7 Cancer of the Lung

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1 Summary

Statement of the problem/introduction

The purpose of this chapter is to provide a concise description of cancer of the lung, its causes and the options for prevention, treatment and care, so that commissioners may develop quantified cost-effective strategies in collaboration with the providers of the various services involved. Detailed recommendations on commissioning have been drawn up by the Cancer Guidance Group of the Clinical Outcomes Group funded by the NHS Executive in England and this chapter is based largely on that guidance.[1]

The chapter is organised around the concepts of Health Benefit Groups (of conditions), Health care Resource Groups (of interventions) and the Performance Management Framework.[2] The intention is that these can be organised systematically to provide a formal health care framework that identifies the needs, appropriate interventions, standards of care, outcomes and costs for the whole programme of services related to lung cancer. Sections of the chapter deal with the subtypes of lung cancer and related conditions, the relevant interventions, the expected outcomes, costs and monitoring measures. These are then brought together as an example purchasing framework in Appendix VI, which summarises and quantifies the volumes, costs and standards of services related to lung cancer.

The data provided on incidence, costs and outcomes are drawn from various sources and, where possible, adapted to make them as representative of the epidemiological and health care situation per million population as possible. The most useful British sources are the Public Health Common Data Set,[3] hospital discharge data [either local provider data, or national data from Department of Health (DoH)] and the National Schedule of Reference Costs[4] (which provides inpatient HRG costs for medical and surgical care, and from 1999, for radiotherapy as well).

Sub-categories

The sub-categories used in this chapter are those relevant to the purchasing of services and are:

- the population at risk
- the population presenting with lung cancer
- the population with confirmed lung cancer
- the population with continued consequences of lung cancer.

Prevalence and incidence

It should be noted that cancer of the lung causes significant numbers of deaths and will consume considerable health care resources. Per million persons in the UK, there will be about 615 deaths per year (400 men and 215 women) causing about 3720 lost years of life, and the cost of treatment and palliative care will be around £4 million (at 1997 prices).

Service available and effectiveness of services

The key factors involved in purchasing care for cancer of the lung are to do with prevention, treatment and palliative care.

Prevention is concerned almost entirely with reduction in tobacco smoking, both reducing the numbers of young people starting to smoke, and increasing the numbers of people giving up smoking. This offers the only hope for a reduction in the death rates. The evidence shows that preventive interventions aimed at reducing smoking are highly cost-effective in terms of life years saved. This is true for both face-to-face interventions and community-based campaigns. However, because of the long-term nature of the carcinogenic exposure, success in achieving reductions in smoking will not result in early reductions in death rates. An investment in prevention now could result in savings in treatment costs in about 10 years.

The cell type and spread of disease determine treatment. Only in cases diagnosed at an early stage, in which the tumour is localised to the lung, is cure possible.

Small cell tumours are more aggressive, and the main treatment option for limited disease is chemotherapy. This can provide a worthwhile extension of survival, but even for these cases the prognosis is poor. Non-small cell cancers are less aggressive (although the prognosis is also poor) and, if diagnosed early enough, may be suitable for surgery. For those with limited disease, but not suitable for surgery, radical radiotherapy may be appropriate. The majority of treatment, however, is largely aimed at palliation and controlling symptoms. For this, short-course radiotherapy may be helpful, as may other forms of pain relief and nursing care.

Quantified models of care/recommendations

The service must aim at a reasonable balance of economy of service, with a properly organised assessment process that ensures that those with a reasonable prognosis receive the appropriate diagnostic and treatment services. However, the majority of patients will require good symptom relief and support in hospital, hospice and the community. Although the majority of the resources will be provided for palliative/terminal care, funding should also be available to progress new or innovative treatments and preventive interventions whenever possible. It is particularly important, however, that new forms of treatment are properly evaluated, and wherever possible patients should be enrolled in multicentre trials if new or unproven treatments are contemplated.

2 Introduction

Definition

Cancer of the lung includes a number of different cell types that affect the lung and associated structures. For the purpose of this specification, the definition includes all malignancies arising in the epithelium of

the airways below the larynx and within the lung parenchyma (i.e. bronchogenic carcinoma) and excludes mesothelioma and cancers of other sites with metastatic deposits in the lungs.

The clinical features are described briefly in Appendix I.

Coding and classification

Classifications and codings apply both to the condition and relevant health care interventions and the codes for various systems relevant to lung cancer are shown in Appendix II.

Histological types

Malignancy in the respiratory tract may be subdivided into a number of cell types. The characteristics of the disease, aetiology, prognosis and amenability to treatment differ between types. The major distinction from the point of view of purchasing services is between small cell (previously known as oat cell) and non-small cell tumours because they have different prognoses and require different types of treatment.

Staging

The extent of the disease, together with the physical state of the patient, determines the treatment options and prognosis. Radical treatment to achieve cure is possible in limited disease.

Definitions of limited and extensive disease vary, but among those that have been used for limited disease are:

- Non-small cell lung cancer — Staging follows the tumour, node, metastasis (TNM) staging classification, Stage I or II and some Stage IIIa patients are operable.
- Small cell lung cancer — Cancer confined to one side of the thorax and ipsilateral mediastinal lymph nodes.

Staging definitions are shown in Appendix IV.

The current position

Cancer of the lung is the most common type of malignancy in England and Wales and has assumed epidemic proportions over the last 40 years as a consequence of social changes and upheavals of the 20th century, particularly the social consequences of the two world wars, and the widespread adoption of cigarette smoking by all sections of society.

Figures 1 and 2 (*see* overleaf) show the age-specific rates of lung cancer in men and women for birth cohorts from 1900. In men the highest rates were seen in the cohort born in 1900–05, and who started smoking during the 1914–18 war. For women, the highest rates are seen in the cohort born in 1920–25, who started smoking during the 1939–45 war. Subsequent cohorts for both men and women have lower age-specific rates.

In that it is almost entirely due to smoking, the disease could effectively be eliminated over a period of years if all cigarette smoking was to cease. However, not only are there major pressures from commercial

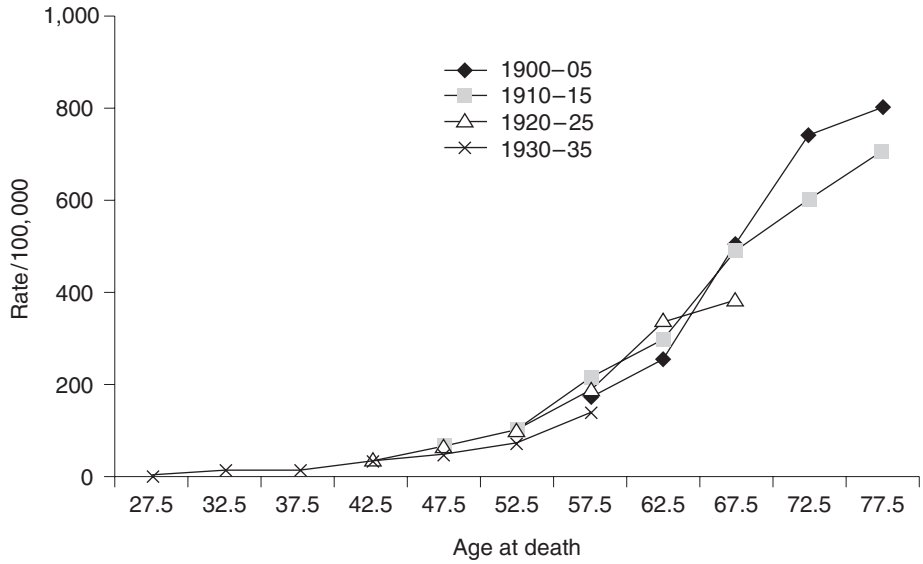


Figure 1: Male lung cancer death rates, England and Wales. Cohorts 1900–35.

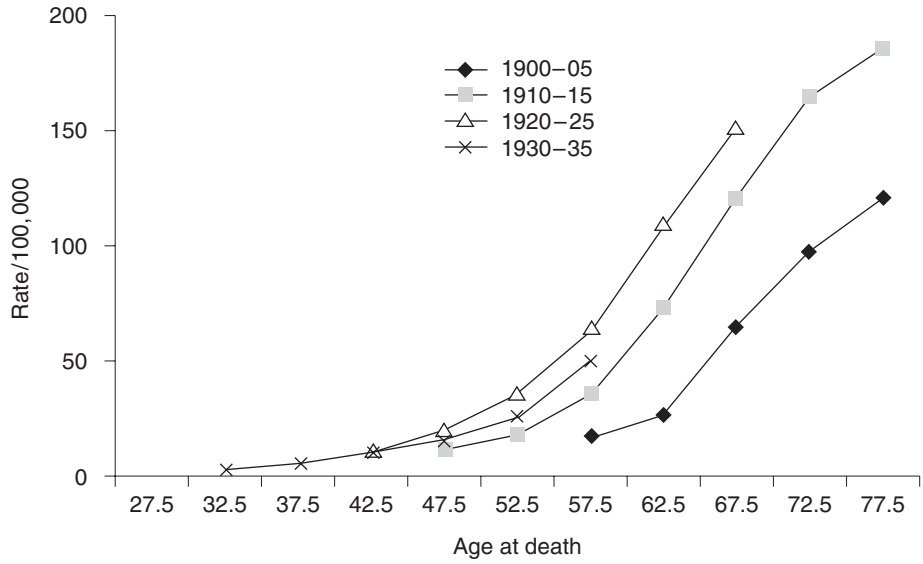


Figure 2: Female lung cancer death rates, England and Wales. Cohorts 1900–35.

interests and the media, there are also important ethical issues about the limits on societies' rights to control individual behaviour. Despite the reductions in smoking rates over recent years, the take up of smoking in adolescents has not declined. Efforts to address this cannot be divorced from the complex relationship between young people's attitudes to authority, and the confused messages around cigarettes, alcohol and 'soft' drugs.

Apart from prevention/health promotion, the main involvement of health services is in providing curative and caring services. Although most individuals with lung cancer are incurable, much of the focus on research in lung cancer care has been on developing and testing new treatment modalities; however, in order to base purchasing on an adequate evidence base it is also necessary to develop better research on cost-effective ways of delivering pain relief and support in terminal illness.

The Health Benefit Group/Health care Resource Group (HBG/HRG) matrices

Assessment of needs for care can be organised around a matrix that summarises the conditions involved and the relevant interventions. These matrices allow:

- identification of the numbers of cases for each sub-category of conditions related to lung cancer
- specification of the appropriate interventions and the standards for their delivery
- the effectiveness and potential criteria for monitoring the outcome of care
- the cost of providing the interventions to all the cases within the population.

The matrices are split into four categories to encompass the whole range of disease and health care services. Conditions are split as follows.

- **At risk.** Individuals who are at risk of developing the particular condition, and who require health promotion or preventive activities (if any effective available). These may be split into a number of levels of risk, from low to high.
- **Presentation.** Individuals who present with symptoms or signs suggestive of the condition, and who require investigation/assessment in order to confirm the diagnosis. A proportion of these individuals will subsequently be proven not to have the condition, however, this is still a legitimate call on the resources of the health service.
- **Confirmed disease.** Those with a confirmed health condition which requires clinical management.
- **Continued consequences of disease.** Those who require continuing care and/or rehabilitation

Interventions are split into:

- promotion/prevention
- diagnostic/assessment
- curative services
- care, palliation and support.

