Report

Respiratory disease in England and Wales

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Introduction

There has been concern in recent years about the low priority given to respiratory medicine in the allocation of resources, particularly in relation to staffing^{1,2} and to research.³ It was therefore considered appropriate to assess the burden of respiratory disease in the community and the implications for the health services. This report is a synthesis of the currently available information on respiratory disease, and is focused on England and Wales; in some cases, however (notably with the General Household and the Health and Lifestyle Surveys), it has been impossible to separate the England and Wales data from those for Scotland. Throughout the paper the burden of respiratory disease has been related to all diseases combined rather than to specific disease groups.

In 1975, in a discussion on biomedical research priorities, Black and Pole published a report on the health burden imposed by 54 different disease categories.⁴ Although not primarily concerned with respiratory disease, they ranked it as second in importance to mental illness and mental handicap. Over the last 15 years several important changes have occurred. There has been a steady decline in the proportion of adults who smoke; in 1974 51% of men and 41% of women over 16 years of age were regular smokers, but by 1984 the proportions had dropped to 36% and 32%.⁵ There has been a continuing shift in the age distribution of the population such that the population aged 75 years or more increased by 24% from 1971 to 1981, but that below the age of 15 fell by 13%.⁶ The incidence of some diseases (notably tuberculosis) has continued to fall whereas there have been reports

of increases both in the prevalence of and in mortality from asthma. There have also been changes in the nature and geographical pattern of air pollution and in the use of antibiotics.

Sources Data on mortality, morbidity, and financial costs are presented from the sources listed in table 1. In each case the most recent figures available are provided.

Definitions

For the purpose of this report the following diagnostic groups, based on the ninth revision of the International Classification of Diseases (ICD), have been used so far as possible: acute upper respiratory infection including acute bronchitis and influenza (ICD 460-465, 466, 487), pneumonia (ICD 480-486), bronchitis (chronic and unspecified), emphysema and chronic airways obstruction (ICD 490-492, 496), asthma (ICD 493), malignancy of respiratory organs (ICD 160-163), respiratory tuberculosis including its late effects (ICD 10-12, 137), and other respiratory diseases (remainder of ICD codes in chapter VIII). Any deviation from these groupings is indicated in the text or tables. Congenital disease (notably cystic fibrosis) and specific infections that may affect the respiratory tract (for example, pertussis, measles) are not included.

Mortality

In 1985 102 449 deaths were attributed to respiratory disease in England and Wales. This was 17% of the total number of deaths from all causes—21% of male and 14% of female deaths (table 2). In men almost half of all respiratory deaths were attributed to malignant disease, a substantial proportion (29%) of which was in persons aged 45-64 years. In women the commonest cause of respiratory death was pneumonia, accounting for half the deaths in women aged 65 years or more.

In the same year 63% of all deaths under 1 year of age were attributed to congenital lesions or to conditions specific to the perinatal period, which include several respiratory causes (respiratory distress syndrome, birth asphyxia, aspiration, etc).

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Table 1 Sources of data

Source	Year	Country	Database
Mortality statistics (OPCS) ^{7,8}	1985	England & Wales	All registered deaths
Hospital Inpatient Enquiry (HIPE) ^{9,10}	1985	England	10% of hospital discharges and deaths (not psychiatric or maternity)
Third national morbidity study (RCGP) ¹¹	1981/82	England & Wales	332 270 persons in 48 selected general practices
General Household Survey (GHS) (OPCS) ¹²	1975	Great Britain	12 000 private households (annual survey)
Health and Lifestyle Survey (HLS) ¹³	1986	England, Wales, Scotland	9003 adults (over 18 years of age)
Sickness certification data (DHSS, unpublished)	1982	Great Britain	1% random sample of claimants (total work force figures from Labour Force Survey)
Report on medical wastage ¹⁴	1986	Great Britain	Random sample of 12 000 Post Office and Girobank employees
Patterns of European diagnosis and prescribing (OHE) ¹⁵	1984	United Kingdom	
Prescription analyses (DHSS)	1986	England & Wales	A 0.2% sample of all general practitioner prescriptions

OPCS—Office of Population Censuses and Surveys; RCGP—Royal College of General Practitioners; DHSS—Department of Health and Social Security; OHE—Office of Health Economics.

