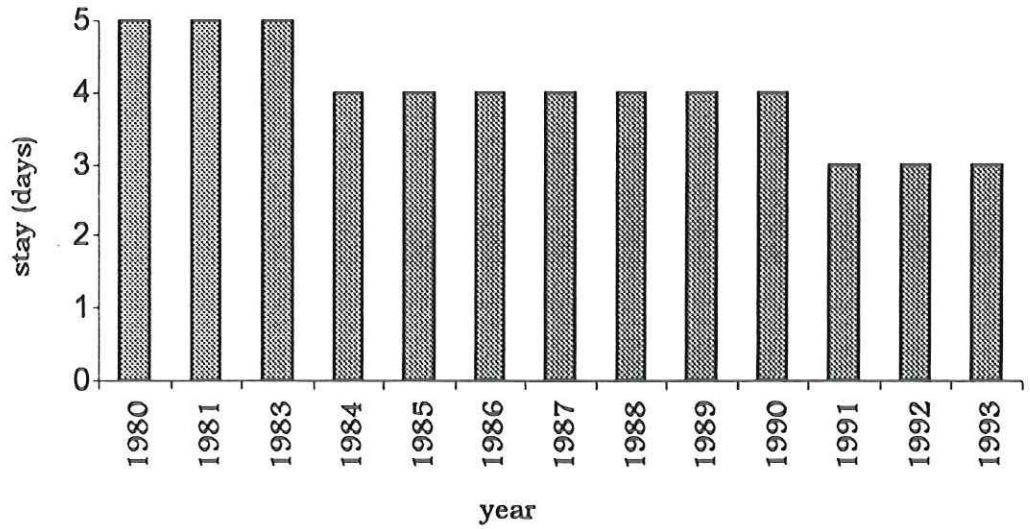


FIGURE 3
PRIMARY INGUINAL HERNIA REPAIR IN SCOTLAND
MEDIAN WAITING TIME BY YEAR

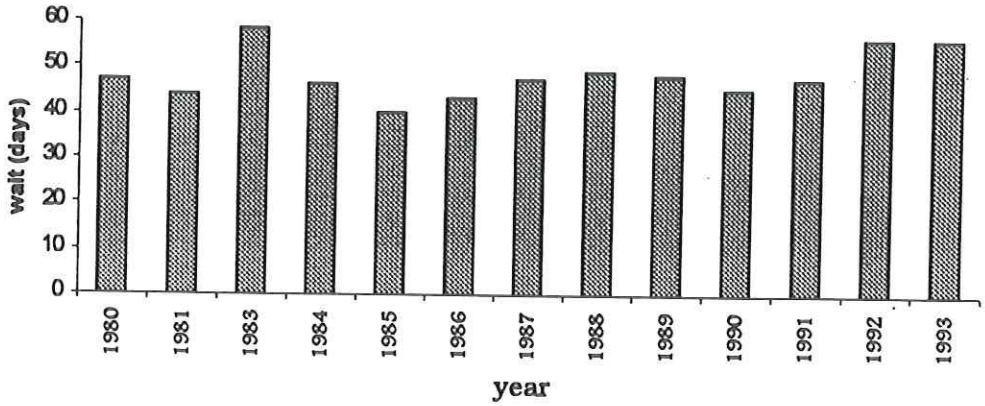


FIGURE 4
PRIMARY INGUINAL HERNIA REPAIR IN SCOTLAND
PROPORTIONS OF OPERATIONS PERFORMED AS EMERGENCIES

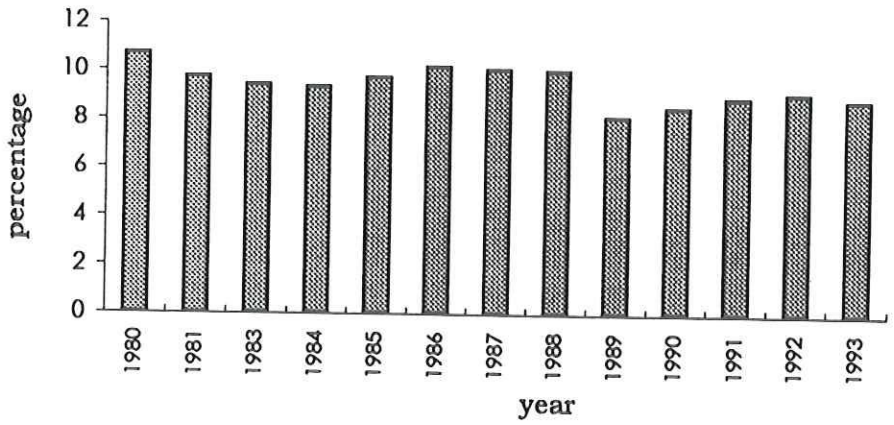


FIGURE 5
PRIMARY INGUINAL HERNIA REPAIR IN SCOTLAND