This approach provides the basis of this chapter, and a systematic structure for creating a commissioning document that can be discussed by purchaser and provider. It is very similar to the structure used in a number of programme budgeting exercises.[5] It also permits the incorporation of performance indicators to measure the efficiency and effectiveness of the care provided within the performance framework. This framework identifies six areas of performance for the assessment and monitoring of delivery of health services:

1 **Health improvement.** To reflect the overall aim of improving the general health of the population.
2 **Fair access.** To ensure fair access in relation to needs irrespective of geography, class, ethnicity, age or sex.
3 **Effective delivery of appropriate health care.** To ensure that care is effective, appropriate and timely, and complies with agreed standards.

4 **Efficiency.** To ensure value for money in use of resources.
5 **Patient/carer experience.** To ensure the NHS is sensitive to individual needs.
6 **Health outcomes of NHS care.** To ensure the direct contribution of NHS care to improvements in overall health.

The use of the condition/intervention matrix with the areas of performance in an integrated health care framework helps to base the development and monitoring of commissioning plans on local patient data. In order to achieve this, groupings of types of patient and types of intervention are necessary. When appropriate individual patient data are available, these can be used to aggregate records, and identify the numbers of individuals in each sub-category, and the numbers of episodes of each type of care provided. To assess local services, the care provided locally should then be compared with the benchmark averages, which can be derived from the performance framework, and the best practice recommended by guideline documents. Because development of these groups and the areas of performance are still underway, not all of them can be defined completely, however, where possible, definitions are provided.

A draft summary HBG/HRG matrix for lung cancer is shown in Appendix III, together with definitions of each of the relevant HBGs/HRGs. The NHS Information Authority – Case-mix Programme is defining and coding the relevant HBGs and HRGs and associating them with the performance indicators in the Health care Framework.

Data do not yet exist in this form in most places, and comprehensive use of HBGs and HRGs is beyond the information capabilities of most places. However, developments in clinical information systems should make this possible in the future. In the mean time, the basic structure provides a convenient model for the presentation of such information as is available and forms the basis of recommendations on how to develop information systems which will support systematic commissioning of health care. The lack of good information on rates of incidence/prevalence, intervention and outcomes should not be a reason for abandoning a systematic approach to thinking about the needs and service requirements. Rather it identifies what information needs to be developed to undertake the task of commissioning in a professional manner, and how it should then be used.

It should be noted that some of the services required are not specific to lung cancer (for instance, the preventive, diagnostic and palliative care components) although even these services may have some lung cancer-specific aspects. While these must be included in the lung cancer specification, it is important that they should not be double counted when developing broader service specifications.

3 Sub-categories of lung cancer

The description of sub-categories is provided in four sections that are relevant to the purchasing of services:

- At risk
  - Whole population
  - Population at specific risk
    (i) Smokers
  - Previously treated disease
- Presentation
  - Asymptomatic, screen detected or incidental finding
  - Specific and general symptoms

- Confirmed disease
  - Small cell limited disease
  - Small cell extensive disease
  - Non-small cell operable
  - Non-small cell inoperable, limited
  - Non-small cell extensive disease
  - Non-small cell metastases
- Continued consequences of disease
  - Terminal disease/intractable pain.

At risk

Numbers at risk can be identified through factors associated with the development of lung cancer.

Smoking

By far the most important cause of lung cancer is smoking (estimated at 90%).[6] Long-term cigar and pipe smokers who do not inhale do not have such high rates of lung cancer, but cigar and pipe smokers who are ex-cigarette smokers (and hence inhalers) have just as high risks as continuing cigarette smokers.[7]

Passive smoking

Results of individual studies vary, but an excess risk of between 10 and 30% seems to exist for individuals passively exposed to tobacco smoke over long periods.[8]

Asbestos

Occupational exposure to asbestos causes both cancer of the lung and mesothelioma (normally of the pleura, but also occasionally of the peritoneum). The latter is almost exclusively due to asbestos. Smokers who have exposure to asbestos have very high risks of lung cancer.[9]

Metal ores

Workers with nickel and chromium ores are at higher risk of developing lung cancer.[10]

Air pollution

Cancer of the lung is more common in residents of urban areas but a substantial part of this difference is due to smoking, social class and occupational exposure. Studies from the US[11] and Poland[12] have suggested an independent association, and local industrial air pollution in the UK has been associated with high rates of lung cancer.[13] Overall, the attributable risk is likely to be small.

Radon

Exposure to radon in houses increases the risk of lung cancer. Although overall the effect is small, it is potentially significant, particularly in the South-west of England.

Incidence and prevalence

For purchasing activity through the HBG/HRG matrix, three 'at risk' HBGs are identified:

- the whole population
- the population at specific risk, which includes:
  - children and young adults, who are at risk of starting smoking. Per million population there will be about 128 000 children aged 5–14 and 123 000 young persons aged 15–24.
  - Smokers who need encouragement and assistance to stop smoking. Twenty-eight per cent of men aged over 16 are smokers and 25% of women aged over 16. This represents about 214 000 persons (110 000 men, 104 000 women) per million.

    While there are other risks, there is little that can be done after exposure has occurred, although environmental monitoring and industrial protection are required to minimise exposure to these risk factors.
- treated previously. Individuals with a history of lung cancer who have been treated successfully and are under follow-up. Because of the poor prognosis of this tumour (< 10% survival at 1 year) there will only be about 60 new cases yearly for follow-up.

Those presenting with symptoms

Presentation may be with specific or non-specific symptoms. In addition, some individuals are diagnosed through incidental findings of other investigations. The HBGs are divided into:

- asymptomatic, screen detected or incidental finding (about 5% of all cases)
- symptomatic presentation. This will include those with suggestive symptoms and a presumptive diagnosis of lung cancer, those with more general symptoms, and those presenting as acutely ill. A definitive diagnosis for these last two groups is made as part of the diagnostic assessment.

Not all of those who present will subsequently be proven to have cancer of the lung, but in these cases, the use of resources to exclude the diagnosis is important. There is very little information about the numbers of cases investigated and/or referred with suspected symptoms, so the numbers of individuals requiring diagnostic services is not easy to identify, either nationally or locally.

As an estimate, in lieu of better information, twice the incidence of lung cancer has been used as an assessment of the numbers of referrals that will require a basic outpatient consultation and simple investigation package. This represents about 1200 referrals of patients with symptoms for assessment per million persons. Once the diagnosis has been made, further investigations are required for staging, and these are identified in the treatment matrix.

Diagnosed disease

Incidence and prevalence figures are required to assess the volumes of services that should be purchased for curative services. Because the disease is so lethal, mortality and mean survival figures (Table 1) provide good estimates for incidence and prevalence, however, data to break these down by cell type and extent are difficult to obtain (typically only about two-thirds of cases are confirmed histologically; Table 2). Consequently, the implications for types of services are also difficult to quantify.

Table 1: Age-specific deaths and death rates per 100,000 persons [based on rates for England 1994–96 (PHCDS)].

	Males		Females		All persons	
	Rate/100,000	**Number**	**Rate/100,000**	**Number**	**Rate/100,000**	**Number**
1–4	0.0	0.0	0.0	0.0	0.0	0.0
5–14	0.0	0.0	0.0	0.0	0.0	0.0
15–34	0.2	0.4	0.2	0.1	0.2	0.5
35–64	49.7	94	25.4	48	37.6	142
65–74	385.7	152	172.3	80	269.7	232
75+	608.4	153	182.8	86	329.8	239
All ages	81.0	398	42.3	215	61.3	614

Factors affecting the incidence are described in Appendix V.

Table 2: Estimated percentage of cases by cell type and extent of disease.[14]

	Limited	**Extensive**	**Total**
Non-small cell	12 ± 8[a]	62	80
Small cell	6	14	20
Total	22	78	100

[a] Up to 15% of NSCLC cases may be suitable for surgery and a further 10% may be suitable for radical radiotherapy.

The numbers for any particular district can be found from the Public Health Common Data set (PHCDS). Districts which have high concentrations of social class IV/V, or a high prevalence of smoking will tend to have higher rates of cancer of the lung than average. Use of the SMRs (standardised mortality ratio) by social class or the SRRs (standardised registration ratio) for ONS (Office of National Statistics) area types can be used to calculate an expected incidence for a given population (Table 3).

Table 3: New cases per year for a population of 1 million.

	Limited	**Extensive**	**Total**
Non-small cell	$74 + 48$	370	492
Small cell	37	85	122
Total	159	455	614

Functional consequences of continuing disease

Advanced lung cancer causes pain, respiratory symptoms (breathlessness) and increasing debility and incapacitation. In addition, the psychological effects of terminal disease affect not just the individual, but also carers and family members. The degree of pain, functional impairment and psychological distress can vary widely and has been described for patients dying of cancer in general,[14] but there is little information on the distribution specifically in relation to lung cancer. Because lung cancer has a very poor prognosis, with only 10% survival at 1 year, and a mean life expectancy of 6 months from diagnosis, the incidence rate provides a reasonable estimate of the numbers of individuals who will experience these functional restrictions to some extent.

It has been estimated that 15–25% of patients dying from cancer receive inpatient hospice care, and between 25 and 65% receive input from a support team or Macmillan nurse. However, these estimates are largely a function of the availability of service, and there is little information on measures of objective need, or easy ways to identify how these estimates should be modified to suit different districts.[15]

This implies that 555 individuals will die during a year, who will experience the symptoms and functional limitations of continuing lung cancer and who are likely to require help of some sort in terms of pain relief, symptom control, nursing care and psychological support.

4 Interventions/services

This section describes the nature, volume and costs of services used to prevent and treat cancer of the lung per million persons and is based upon current guidelines of appropriate care.[1,16]

Services for those at risk of developing lung cancer (whole population/at risk, children smokers, previously treated disease)

Controlling smoking

Smoking prevalence reduction is not only undertaken by the health services. Controls on advertising, availability to young people and taxation policy are also the responsibility of other government agencies.

Health services at the local level deal with two main areas (preventing starting and smoking cessation) and cost estimates for smoking cessation interventions have been taken from guidance issued by the Health Education Authority (HEA)/Centre for Health Economics, York.[17] These estimates are for various options. Smoking cessation guidelines have also been published.[18,19]

Prevention of the uptake of smoking

Education and health services inform about the risks of smoking, and also help to develop young people's self-confidence and self-esteem. The HEA supplies materials for classroom activities, the major input of staff is teacher time. Training and support for teachers varies from district to district, but is estimated, on average, to be 0.05 WTE health promotion officer/million persons (*c.* £1000 p.a.; V. Speller, personal communication).