Table 2 Respiratory death rates per 100 000 population by disease category, age and sex: 1985, England and Wales

	Respiratory death rates per 100 000 by age and sex													
	Male—age (y):							Female—age (y):						
Disease category	0-4	5-14	15-44	45-64	65 or more	All	% of resp	0-4	5-14	15-44	45-64	65 or more	All	% of resp
Acute respiratory infection	6	<1	<1	1	14	3	1	4	<1	<1	1	19	3	2
Pneumonia	8	<1	1	11	317	43	17	7	<1	1	8	366	68	43
Bronchitis, emphysema, chronic airways obstruction	1	<1	<1	46	566	81	32	<1	<1	<1	23	156	33	21
Asthma	1	<1	1	5	13	3	1	<1	<1	1	6	14	4	3
Malignancy of respiratory tract	0	0	3	144	631	111	44	0	<1	2	53	150	39	25
Respiratory tuberculosis	0	0	<1	2	9	2	1	0	0	<1	1	4	1	1
Other respiratory disease	4	<1	1	7	69	11	4	3	0	<1	5	43	9	6
All respiratory	19	1	6	216	1619	253	100	15	1	4	97	752	160	100
% of all causes	7	4	6	19	23	21	—	7	4	7	15	14	14	—
All causes	257	25	107	1117	7132	1202	—	204	18	61	658	5440	1166	—

Respiratory disease (mainly acute infection or pneumonia) accounted for a further 7% of infant deaths, or about one death per 1000 live births. Apart from congenital and perinatal causes, respiratory disease was the commonest cause of infant mortality.

In each year from 1979 to 1983 respiratory disease accounted for about 21% of all deaths. In 1984 there was a change in the rules for coding death certificates, which led to a substantial reduction in the number of deaths attributed to pneumonia (from 55 513 in 1983 to 24 687 in 1984 and 27 931 in 1985). The total number of deaths from all other respiratory causes did not alter appreciably from 1979 to 1985, though there have been important changes in some specific categories. For example, there has been a steady decline in the number of deaths attributed to chronic bronchitis (ICD code 491) but this has been offset by a substantial increase in deaths from chronic airways obstruction (ICD code 496), so that the total number of deaths from all forms of chronic obstructive airways disease (ICD codes 490–492, 496) has actually risen. In

addition, there has been a small but steady increase in deaths from asthma.

Data from the most recent decennial supplement⁸ show an increasing mortality with social class for all respiratory diseases (ICD chapter VIII) and for malignant disease of the trachea, bronchus, and lung (ICD code 162–163). In both these categories the proportional mortality ratio in social class V was about twice that in social class I. The difficulty in interpreting data from the decennial supplements, due in particular to lack of comparability of the information on occupation in the numerator and denominator, has been fully discussed elsewhere.¹⁶

Morbidity

SELF ASSESSED

General Household Survey

In 1975 15% of males and 16% of females interviewed for the General Household Survey reported "limiting long standing illness" (data not tabulated here). It is

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impossible to ascertain the exact proportion attributed to respiratory disease because of those reporting more than one illness; in males it must lie between 15% (the proportion reporting a single respiratory illness) and 22% (the total of those reporting disease in the three specified groups—namely, acute upper respiratory disease, bronchitis, and other lower respiratory diseases). In females the respective figures are 10% and 14%. Because of the diagnostic classification used by the General Household Survey these figures do not include malignant disease or tuberculosis. The largest respiratory disease category in each sex was "bronchitis" (including acute bronchitis), which was most common in the older age groups; 6.4% of all men over the age of 65 reported themselves as chronically limited by bronchitis.

"Acute illness" was defined as that which had restricted activity in the two weeks before the survey. A little under 10% of the survey population reported such restriction (8.7% of males and 9.8% of females). One third of acute illness in each sex was attributed to respiratory disease, about 80% affecting the upper respiratory tract; 16% reported bronchitis and 6% other lower respiratory tract diseases, including asthma.