PROPORTION OF ELECTIVE OPERATIONS PERFORMED AS DAY CASES

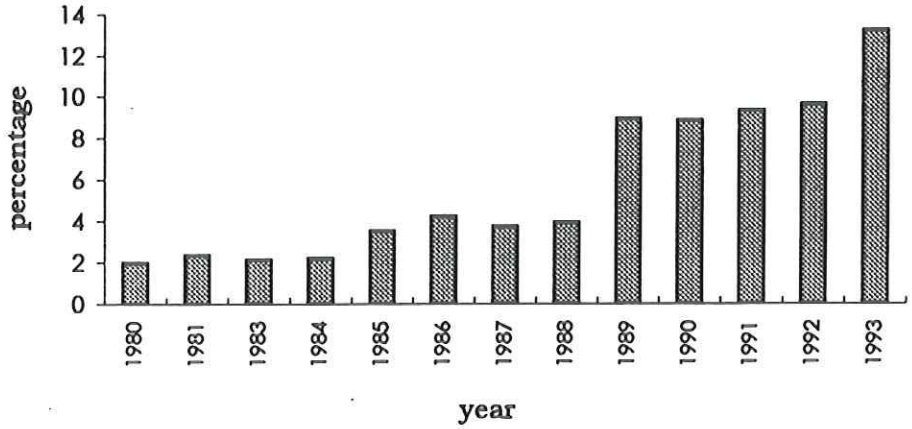


FIGURE 6 (RATE PER 1,000)
PRIMARY FEMORAL HERNIA REPAIR IN SCOTLAND
STANDARDISED OPERATION RATES 1980 TO 1993

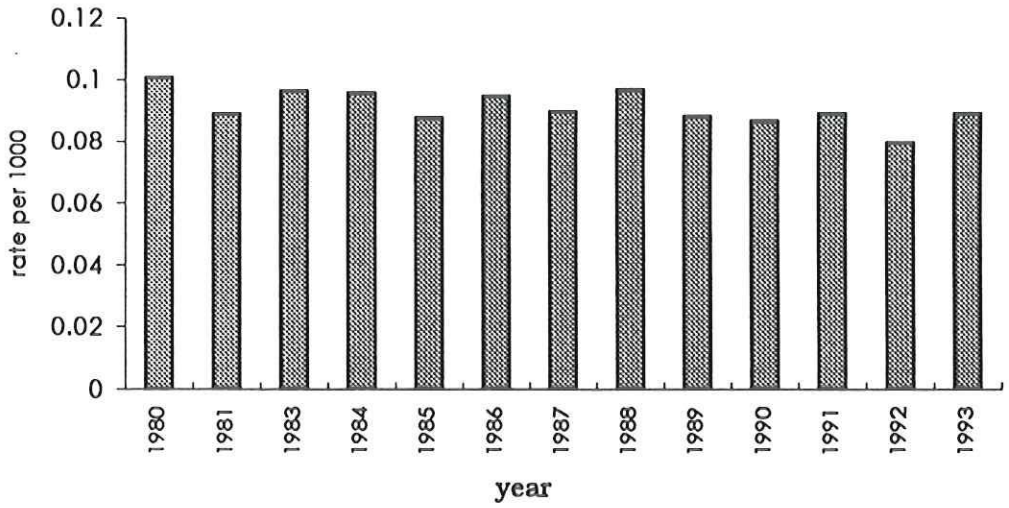


FIGURE 7
PRIMARY FEMORAL HERNIA REPAIR IN SCOTLAND
MEDIAN STAY BY YEAR

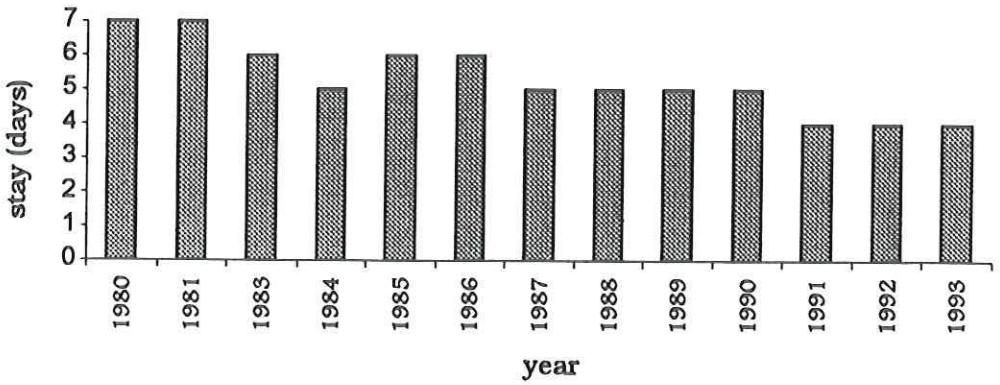


FIGURE 8