Teacher input has been estimated as 3 hours/year in primary school and 6 hours/year in secondary school (not only related to smoking). On the assumption that a population of 1 million has a school-age population of about 153 000 (aged 5–16), of which about 83 000 will be in 450 primary schools and about

70 000 in 70 secondary schools, a cost of about £140 000/year in direct teaching time can be estimated. In addition, materials from the HEA for these schools will cost *c.* £25 000 (non-recurrent). (N.B. These are not health authority costs.)

Encouraging and supporting quitting

Two types of intervention were assessed by the HEA guidance:

- face-to-face interventions
- community interventions, e.g. 'No Smoking Days'.

Face-to-face interventions range from brief advice (up to 3 minutes) to brief counselling (3–10 minutes) and support with nicotine gum. Brief advice is estimated to cost £492 000 (if undertaken routinely for a population of 1 million and assuming a population reach of 80%); brief counselling (again if provided routinely and assuming a population reach of 70%) has an additional estimated cost of £2.2 million. Nicotine gum is estimated to be a further additional cost of £460 000 (assuming a population reach of 50%).

Community interventions assessed were 'Quit and Win' campaigns, which generally involve eligibility for a prize draw for smokers who can demonstrate abstinence for a defined period, and locally organised 'No Smoking Days'. An average cost/average participation Quit and Win campaign is estimated to cost £200 000 and local 'No Smoking Day' activities are estimated at £12 000. The costs to the NHS of encouraging and supporting quitting are given in Table 4.

Table 4: Summary of costs to the NHS for at risk population per million (assuming one 'No Smoking Day' and one 'Quit and Win' campaign per year).

HBG	Health education in schools	Health education/ support in primary care	Community interventions	Eligible cases	Total cost
School children				153,000	*c.* £1,000
Smokers		£12.80		230,000	£2,952,000
			£0.92	230,000	£212,000
Total					£3,164,000

Note: There are also costs to smokers of time and nicotine gum.

Services for those presenting with symptoms/signs

Screening

No screening services are provided for the early detection of cancer of the lung in the NHS as there is currently no evidence that population screening is effective in reducing mortality.

Diagnosis

The diagnosis of cancer of the lung is generally made without extensive investigation, however, it may be necessary to undertake further investigation to establish the extent and cell type of the tumour before deciding on the appropriate treatment.

Guidelines recommend that all those with suspicious chest X-ray and history should have bronchoscopy or sputum cytology or computed tomography (CT)-guided fine needle biopsy. However, not all cases are confirmed histologically. Up to 1990 the rate was 50–60%,[20,21] but by 1992–94 this had improved to 70% in the Northern and Yorkshire region.[22]

Referral patterns will vary (and some patients see more than one specialist), but in a recent review of all lung cancer cases in one region (East Anglia; T. Davies, personal communication), 90% of all cases were seen by a physician, 15% by a surgeon and 38% by an oncologist. (Information on the referral patterns of those in whom lung cancer was excluded is not available.) In contrast, data from the Northern and Yorkshire region[22] show that in 1992–94, 61% were seen by a chest physician, 47% by an oncologist and 21% by a surgeon. However, this study also showed substantial variation in the proportion managed by a specialist between both trusts and age groups (86% for those under 70 years, and 63% for those over 70 years).

Lung cancer guidance recommends that all cases are referred to a multidisciplinary lung cancer team comprising a respiratory physician, radiologist, pathologist, nurse specialist, oncologist, radiotherapist, palliative care specialist and thoracic surgeon.

Average diagnostic costs are small in relation to treatment costs but will include at least one outpatient visit, bronchoscopy in about 50% of cases and chest X-ray. Average diagnostic costs are unknown but unlikely to be more than *c.* £500/patient (Table 5).

Table 5: Summary of diagnosis services.

HBG	Numbers of individuals	Outpatient visit	Chest X-ray	Rigid broncho-scopy (D08)	Flexible broncho-scopy (D07)	Number of cases	Total cost
Screen detected/ Asymptomatic Symptomatic presentation	n/k	n/k	n/k	£418 (day case) £727 (IP)	£308 (day case) £488 (IP)	n/k	n/k

Services for those with diagnosed disease

The type of service provided depends entirely on the histological type and stage of disease.

Non-small cell carcinoma operable

Only patients with potentially curable disease (up to Stage IIB) are considered resectable. Some Stage IIIa tumours are also resectable, particularly if N2 (mediastinal node involvement) disease is only found at resection.

Selection involves assessment of the general health of the patient, histological diagnosis and staging of the disease. All those considered for surgery will probably have bronchoscopy, a CT scan of the thorax and upper abdomen, and mediastinoscopy if there are enlarged mediastinal nodes on CT (>1 cm in diameter).[1] Current practice varies, and there is little information on the numbers of cases assessed, as distinct from the numbers selected for surgery, but estimates range from 6.7 to 15% of all cases. However, resection rates in the UK are some of the lowest in Europe. Although older patients are less likely to

undergo surgery than younger patients, age should not be a barrier to surgery, provided that the patient's performance status is satisfactory.

Mediastinoscopy falls within HRG D04, D05. National average costs (1997–98) are *c.* £1600–2700. This implies about 74 cases per year per million.

HRG costs for surgical care are now becoming available based on care profiles. A typical profile for surgical care includes:

- 12 days inpatient stay
- 1.5–2.5 hours operating theatre time
- 0.25 days ITU
- chest X-ray, CAT scan (0.15) , mediastinoscopy/mediastinotomy
- group and cross-match/transfuse 2 units
- full blood count and biochemistry
- Pre- and postoperative radiotherapy are not recommended.

Current cost estimates for HRG D02 (complex thoracic procedures) are £4183 (elective) and £4151 (emergency). The mean length of stay for HRG D02 (complex thoracic procedures) is 9.4 days (1997–98).

Non-small cell, inoperable, limited disease

For a small number of patients with disease limited to the thorax (approximately 8% of all cases), but unsuitable for operation, radical radiotherapy may be indicated. A recent trial of continuous hyperfractionated accelerated radiotherapy (CHART) in patients with small volume, but inoperable, disease has shown that three daily fractions of radiotherapy (each of 1.5 Gy for 12 days, total 54 Gy) provides a greater response rate than conventional radical radiotherapy. This results in a 24% reduction in the relative risks of death, i.e. 9% absolute improvement in 2-year survival compared with conventional radiotherapy (29 vs. 20% respectively).[23] Despite this evidence, not all radiotherapy centres have implemented the CHART regime for all suitable patients.

Estimates of the frequency of CHART or conventional radical radiotherapy (the latter probably being given to localised disease considered too bulky for CHART) vary, possibly depending on the availability of resources. An estimate of 8% indicates about 48 cases per year per million persons (and may be very much less in other districts, dependent on local practices).[20] In general, cases will have complex planning which should include a CT of the thorax and for CHART, probable inpatient accommodation. For routine radical radiotherapy, daily visits will be necessary, i.e. 25 visits over a 5-week period. There will also be follow-up visits to outpatients at 2–3-month intervals.

The CHART regime falls into HRG W18 (hyperfractionation, complex with imaging). Other radical radiotherapy regimes will be:

- W15 (complex with imaging, 13–23 fractions) or
- W16 (complex with imaging, 24+ fractions).

See Appendix III for radiotherapy HRG definitions.

The costs per course are £2484, £1902 and £2390 respectively (K Lloyd, personal communication).

There are few data available on chemotherapy costs, however, this regime falls into the 'Toxic, low cost' group for the proposed chemotherapy HRGs, at an estimated cost from one hospital of £336 (£63 per visit, average 5.3 visits).

Non-small cell, inoperable, extensive disease

The majority of non-small cell carcinoma (NSCLC; 62% of all lung cancer cases) will have progressed beyond the limited stage at diagnosis. In the majority of these patients, palliative radiotherapy will be used at some stage to provide symptom relief. This applies to about 370 cases per year per million population.

On average, cases will receive simple planning and 1–5 fractions of radiotherapy (total dose 20–30 Gy) on an outpatient basis, unless very distant from the radiotherapy centre or very frail (HRG W07 simple and simulator, 4–12 fractions). Some radiotherapy centres have adopted a reduced fraction schedule, which may involve only two or three fractions, which is as effective as longer and more fractionated courses (HRG W06, simple and simulator 0–3 fractions). Estimated costs are £944 and £296 respectively.

The role of chemotherapy for these patients is less clear, there is some inconclusive evidence of benefit. Trials are continuing to explore this potential, but this is not currently regarded as standard therapy.

Metastatic disease

Depending on the site of metastases, a few fractions of simple radiotherapy may be effective in providing relief of symptoms and pain (HRG W06 simple and simulator 0–3 fractions, cost £296).

Small cell carcinoma

Small cell carcinoma is responsible for approximately 20% of all cases and is more aggressive than non-small cell carcinoma, is more likely to be widely spread through the lung and to metastasise early. It is radiosensitive, but because of the rapid rate of growth and dissemination, radiotherapy is not effective in achieving cure on its own. The tumour is sensitive to combination chemotherapy.

Limited disease

About 30% of cases of small cell lung carcinoma (SCLC) are limited (confined to one hemithorax). Surgery may be carried out in a few cases (less than 3% of all SCLC in East Anglia) but the treatment of choice is combination chemotherapy. The recommended duration of treatment is six cycles, one every 3 weeks (chemotherapy, multidrug high cost £1817, Northampton costs).

Ninety per cent of patients with limited disease will respond with at least 50% achieving a complete response, however, this is not the same as cure, and many of these patients will subsequently relapse. The administration of mediastinal radiotherapy (W15 complex with imaging 13–23 fractions £1902) is recommended in responding patients and this has a benefit on the median survival, increasing it by 5% at 3 years in patients who have responded to chemotherapy.[24]

Extensive disease

Extensive disease should also be treated with the same chemotherapy regime as for limited disease (chemotherapy group, multidrug high cost, £1817 per patient course).

Up to 60% of patients respond, with 20% achieving a complete response. Chemotherapy prolongs median survival in limited disease patients from 3 months untreated to 12–15 months, and in extensive disease from 4 weeks untreated to 6–9 months. The cure rate for patients with limited disease is 7% at 4 years and 0–2% for extensive disease patients. However, fit patients with limited disease and normal biochemical values at diagnosis have a 15–20% chance of cure.

The role of prophylactic cerebral irradiation in prolonging survival is small, but it significantly reduces the incidence of relapse within the brain and the high associated levels of co-morbidity and a prolonged

stay in hospital (W07 or W08, simple with simulator, 4–12 or 13+ fractions £944, £1417).[25] The effect of chemotherapy on quality of life is beneficial with good control of presenting symptoms. Side-effects should also be tolerable. For those who relapse after a disease-free interval of 1 year, further chemotherapy may by useful, although less so than the initial treatment.

The intensity and duration of chemotherapy may be modified based on stage, performance status and other factors. Costs of chemotherapy are, therefore, variable and a true average figure is not available. HRGs for chemotherapy are not published at the time of writing, but when available will provide estimates of costs for these courses of treatment. Costs quoted in this section are based on costs for draft HRGs from Northampton Acute Trust (Table 6).

Table 6: Summary of treatments and costs (per million population, percentage of all cases).

			Cases	Cost	Total cost
	Local, operable	Surgical resection (12%)	74	HRG D02 £3,750	£277,500
		Mediastinoscopy	37	HRG D04 £1,812	£67,044
Non-small cell (80%) 492	Local disease (inoperable)	CHART (Hyperfractionation) Radical radiotherapy 13–24 fractions	48	HRG W18 £2,484	£119,232
		Radical radiotherapy 24+ fractions (8%)		HRG W15 £1,902	
		Chemotherapy		HRG W16 £2,390 Toxic low cost £336	£16,128
	Widespread disease	Palliative radiotherapy (62%)	370	HRG W07 £944	£174,640
				W06 £296	£54,760
	Metastases	Palliative radiotherapy (?25% of all lung cancers)	?	HRG W06 £296	£44,400
Small cell (20%) 122	Limited	Chemotherapy (6%)	37	Multidrug, high cost £1,817	£67,229
		+ Mediastinal radiotherapy for the 90% who respond	33	HRG W15 £1,902	£62,766
	Extensive	Chemotherapy	85	Multidrug high cost £1,817	£154,445
		Prophylactic cerebral irradiation (14%)		W07 simple + sim 4–12 fractions £944	£80,240
Total					£1,118,384

Services for those with functional consequences of continuing disease

The majority of patients require palliative care during the terminal phase of their illness, which may last for 3–6 months, and 95% of patients will die of their cancer. Location of care may vary between hospital, hospice, day unit and home. Services provided may include nursing care, pain relief, counselling and support to the patient and family. Models of care have been described in *Palliative and Terminal Care*.[15]

Analysis of service use by 320 terminally ill cancer patients (not only lung) in Wandsworth showed total average costs of £7100. This was made up of an average of 29 inpatient days, six outpatient visits, two day-patient attendances and 13 district nurse visits.[26]

An alternative estimate suggested a rather lower consumption of resources,[27] comprising 14–17 inpatient days, and a requirement for about 50 inpatient hospice beds to provide for the needs of cancer patients in a population of a million. This would imply a cost of *c.* £3.6 million/year at a bed/day cost of £200 per day. From this assessment, if the inpatient hospice requirements are £3.6 million, then the total resource requirements per million persons for cancer patients could be £4.5 million (including community and district general hospital services). Since cancer of the lung causes about 25% of the cancer deaths, this would imply a consumption of about £1.1 million for lung cancer patients, or equivalent to *c.* £2000 per patient (for *c.* 550 patients who die of lung cancer each year).

Dedicated funding for terminal/palliative care was provided to districts up to 1994–95 and was *c.* £1 million per million population. However, this did not cover the activity of non-specialist services, such as general practitioners (GPs), district nursing, use of general beds (both in district general and community hospitals) for nursing and symptom relief.

A survey in 1993 showed that there was considerable use of these services, and a quarter of patients had 20 or more contacts with their GP during the last year of life and 50 or more visits from a district nurse.

Systematic and consistent information about the resources required for the provision of palliative/terminal care is difficult to obtain. This is partly because the care is distributed across a number of services, including acute hospitals, community services, primary care and contracted private services (hospices).

Recommended patterns of care, requirements for information collection and service standards are detailed in Higginson,[15] but the specific resource implications for patients with cancer of the lung are not known. Palliative care HRGs are under development.

In the light of this uncertainty about the costs of palliative and terminal care, it is difficult to provide more than a very broad range of estimates of the costs of palliative/terminal care for lung cancer patients of £2000–7100 per person, which translates to a total cost per million persons of between £1.1 million and £3.9 million.

5 Efficacy/cost-effectiveness of services

Prevention

The evidence on costs and effectiveness of smoking cessation interventions has been summarised by the HEA.[19] (This work has not examined the cost-effectiveness of preventing children from starting smoking.)

Because of the limitations of the studies reported in the literature, the estimates that have been derived are based on a number of assumptions. However, 'the data strongly support the value of smoking cessation programmes compared with almost any other health service intervention'.[17] One problem is the difficulty of ensuring that changes in smoking have been due entirely to the intervention and not another influence. Randomised controlled trials are rare and difficult to arrange when the intervention is to large groups, in

addition, the verification of abstinence and the duration of follow-up are other factors which tend to vary and make the literature difficult to compare.

The two types of intervention compared are face-to-face interventions (brief advice, brief counselling, nicotine gum) and community interventions ('No Smoking Day', broader community-wide campaigns and 'Quit and Win' campaigns (Table 7).

Table 7: Comparison of face-to-face and community interventions.

	Effectiveness	Population reach	Life years gained (lyg)	Cost to NHS (per 1 million persons)	Cost/lyg NHS	Cost/ lyg smokers	Cost/ lyg both	Discounted cost/lyg (both)*
Brief advice	2%	80%	6,068	£492,760	£81	£13	£94	£479
Brief counselling	2% (additional gain)	70%	5,310	£2,204,502	£415	£130	£545	£2,787
Nicotine gum	8% (additional gain)	50%	15,202	£561,972	£37	£462	£463	£2,370
No Smoking Day	0.15%	90%	568	£11,960	£21	N/A	£21	£107
Broader community-wide campaigns (mid estimate)	0.1%	100%	380	£102,854	£271	N/A	£271	£1,390
Quit and Win average cost estimate	8%	1.26%	384	£200,542	£522	N/A	£522	£2,710

Screening

Prevention of death through early diagnosis by mass screening (X-ray and sputum cytology) has been evaluated in a number of studies in the US and Germany.[28,29] These have not shown any benefit in terms of reduced mortality even when high-risk persons are selected.

Treatment

Surgery for NSCLC

The results of surgery depend upon the selection criteria used, but audit data suggest a 32% relative survival at 5 years. Survival for Stage I NSCLC patients undergoing surgery is quoted as 70% compared with 10% for those who were not operated on, however, selection bias will account for some of this difference, and there are no randomised controlled clinical trials of surgery.

Taking this difference as the most optimistic estimate, the effect of surgery could be estimated as delivering 3 life years per patient, up to 5 years (quality of life is below baseline for up to 6 months postoperatively), at a cost of (£3750 + 1812/2) = £4656, this implies a cost of £1522 per life year gained.

This is an underestimate because of the potential gains beyond 5 years, but this may balance the overoptimistic estimate of the difference between surgery and no surgery. (There may be a greater gain due to the avoidance of palliative/terminal care costs.)

Radical radiotherapy for NSCLC

Again, the results will depend upon the patient selection criteria used, but 30% of patients with cancer limited to the thorax treated with the CHART regime survived for 2 years, compared with 20% randomised to conventional radiotherapy. This is equivalent to a gain of 0.2 life years per patient for an extra cost of £698 (£3490 per life year gained).

Meta-analyses of clinical trials in which patients have been randomised to receive radical radiotherapy or radical radiotherapy preceded by chemotherapy, highlight a potential benefit of the combined treatment showing a 2-month advantage for the addition of chemotherapy to radiotherapy alone. There is a 4% improvement in survival at 2 years with the addition of cisplatin-containing combination chemotherapy to radiotherapy.[30] Further studies are required to validate this data prospectively.

Palliative radiotherapy for NSCLC

Palliative radiotherapy is effective in relieving specific symptoms, but does not prolong survival. Results from the MRC trial of palliative radiotherapy suggest that two fractions are just as effective in controlling symptoms,[31,32] as longer regimes of higher doses. This regime has been adopted in some centres. It should, however, be noted that the longer term survivors (18 months) of this regime have a risk of radiation myelitis. Although the risk is small ($< 5\%$) the consequence, paraplegia, is severe.

Preliminary trials suggest that a single fraction of intraluminal radiotherapy may be effective in providing palliation, without the risk of myelitis. There are, however, higher costs associated with the equipment, sources and technical skills required in introducing the source via a bronchoscope.

The role of chemotherapy in addition to palliative radiotherapy and best supportive care is uncertain. The meta-analysis assessed every study of chemotherapy versus best supportive care published before 1995 and showed a small, but significant, advantage over best supportive care for cisplatin-containing combination chemotherapy. Quality of life data remain scanty, but there was a 10% improvement in survival with the addition of chemotherapy in patients with advanced NSCLC at 1 year. Again, further prospective studies are required, including quality of life assessment and health economic assessment in order to verify this claim. Chemotherapy outside clinical trials is discouraged.

The cost-effectiveness of conventional radical radiotherapy is difficult to determine, as there are no recent randomised controlled trials of its effectiveness. Laser and selectron therapy have not yet been demonstrated to provide useful results.

Chemotherapy for SCLC

Overall outcome for chemotherapy is 10% survival at 2 years and 5% at 5 years. The results for limited disease are somewhat better at 15–20% at 2 years.

Mean survival without treatment is 3 months for limited disease and 6 weeks for extensive disease. With treatment, this becomes 12–15 months for limited disease and 6–9 months for extensive disease.

The mean survival gain may be estimated as 9–12 months per patient, however, the significant side-effects of chemotherapy may reduce the quality of life. At a cost of £1800 per course of chemotherapy and £1900 for radiotherapy for the 90% of patients who respond (i.e. £3510), the cost per life year is £4680.

A Canadian trial of various regimes indicated that for the most effective regime, an increase in survival of 1.6 months was obtained at a marginal cost of $450. i.e. $3370 per extra life year gained.[33]

Although most estimates of life years gained should be discounted, in the instance of lung cancer treatment, since the duration of life gained is relatively short, this has not been undertaken.

Terminal care

Up to 70% of patients would opt for home care in preference to hospital or hospice if possible, and for half of these patients, the final choice was home care. The provision of care in the home has been found to substantially reduce the number of inpatient days, and the extra support at home is no more costly than traditional care,[34] or may be less.[35] Caring for terminally ill patients in a general hospital setting is often felt to be incompatible with the needs of the terminally ill and their relatives for open-ended conversation and emotional support. Hospice or dedicated hospital care may, therefore, be seen as more appropriate.

Summary of efficacy/cost-effectiveness of services

A summary of the efficacy/cost-effectiveness of services is given in Table 8.

Table 8: Service efficacy and cost-effectiveness.

	Intervention	Size of effect[a]	Quality of evidence[b]
Prevention	Face-to-face interventions	A	II-1
	Community interventions	A	II-1
Treatment	NSCLC surgery	A	II-2
	NSCLC radical radiotherapy	B	I-2
	NSCLC radical radiotherapy plus chemotherapy	C	II-1
	NSCLC palliative radiotherapy	B	I-2
	SCLC chemotherapy	B	I-2
Support	Palliative care	B	II-1

[a] A, the procedure has a strong beneficial effect; B, the procedure has a moderate beneficial effect; C, the procedure has a measurable beneficial effect; D, the procedure has no measurable beneficial effect; E, the harms of the procedure outweigh the benefits.
[b] I-1, evidence from several consistent or one large randomised controlled trial; I-2, evidence from at least one properly desigened, randomised controlled trial; II-1, Evidence from well-designed controlled trials without randomisation or from well-designed cohort or case–control analytical studies; II-2, evidence obtained from multiple time series with or without intervention. Dramatic results from uncontrolled experiments could also be regarded as this type of evidence; III, opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees; IV, evidence inadequate or conflicting.