PRIMARY FEMORAL HERNIA REPAIR IN SCOTLAND
MEDIAN WAITING TIME BY YEAR

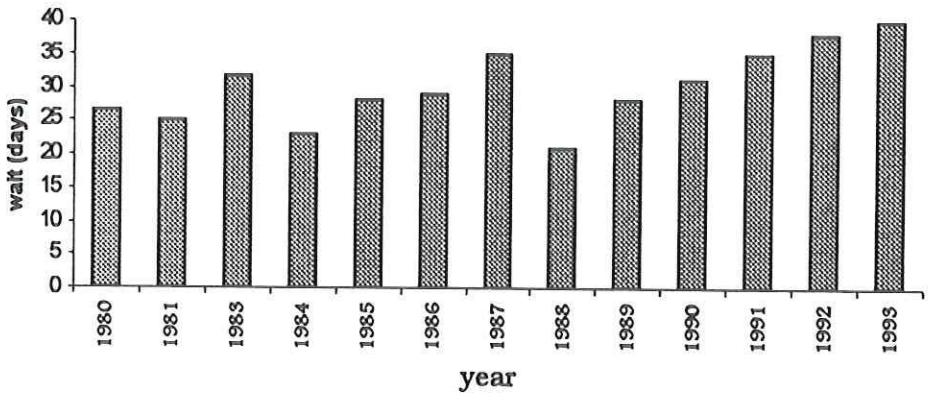


FIGURE 9
PRIMARY FEMORAL HERNIA REPAIR IN SCOTLAND
PROPORTIONS OF OPERATIONS PERFORMED AS EMERGENCIES

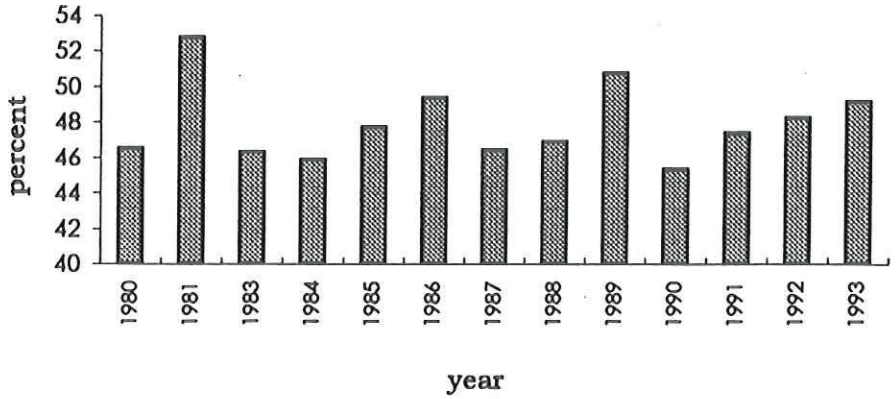


FIGURE 10
PRIMARY FEMORAL HERNIA REPAIR IN SCOTLAND
PROPORTION OF ELECTIVE OPERATIONS PERFORMED AS DAY CASES