6 Models of care and recommendations

Prevention

Prevention of lung cancer through reductions in the numbers of smokers is an effective, but long-term, strategy. For smokers who give up, the risk of developing lung cancer is a function of the years of exposure

to cigarette smoke, and will remain raised but static. Reductions in lung cancer rates are, therefore, only gradual, and the effectiveness of preventing young people from starting to smoke, will only become apparent 30–40 years later as they enter their 50s and 60s.

Recommendation for prevention

Investment in prevention is required now if the reductions in smoking are to be achieved. Even then, the reductions in cancer rates will take several years to occur, and cannot be justified in the short term in terms of reductions in treatment costs or life years saved. It is worth bearing in mind, however, that substantial investments in basic research in cell biology and control mechanisms are now being made in order to find new methods of treatment in cancer. These are also unlikely to yield significant improvements in patient care for many years . . . perhaps as many as 20, but are more enthusiastically promoted although the probability of return on investment is no more certain.

In summary, there is a need to provide a balanced and effective strategy, which will include:

- programmes to prevent children from starting to smoke (support to schools)
- programmes to help people to give up smoking (workplace programmes, National No Smoking Day)
- advice from health professionals (GPs, nurses)
- mass media/fiscal measures/action on advertising (lobbying and local advertising).

It is important to note the time-scale for improvements in lung cancer incidence, and the consequent need to take cost-effective action early.

Screening

As a result of the evaluative studies cited above, screening programmes cannot be recommended, as there is no significant improvement in the prognosis of patients found through screening.

Treatment

Surgery

For suitable tumours, surgical resection offers good outcome at a reasonable cost. Careful selection of cases with thorough pre-operative assessment is likely to ensure good results. Purchasers should discuss the criteria for surgical resection with the providers. Purchasers should ensure that the criteria for standards of care in the lung cancer guidance document are followed.

Radical radiotherapy

The CHART regime has been demonstrated to be more effective, though more costly, than conventional radiotherapy. Purchasers should discuss with providers how to ensure those patients deemed suitable for radical radiotherapy can be treated under the CHART regime.

Palliative radiotherapy

The available evidence suggests that palliative radiotherapy can both be deferred until symptoms are present and reduced to 1 or 2 fractions in many cases. This approach may also be used for the relief of local

symptoms and metastases. Adoption of these criteria could potentially reduce the costs of radiotherapy to a district. However, the effect of this on overall costs will be limited because these are dominated by the cost of terminal care, and these are relatively simple and low cost fractions. In addition, since some radiotherapy departments have already adopted the implications of the MRC trial,[36] the potential gains will not exist in some districts. Purchasers should explore the balance of regimes with providers.

Chemotherapy

The available evidence suggests that survival for SCLC can be extended by 9–12 months on the most cost-effective regime. The evidence for chemotherapy in NSCLC is less clear. Purchasers should discuss with providers how to ensure that patients with SCLC expected to benefit from chemotherapy receive a cost-effective regime. Suitable patients with NSCLC should only receive chemotherapy as part of properly costed multicentre trials. Purchasers should meet the additional costs of trial entry.

Palliative/terminal care

Palliative care for cancer of the lung is in principle no different to that for other malignant disease. Between 40 and 50 terminal care beds per million persons have been recommended, of which 10–12 would be used by patients with cancer of the lung. Home care provision has been recommended at four home nurse per million persons for patients with severe pain.

In order to provide care for all patients in need it is important for terminal care to be:

- population based
- able to cope with the difficult as well as easy problems
- able to educate health care professionals (both in hospital and the community) in order to raise the quality of palliative care
- based on an appropriate balance between specialist palliative care and the generalist support of the primary care team.

Continuing education of GPs, hospital doctors and nurses is required together with a well co-ordinated policy on palliative care to ensure that those with the greatest needs get the highest priority for service.

7 Measures of outcomes and targets to monitor services

The measures suggested in this section are based on the six Areas of Performance, and will be better defined as the National Service Frameworks for Cancer are developed.

Prevention

Activity measures should show the interventions undertaken and amount of staff time (including primary care team) devoted to reducing smoking.

The success of preventive activities should be monitored by examining reductions in the rate of starting smoking by children, quit rates achieved by established smokers (these need to be verified by biochemical measures of nicotine and carbon monoxide) and by estimating smoking rates in the community. Methods to ascertain this from sample surveys and extrapolations from other areas (e.g. General Household Survey)

need to be explored in order to determine whether the intended reduction in smoking is achieved. It will be important to ensure that such surveys are methodologically sound and well-designed studies may need to be carried out for 3–5 years in order to determine the actual progress in smoking reduction. Such studies may, however, be costly and should only be undertaken if the information gained is worthwhile.

Over a longer period, reductions in the number of deaths from lung cancer should occur if smoking reductions have been achieved.

Treatment

Efficiency

Costs of treatment regimes should be within an agreed percentage of the national average HRG cost.

Fair access

There should be an agreed rate of access to surgery for operable limited NSCLC disease.

Effective delivery

There should be:

- an agreed rate of entry to CHART for NSCLC inoperable/limited disease
- an agreed rate of use of 1–3 fraction palliative radiotherapy courses for extensive NSCLC
- an agreed rate of early referral to a specialist lung cancer team
- an agreed target rate of histological confirmation, patient/carer experience
- agreed standards of patient explanation for all treatment regimes.

Outcomes of health care

There should be agreed rates of survival/quality of life scores for all treatment regimes.

Terminal care

The important elements of terminal care are the relief of symptoms and support of the patient and carers. Fair access should be monitored through the availability of palliative care specialist teams, and the patient/carer experience should be monitored at regular intervals.

8 Information

The data to provide the systematic needs assessment outlined in this chapter are not generally available at the district level. The development of the NHS Information Strategy over the next few years will focus effort on creating clinical information systems that support patient care, and can also be used to extract epidemiological and management information. An early element of the Information Strategy is the

development of a Cancer Information Strategy which will support the early implementation of electronic patient records for cancer patients. A key component of this strategy will be the specification of agreed minimum data sets (clinical and statistical). These are likely to be based on data sets published by the Royal College of Pathologists and the Royal College of Physicians. This cancer strategy is expected to be published in early 2000 and it is likely that in the longer term, the role of cancer registration will become more closely integrated into these clinical information systems.

The essential components of this will include:

1 GP computer systems which can provide details of HBGs through the organisation of groups of GPs who are willing to collaborate and ensure the accurate collection of data through their computer systems. This can then be extracted and pooled to provide an estimate of the epidemiology of lung cancer in the population. (This does not need to be 100% of practices as suitable samples could provide sufficiently accurate information.) In addition, the use of services at the primary care level can be assessed, in particular to provide estimates of preventive, diagnostic and palliative/terminal activities.

   - Numbers of individuals at risk (smokers, history of asbestos exposure, etc.).
   - Numbers of individual presenting with suspicious symptoms.
   - Numbers of individuals referred to hospital and stage at diagnosis (from hospital discharge summary).
   - Numbers of individuals with terminal disease.
   - Numbers of packages of palliative/terminal care.
   - Outcomes of care (survival and quality of life measures).
   - Numbers of individuals receiving smoking advice and counselling.

2 District hospital clinical systems (and laboratory/radiology department systems) which can provide details of HRGs delivered and performance measures through linking electronic patient records. These need to be linked to demographic details so that the activity can be ascribed to the right population.

   - Numbers of individuals seen and assessed in outpatient departments (including diagnostic services).
   - Numbers of admissions for surgery (chemo/radiotherapy), palliation and terminal care.
   - Standards of care for clinical governance and performance management.

3 Cancer centre clinical systems, similarly linked, which can provide details of HRGs delivered and performance measures through:

   - numbers of courses of chemotherapy and radiotherapy
   - care standards for clinical governance and performance management.

4 Voluntary sector (hospices, Marie Curie, etc.) provide details of HRGs delivered and performance measures through:

   - numbers of patients receiving palliative/terminal care in the voluntary sector
   - care standards delivered.

5 Community/primary care group clinical systems.

   - Numbers of patients receiving palliative care in community settings.
   - Numbers of health education interventions to school children.

6 Cancer registries ensure completeness of epidemiological data capture and long-term outcome measures.

   - Population-based capture of new cases.
   - Information on long term-death rates.

9 Research priorities

Case-mix language

Considerable amounts of guidance are available on the evidence for effective processes of care; outcomes and guidelines have been published in the last few years. The interpretation and use of these documents is made more difficult by the use of differing groupings and terminology. A set of standard groups, based on clinical terms, and which can be used consistently to extract data from clinical systems, would make the interpretation, application and monitoring of guidance considerably more simple and less expensive.

Curative therapy

The development of better curative treatments needs to be continued because present treatments are effective for only a small proportion of patients. This should come about through well co-ordinated multicentre trials. Small increases in effectiveness might provide reasonably large increases in the number of life years gained, and districts should ensure that the costs of entry to clinical trials is included in the funding of services.

Palliative care

There is a need for more widely generalisable studies of the relative cost-effectiveness of different models of care for patients with terminal disease, so that evidence-based choices about the development of services can be made.

Appendix I. Clinical features of cancer of the lung

Symptoms

Local symptoms include chest pain, breathlessness, hoarseness and coughing up blood (haemoptysis), however, the presentation may vary widely, and perhaps only half of the total present with a typical picture. This makes it less easy to identify the ideal patterns of referral than for some other tumours. Symptoms of metastatic spread include bone pain, headaches, pain over liver, fever, weight loss and malaise.

Endocrine secretion

Small cell lung cancers commonly produce ectopic peptide hormones: anti-diuretic hormone (ADH) and adrenocorticoidtrophic hormone (ACTH) being the most common. Their production is a poor prognostic sign. Squamous cell carcinomas sometimes produce parathormone-like substances that cause hypercalcaemia.

Local invasion

Local growth of the tumour and spread into mediastinal lymph nodes can cause pressure on the other important structures in the chest. These include the great vessels (superior vena cava), pericardium, oesophagus and various nerves. Extensive local tumour may create problems, as well as making it impossible to remove the tumour surgically. Local growth may also invade the chest wall and the ribs.

Metastatic spread

Cancers of the lung tend to spread rapidly to other sites in the body, both through lymphatic channels (to lymph nodes) and through the blood. Initially, lymphatic spread is normally to the hilar, mediastinal, paratracheal and supra-clavicular lymph nodes. Common sites of distant metastases are the brain, liver and bones (especially the spinal column), adrenal glands and subcutaneous tissues.

Appendix II. Coding and classification of cancer of the lung

Diagnoses are classified in the *International Classification of Disease* (ICD 9 and ICD 10). Conditions relevant to lung cancer are also grouped into HBGs, which cover risk, presentation, confirmed disease and irreversible disease.

Interventions are classified in a number of ways. OPCS 4 codes are used for surgical activities, and these are grouped into HRGs for inpatient surgical admissions. Radiotherapy courses are also classified by HRGs, and a draft set of chemotherapy HRGs has been defined. No classification of palliative/terminal care interventions is available yet, although a draft palliative care minimum data set has been published by the National Council for Hospice and Specialist Palliative Care.[37] Palliative care HRGs are under development by the NHS Information Authority.

Conditions

ICD 9

162	Malignant neoplasm of trachea, bronchus and lung.
162.0	Trachea.
162.2	Main bronchus.
162.3	Upper lobe bronchus or lung.
162.4	Middle lobe bronchus or lung.
162.5	Lower lobe bronchus or lung.
162.8	Other.
162.9	Bronchus and lung, unspecified.

ICD 10

C34	Malignant neoplasm of trachea, bronchus and lung.
C340	Malignant neoplasm of main bronchus.
C341	Malignant neoplasm of upper lobe, bronchus or lung.
C342	Malignant neoplasm of middle lobe, bronchus or lung.
C343	Malignant neoplasm of lower lobe, bronchus or lung.
C348	Malignant neoplasm of overlapping lesion of bronchus and lung.
C349	Malignant neoplasm of bronchus or lung, unspecified.

Interventions

OPCS 4 procedures

E46–E63	With a diagnosis from the above list.
E461	Sleeve resect bronch anast HFQ.
E462	Excision of cyst of bronchus.
E463	Excise lesion of bronchus NEC.
E464	Open destr lesion of bronchus.
E468	Partial extirp bronchus OS.
E469	Partial extirp bronchus NOS.

E471 Open biopsy lesion bronchus NEC.
E472 Closure fistula bronchus.
E473 Repair of bronchus NEC.
E478 Other open operation on bronchus OS.
E479 Other open operation on bronchus NOS.
E481 Fib snare resection lesion lower RT.
E482 Fib laser destruction lesion lower RT.
E483 Fibreoptic destruction lesion lower RT.
E484 Fibreoptic aspiration lower RT.
E485 Fibreoptic removal FB lower RT.
E486 Fibreoptic irrigation lower RT.
E488 Ther fib endoscopy lower RT OS.
E489 Ther fib endoscopy low RT NOS.
E491 Fib endo exam + biopsy lower RT.
E498 Diag fib endoscopy lower RT OS.
E499 Diag fib endoscopy low RT NOS.
E501 Rigid endo snare resec low RT.
E502 Rigid endo laser lesion lower RT.
E503 Rig endos dest lesion low RT NEC.
E504 Rigid endos aspiration low RT.
E505 Rigid endos removal FB low RT.
E506 Rig endos irrigation lower RT.
E508 Rigid ther bronchoscopy OS.
E509 Rigid ther bronchoscopy NOS.
E511 Rigid bronchoscopy and biopsy.
E518 Rigid diag bronchoscopy OS.
E519 Rigid diag bronchoscopy NOS.
E521 Irrigation of bronchus NEC.
E522 Aspiration of bronchus NEC.
E528 Other op bronchus/trachea OS.
E529 Other op bronchus/trachea NOS.
E538 Transplantation of lung OS.
E539 Transplantation of lung NOS.
E541 Total pneumonectomy.
E542 Bilobectomy of lung.
E543 Lobectomy of lung.
E544 Excision of segment of lung.
E545 Partial lobectomy of lung NEC.
E548 Excision of lung OS.
E549 Excision of lung NOS.
E551 Open decortic lesion of lung.
E552 Open excision lesion of lung.
E553 Open cautery lesion of lung.
E554 Open destruction lesion lung NEC.
E558 Open extirp lesion of lung OS.
E559 Open extirp lesion lung NOS.
E571 Repair of lung.
E572 Ligation of bulla of lung.

E573 Deflation of bulla of lung.
E574 Incision of lung NEC.
E578 Other open lung operation OS.
E579 Other open lung operation NOS.
E591 Needle biopsy lesion of lung.
E592 Aspiration biopsy lesion lung.
E593 Biopsy lesion of lung NEC.
E594 Drainage of lung.
E598 Other operation on lung OS.
E599 Other operation on lung NOS.
E611 Open excis lesion mediastinum.
E612 Open biopsy lesion mediastinum.
E613 Open drainage of mediastinum.
E614 Mediastinotomy NEC.
E615 Exploration of mediastinum NEC.
E618 Mediastinum open operation OS.
E619 Mediastinum open operation NOS.
E621 Endoscop extirp lesion mediast.
E628 Ther endoscopy mediastinum OS.
E629 Ther endoscopy mediastinum NOS.
E631 Endoscopy + biopsy mediastinum.
E638 Diag endoscopy mediastinum OS.
E639 Diag endoscopy mediastinum NOS.

Appendix III. HRG/HBG matrix

HBG/HRG for lung cancer – summary

HBG	Primary prevention	Investigation & diagnosis	Initial care	Continuing care
At risk				
Whole population	Health education			
Population at specific risk	Screening and prophylactic			
Previously treated disease	Interventions			
	Follow-up care			
Presentation				
Asymptomatic, screen detected or incidental finding		Physical examination		
		Chemistry		
Symptomatic presentation		Imaging		
		Cytology		
		Biopsy		
		Special investigation		
		Special support		
Confirmed disease				
Stage O, I, II			Surgery	
Stage IIIa, IIIb (limited locally)			Chemotherapy	
Stage IIIa, IIIb (widespread locally)			Radiotherapy	
Stage IV			Special support	
Continuing disease state				
Non-progressive disease				
Functional ability				
Pain				
Other symptoms				
Progressive Disease				
Functional ability				Community general input
Pain				Specialist input
Other symptoms				Voluntary sector

HRGs for Radiotherapy

HRG	Description
w01	Superficial Teletherapy, < 4 Fractions
w02	Superficial Teletherapy, > 3 Fractions
w03	Simple Teletherapy, < 4 Fractions
w04	Simple Teletherapy, > 3 < 13 Fractions
w05	Simple Teletherapy, > 12 Fractions
w06	Simple Teletherapy with Simulator, < 4 Fractions
w07	Simple Teletherapy with Simulator, > 3 < 13 Fractions
w08	Simple Teletherapy with Simulator, > 12 Fractions
w09	Complex Teletherapy, < 4 Fractions
w10	Complex Teletherapy, > 3 < 13 Fractions
w11	Complex Teletherapy, > 12 < 24 Fractions
w12	Complex Teletherapy, > 23 Fractions
w13	Complex Teletherapy with Imaging, < 4 Fractions
w14	Complex Teletherapy with Imaging, > 3 < 13 Fractions
w15	Complex Teletherapy with Imaging, > 12 < 24 Fractions
w16	Complex Teletherapy with Imaging, > 23 Fractions
w17	Complex Teletherapy with Imaging and Multiple Planning, >23 Fractions
w18	Complex Teletherapy with Imaging, Hyperfractionation
w19	Complex Teletherapy with Imaging and Multiple Planning, Hyperfractionation
w20	Teletherapy with Technical Support, < 4 Fractions
w21	Teletherapy with Technical Support, > 3 < 13 Fractions
w22	Teletherapy with Technical Support, > 12 < 24 Fractions
w23	Teletherapy with Technical Support, >23 Fractions
w24	Teletherapy with Technical Support and Multiple Planning, > 23 Fractions
w25	Teletherapy with Technical Support, Hyperfractionation
w26	Teletherapy with Technical Support and Multiple Planning, Hyperfractionation
w40	Live Source Brachytherapy without Anaesthetic
w41	Live Source Brachytherapy with Anaesthetic
w42	Manual Afterload Brachytherapy without Anaesthetic
w43	Manual Afterload Brachytherapy with Anaesthetic
w44	Mechanical Afterload, Low Dose Brachytherapy without Anaesthetic
w45	Mechanical Afterload, Low Dose Brachytherapy with Anaesthetic
w46	Mechanical Afterload, High Dose Brachytherapy without Anaesthetic
w47	Mechanical Afterload, High Dose Brachytherapy with Anaesthetic
w60	Outpatient Unsealed Source Brachytherapy
w61	Inpatient Unsealed Source Brachytherapy

Appendix IV. Staging of cancer of the lung

Source: UICC International Union Against Cancer: Hermanek P, Sobin LN (eds). *TNM Classification of Malignant Tumours*, 4th edn. Berlin: Springer-Verlag, 1987.

TNM clinical classification

T – Primary tumour

TX Primary tumour cannot be assessed, or tumour proven by the presence of malignant cells in sputum or bronchial washings but not visualised by imaging or bronchoscopy.
TO No evidence of primary tumour.
Tis Carcinoma *in situ*.
T1 Tumour 3 cm or less in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus (i.e. not in the main bronchus).[a]
T2 Tumour with any of the following features of size or extent:
more than 3 cm in greatest dimension
involves main bronchus, 2 cm or more distal to the carina
invades visceral pleura
associated with atelectasis or obstructive pneumonitis which extends to the hilar region but does not involve the entire lung.
T3 Tumour of any size which directly invades any of the following: chest wall (including superior sulcus tumours), diaphragm, mediastinal pleura, parietal pericardium; or tumour in the main bronchus less than 2 cm distal to the carina[a]) but without involvement of the carina; or associated atelectasis or obstructive pneumonitis of the entire lung.
T4 Tumour of any size which invades any of the following: mediastinum, heart, great vessels, trachea, oesophagus, vertebral body, carina; or tumour with malignant pleural effusion.[b]

Notes

[a] The uncommon superficial spreading tumour of any size with its invasive component limited to the bronchial wall which may extend proximal to the main bronchus is also classified T1.
[b] Most pleural effusions associated with lung cancer are due to tumour. However, there are a few patients in whom multiple cyto-pathological examinations of pleural fluid are negative for tumour, the fluid is non-bloody and is not an exudate. Where these elements and clinical judgement dictate that the effusion is not related to the tumour, the effusion should be excluded as a staging element and the patient should be classified T1, T2 or T3.

N – Regional lymph nodes

NX Regional lymph nodes cannot be assessed.
NO No regional lymph node metastasis.
N1 Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes, including direct extension.
N2 Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s).
N3 Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene or supraclavicular lymph node(s).

Staging grouping[38]

Occult carcinoma		TX		NO		MO
Stage O		Tis		NO		MO
Stage IA	T1		NO		MO	
Stage IB	T2		NO		MO	
Stage IIA		T1		N1		MO
Stage IIB	T2/T3		N0/NI		MO	
Stage IIIA	T1		N2		MO	
	T2		N2		MO	
	T3		N1, N2		MO	
Stage IIIB	Any T		N3		MO	
	T4		Any N		MO	
Stage IV		Any T		Any N		M1

Summary

Lung

TX Positive cytology.
T1 < 3 cm.
T2 > 3 cm/extends to hilar region/invades visceral pleura/partial atelectasis.
T3 Chest wall, diaphragm, pericardium, mediastinal pleura, etc. Total atelectasis.
T4 Mediastinum, heart, great vessels, trachea, oesophagus, etc. Malignant effusion.
N1 Peribronchial, ipsilateral hilar.
N2 Ipsilateral mediastinal.
N3 Contralateral mediastinal, scalene or supraclavicular.

Appendix V. Factors affecting incidence of lung cancer

Social class

A consistent gradient in social class and rate of cancer of the lung exists for both males and females (Figures A1, A2). A substantial part of this effect is due to differences in smoking habit. Districts with high concentrations of residents in social classes IV and V will have higher than average rates for cancer of the lung.

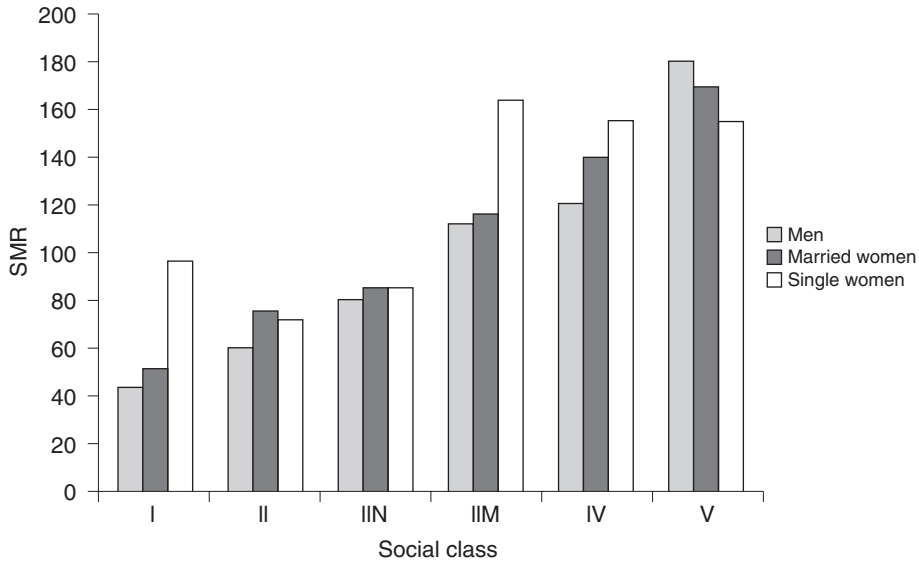


Figure A1: Lung cancer SMR by social class, England and Wales, 1981.

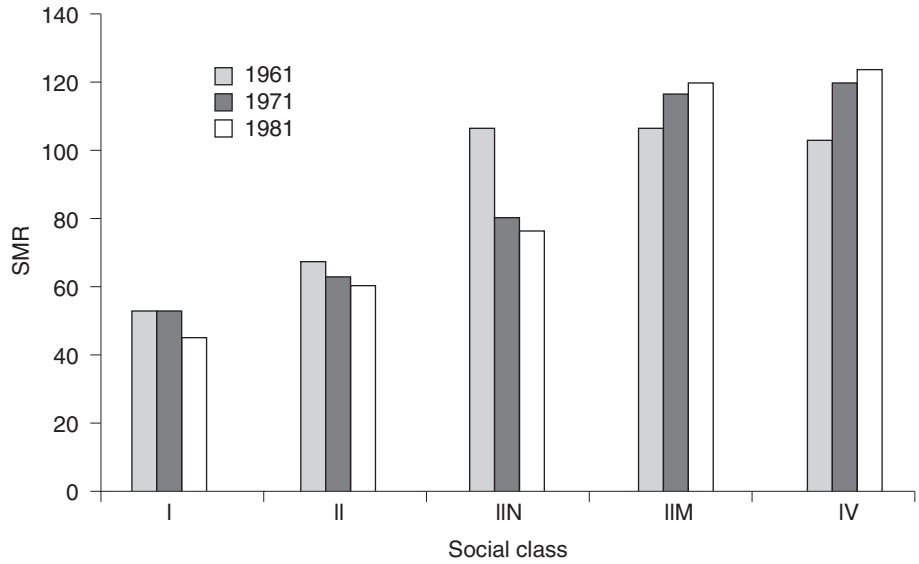
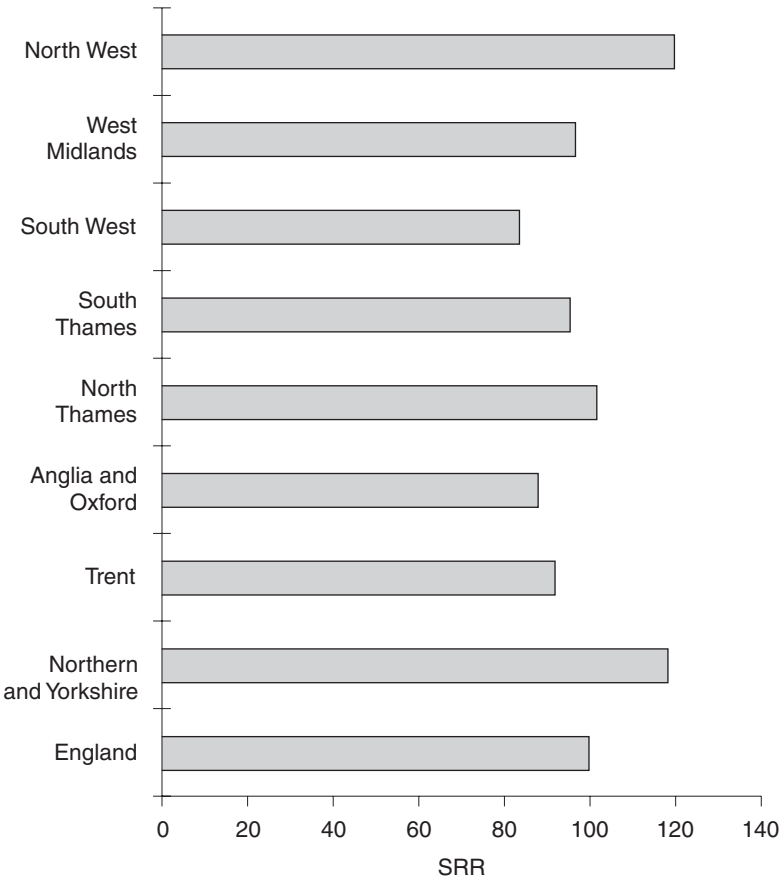


Figure A2: Lung cancer male SMR by social class, England and Wales, 1961, 1971, 1981.

Geographical location

In general, rates of cancer of the lung are higher in the north than in the south (Figure A3). This variation is likely to be due largely to differences in the social class structure, smoking and occupational exposure.



Source: Public Health Common Data Set (1997/8)

Figure A3: Lung cancer standardised registration ratios by region (England 1984–91).

Occupation

Certain occupations have high rates of cancer of the lung (Table A1). Part of this effect may be due to carcinogens in the work place, but the main cause will be the social class effect related to smoking habit.

Districts with a concentration of high-risk occupations may find a higher than expected rate of cancer of the lung. In particular, districts with a history of asbestos industries (dockyards, asbestos component manufacture, etc.) will have high rates. An allowance for this may be calculated from the incidence of mesothelioma.[9]

Table A1: Standardised mortality ratios for selected occupation.

	Men	Married women
High SMRs		
Deck, engine room hands, lightermen, boatmen	306	365
Steel erectors, scaffolders, steel benders, fixers	247	299
Labourers	246	270
Butchers	187	176
Chemical gas and petroleum process plant operators	179	211
Low SMRs		
Engineers and technologists	50	49
Farmers, horticulturalists, farm managers	47	57
Professional and related in science and engineering	44	80
Mechanical and aeronautical engineers	34	62
Teachers	29	41

Ethnic origin

Little variation in rates between different ethnic groups has been described in the UK.

Type of district

Several of the above factors can be summarised in the type of district. The ONS classification of areas is a useful clustering which shows differences in the rates of incidence and mortality (Figure A4).

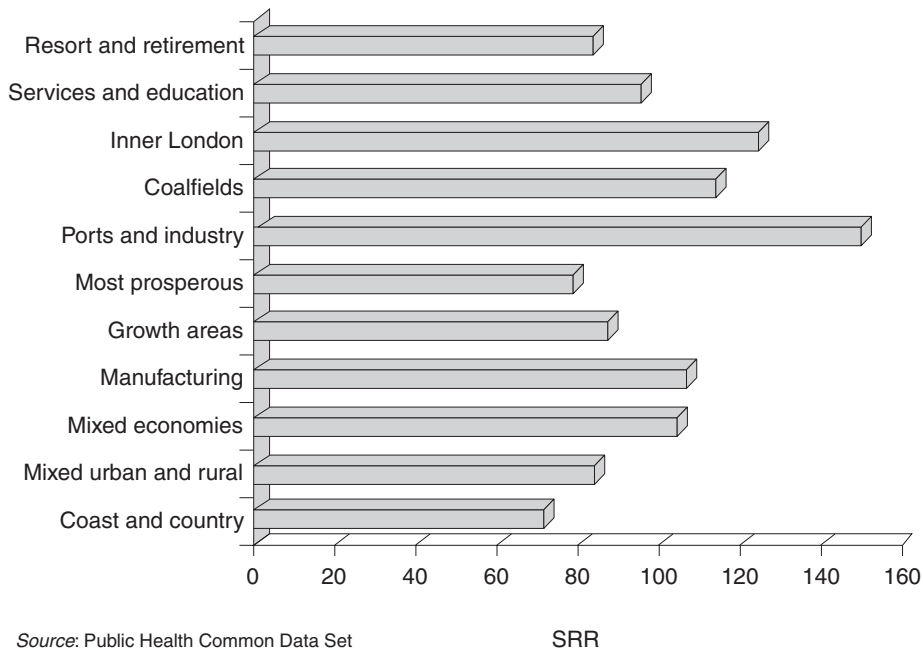


Figure A4: Lung cancer standardised registration ratios by ONS area.

Trends in incidence

It is important to understand the likely trends in incidence in constructing a long-term strategy for commissioning services for the treatment of individuals with lung cancer. Because of changes in the patterns of smoking, there is likely to be a steady reduction in incidence.

Smoking

The incidence of cancer of the lung is a reflection of past patterns of smoking. The prevalence of smoking in men has been falling for the last 20 years, for the last 10 years more slowly (*c.* 1% per year).[39] The rate has also been falling for women, but slightly more slowly than the rate for men (Table A2).

Table A2: Changes in smoking habit.

	Per cent smokers			Per cent change
	1972	**1988**	**1994–95**	**1972–94**
Men	52	33	28	−24
Women	41	30	25	−16
All persons	46	32	26	−20

Over the same period, there has been an increase in the proportion of men who have given up smoking and in those who have never smoked. A similar change has occurred in women (Table A3). Although the reduction in the number of people who have never smoked is less, the proportion who have never smoked was substantially greater initially.

Table A3: Changes in smoking habit 1972–88.

	% Ex-regular smokers			% Never smoked		
Sex	**1972**	**1988**	**Change 1972–88**	**1972**	**1988**	**Change 1972–88**
Male	23	32	9	25	35	10
Female	10	19	9	49	51	2

The average number of cigarettes smoked per week by male smokers is 120, and this did not change between 1972 and 1988. However, the proportion smoking non-filter cigarettes fell from 20 to 3% in the same period. For women the number of cigarettes smoked did increase (from 87 to 99), the proportion smoking plain cigarettes falling from 9 to 1%.

These changes in smoking habit have not been equal between social classes, as shown by the changes in incidence of lung cancer in which the difference between social classes is increasing (Figure A2).

Birth cohorts

Although smoking habit is changing, the incidence of cancer of the lung is a function of many years of exposure to tobacco smoke. Since smoking habit is largely determined in early adulthood, the smoking experience and hence incidence of disease varies according to the development of smoking patterns in successive cohorts of individuals.[40] Examination of the age-specific rates of lung cancer for the cohorts of men born between 1890 and 1940 show that the 1905 cohort has had the highest rates. For subsequent cohorts the rates have been falling (Figure 1). For women, the 1930 cohort had the highest rate. Subsequent cohorts have had lower rates (Figure 2), but the effects of this on overall mortality have not yet become evident.

In practice, this means that although reduction in smoking is an important objective, especially in the young, the effect on lung cancer incidence will not be apparent for many years. Rapid reductions in lung cancer incidence could not be expected even if all smoking stopped tomorrow.

Appendix VI. An example long-term agreement based on case-mix groups

This example agreement is constructed around the condition of lung cancer and seeks to provide a comprehensive plan for lung cancer, from the stage of potential disease, through to terminal disease.

In this agreement, the condition groups (HBGs) have been identified, as have the interventions (HRGs). These are based on the literature and clinical working group advice. These groupings may be used to identify the expected costs and volumes as well as the levels of performance expected within the agreement, and the exercise can be integrated into a higher level of analysis in order to set the detail of this programme into the context of the whole spectrum of conditions and interventions from the NHS.

In working out an agreement, the epidemiology of the population would need to be compared with a national or other benchmark, and the rates of activity and performance measures of the existing service similarly compared. From this base, and consideration of National Service Frameworks and clinical guidelines, the ideal service can be specified, and this forms the basis of a negotiation between purchaser and provider as to what service should be provided for which patients, and the costs and levels of performance expected. Since rapid changes in the delivery of health care is unrealistic, these targets would be set and achieved over a period of years.

The figures supplied in this example are based partly on estimates. The performance standards in particular are provided for illustrative purposes only, and are not intended to be taken as actual recommended standards.

Information to support this level of systematic planning will be available as a product of clinical information systems being developed and implemented as part of the information strategy. This depends upon the extraction of data for primary/community care, secondary care (district general hospital and cancer centre) systems and also population-based registers. These data will be captured as part of the electronic patient record, encoded in clinical terms. Extraction into standard patient groupings minimises the amount of data manipulation required at local level, and ensures comparability of the resulting information. The sources of the data, and the types of data which would need to be extracted, are identified in Section 8.

Example long-term service agreement

Cancer of the lung

1 Parties to the agreement:
   - Midshire Health Authority and its constituent primary care groups:
     - Midshire Acute Trust
     - Midland Cancer Centre
     - Uptown Community Trust
     - Downtown Community Trust
     - Midtown Hospice.

2 Duration of the agreement
   The agreement will be for a period of 5 years, with an option for renegotiation and rolling forwards after 3 years.

3 Objectives
The objective of this agreement is to secure access to efficient, effective and acceptable services for the population of Midshire in respect of the prevention of lung cancer, and the treatment and care of patients with lung cancer, in order to improve the health of the population through prevention of illness and amelioration of disease.

In specific, the agreement focuses on:

- investing in adequate preventive services
- ensuring increased access to curative surgery, radiotherapy and chemotherapy
- ensuring access to integrated palliative care.

4 Schedule of agreement
This agreement contains a specification of the:

- Part A: types of patient within the scope of the agreement
- Part B: numbers of patients
- Part C: treatment packages to be provided for them
- Part D: volumes of service and costs (total and by provider)
- Part E: performance measures for delivery of these services.

This schedule is based on a systematic needs assessment process which has compared the incidence/prevalence of patients in the lung cancer HBGs in Midshire with the national average, and also assessed the actual experience of Midshire patients against national averages and the recommendations in the National Service Framework and clinical guidelines.

Costs and performance measures within the six areas of performance have been compared with national benchmarks and levels of performance expected for the service providers for each year within the scope of this agreement, identified and recorded in the schedule of agreement.

Part A: Condition groups (HBGs) within lung cancer

At risk:

- whole population
- population at specific risk
- children
- smokers
- previously treated disease.

Presentation:

- asymptotic, screen detected or incidental finding
- specific and general symptoms.

Confirmed disease:

- small cell, limited disease
- small cell, extensive disease
- non-small cell, operable
- non-small cell, inoperable, limited
- non-small cell, extensive disease
- non-small cell, metastases.

Functional consequences of disease:

- terminal illness.

Part B: Numbers of cases in each Health Benefit Group/year

		1999–2000	2000–01	2001–02	2002–03	2003–04
At risk	Whole population	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Population at specific risk	Children	152,000	152,000	152,000	152,000	152,000
	Smokers	230,000	230,000	230,000	230,000	230,000
	Previously treated disease	60	60	60	60	60
Presentation	Asymptomatic, screen detected or incidental finding	61	61	61	61	61
	Specific and general symptoms	1,200	1,200	1,200	1,200	1,200
Confirmed disease	Small cell limited disease	37	37	37	37	37
	Small cell extensive disease	85	85	85	85	85
	Non-small cell operable	74	74	74	74	74
	Non-small cell inoperable, limited	48	48	48	48	48
	Non-small cell extensive disease	370	370	370	370	370
	Non-small cell metastases	185	185	185	185	185
Consequences of disease	Terminal illness/pain	555	555	555	555	555

Part C: Appropriate intervention(s) (HRGs) for each condition group

At risk	Whole population	Promotion	Package of care (HRG)
Population at specific risk	Children	Prevention	Health education
	Smokers		Health education and advice on stopping
	Previously treated disease		Follow-up (HRG XXX)
Presentation	Asymptomatic, screen detected or incidental finding	Assessment	Bronchoscopy (D10, D22)/CAT scan/ mediastinoscopy (D04, D05)
	Specific and general symptoms		Bronchoscopy (D10, D22)/CAT scan
Confirmed disease	Small cell, limited disease	Treatment of disease	Radical chemotherapy (multidrug, high cost) and radiotherapy (W15)
	Small cell, extensive disease		Radical chemotherapy (multidrug, high cost) and radiotherapy (W07, W08)
	Non-small cell, operable		Lobectomy (D02) mediastinoscopy (D04, D05)
	Non-small cell, inoperable, limited		Radical radiotherapy (W18)
	Non-small cell, extensive disease		Palliative radiotherapy (W07, W06)
	Non-small cell, metastases		Palliative radiotherapy (W06)
Functional consequences of disease	Terminal illness	Care/support	Inpatient palliative care (HRGXXX)
			Community-based palliative care

Part D: Volumes of service and costs

		Expected numbers/ million pop	Health education	Brief advice	Counsel-ling	OP consult-ation	Rigid bronchos-copy (D10)	Flex. bronchos-copy (D22)	Mediastin-oscopy (D04, D05)	CAT scan	Multi-drug high cost chemo	Radic. RTx (W18)	Proph Rtx (W15)	Palliat. RTx (W07)	Palliat. Rtx (W06)
			£1/head	£2/smoker	£10/smoker	£60	£1,356	£220, £511	£1,812, £194	£150	£1,817	£2,484	£1,902	£944	£296
Based on numbers of episode, cost/ episode and total cost (numbers* cost)															
		1 million													
Specific risk	Children	152,000	£152,000												
	Smokers	230,000		£460,000											
	Previously treated disease	60				£3,600									
Presentation	Asymptomatic, screen detected or incidental finding	61				£3,660									
	Specific and general symptoms	1,200				£72,000	£81,360	£132,000	£277,500	£22,500					
Confirmed disease	Small cell, limited disease	37									67,229		70,374		
	Small cell, extensive disease	85									154,445			80,240	
	Non-small cell, operable	74													
	Non-small cell, inoperable, limited	48										119,232			
	Non-small cell, extensive disease	370												174,640	54,760
	Non-small cell metastases		185												27,380
Functional consequences of disease	Terminal illness/pain		555												
	Total costs		£152,000	£460,000		£79,260	£81,360	£160,620	£277,500	£22,500	£300,000	£119,232	£70,374	£189,606	£82,140

Part E: Service standards schedule (1999–2000)

		Promotion		Fair access	Effective delivery	Efficiency	Patient/ carer experience	Health outcomes	Health improvement
At risk	Whole population	Prevention	Health education						(5% reduction in death rates in 5 years)
Population at specific risk	Children		Health education					Smoking rate in children reduced by 10%	
	Smokers		Brief intervention		50% of consult-ations with smokers			5% quit rate at 6 months	
	Smokers		Longer counselling		5% of consult-ations with smokers			15% quit rate at 6 months	
	Previously treated disease		Follow-up (HRG XXX)						
Presentation	Asymptomatic, screen detected or incidental finding	Assessment	Bronchoscopy (D10, D22)/ CAT scan/ mediastin-oscopy (D04, D05)			< 105% of national mean cost			
	Specific and general symptoms		Bronchoscopy (D10, D22)/ CAT scan/ media-stinoscopy (D04, D05)		< 105% of national mean cost				

Part E: Continued.

		Promotion		Fair access	Effective delivery	Efficiency	Patient/ carer experience	Health outcomes	Health improvement
Confirmed disease	Small cell limited disease	Treatment of disease	Radical chemo-therapy (multidrug, high cost) and radiotherapy (W15)			< 105% of national mean cost		25% survival at 1 year	
	Small cell extensive disease		Radical chemotherapy (multidrug, high cost) and radiotherapy (W07, W08)			< 105% of national mean cost		> 6 months above QUAL score of 5	
	Non-small cell operable		Lobectomy (D02)	Surgery rates > 15 % of NSCLC		< 105% of national mean cost	Adequate explanation	45% survival at 1 year	
	Non-small cell inoperable, limited		Radical radiotherapy (W18)		75% receive CHART regime	< 105% of national mean cost		25% survival at 1 year	
	Non-small cell extensive disease		Palliative radiotherapy (W07, W06)		80% receive 1-3 fraction course	< 105% of national mean cost		> 6 months above QUAL score of 5	
	Non-small cell metastases		Palliative radiotherapy (W06)			< 105% of national mean cost		> 6 months above QUAL score of 5	
Conse-quences of disease	Terminal illness/pain	Care/ Support	Palliative care (HRGXXX)	85% of eligible patients managed by integrate team			Patient/ relative satisfaction rating not less than 95% of national		

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Acknowledgements

This revision is based on the chapter by Sanderson, Mountney and Harris in the previous edition of *Health Care Needs Assessment* documents. Additional material has been provided from the English and Scottish guidelines documents, and from the National Schedule of Reference Costs. Costs for radiotherapy and chemotherapy have been provided by Dr K Lloyd based on costing studies in Northampton.

Health Benefit Groups (HBGs) and Health care Resource Groups (HRGs) are being developed by Clinical Working Groups to the specification of the Case-mix Programme of the NHS Information Authority. The Clinical Working Group for cancers has been chaired by Dr K Lloyd.