Health and Lifestyle Survey

Six questions in the Health and Lifestyle Survey concerned chest disease. In response to a direct question, 7% of all men and 5% of all women over the age of 18 gave a history of asthma, with little variation between age groups. Similarly, 11% of both sexes reported a history of bronchitis, the proportion being considerably higher among those over 65 (20%) than among those aged less than 45 (7%). The proportion of people reporting persistent cough was higher in

smokers, particularly in older age groups: 20% of men and 23% of women aged 65 or more who smoked regularly had a persistent cough, compared with 4% of men and 9% of women of the same age who had never smoked.

GENERAL PRACTICE

In the third national morbidity study in 1981–2, 26% of males and 28% of females consulted their general practitioner for one or more respiratory complaints, the commonest being acute respiratory infection (table 3).

Comparison with the second morbidity study, carried out 10 years previously,¹⁷ showed a substantial increase in the rate of patients consulting for asthma—from 9.6/1000 patients at risk in 1970–1 to 17.8/1000 in 1981–2. Over the same period the total number of different episodes of illness attributed to asthma rose from 13.4 to 21.4/1000. This increase may be set against a decline for chronic bronchitis (ICD code 491) over the same 10 years, the rate falling from 11.5/1000 in 1970–1 to 6.0/1000 in 1981–2. Episodes attributed to chronic bronchitis also fell, from 14.2 to 6.4/1000.

SICKNESS ABSENCE

Work absence figures apply only to employed and insured persons and to illnesses of more than four days' duration, and thus exclude much acute respiratory illness. In 1982–3 respiratory diseases accounted for 45.5 million days of certified incapacity, 14% of all days for men and 11% of those for women. Over half the male respiratory figure was attributed to bronchitis, emphysema, or asthma, and 21% to acute respiratory infection. These two categories also accounted for over 80% of days lost by women, but in this case acute respiratory infection (50%) was more

Table 3 Patients consulting their general practitioner by disease category, age and sex—rates per 1000 population: Royal College of General Practitioners third national morbidity study 1981–2

Disease category	Male—age (y):						Female—age (y):					
	0–4	5–14	15–44	45–64	65 or more	All	0–4	5–14	15–44	45–64	65 or more	All
Acute respiratory infection, including bronchitis unspecified*	875	362	197	164	204	263	785	382	286	222	192	300
Pneumonia	5	3	2	2	14	4	5	2	1	3	10	3
Bronchitis, emphysema, chronic airways obstruction	164	50	33	72	178	71	131	40	41	73	110	64
Asthma	33	38	14	14	20	20	18	21	13	18	16	16
Malignancy of respiratory tract	0	0	<1	2	7	1	0	0	0	1	1	<1
Respiratory tuberculosis	<1	0	<1	1	1	<1	<1	0	<1	<1	<1	<1
Other respiratory disease	89	71	41	31	35	46	72	62	56	40	27	49
All patients consulting for one or more respiratory diseases	639	339	204	185	255	258	598	344	275	223	212	282
% respiratory of all causes	68	53	37	30	35	41	65	52	39	32	28	39
All consulting for one or more diseases	943	645	557	611	721	629	918	658	705	695	756	718
Survey population	10139	23471	64196	30710	18299	146815	9559	21974	69312	32378	27765	160988

*This category includes several different diseases.

common than bronchitis, emphysema, or asthma (32%). Of all certified spells of incapacity, about one third in both sexes were attributed to respiratory disease.

Figures for Post Office and National Girobank employees¹⁴ show a rate of retirement on medical grounds (or death in service) due to respiratory disease of 0.9 per 1000 employees; this represents 8.0% of all male and 4.6% of all female medical retirements.

Impact on the Health Service

HOSPITAL SERVICES

The only available data that reflect hospital admissions are based on diagnosis recorded at the time of discharge or death. In 1985 there were an estimated 525 420 discharges or deaths for respiratory disease, 58% of them in males. This represents 13% of the total for males and 8% for females and over 20% for both sexes in the age range 0–14 years (table 4). Apart from "other respiratory diseases" (which include upper respiratory tract disease such as diseases of the tonsils, nasal sinuses, etc) and tuberculosis, all the categories of respiratory disease account for roughly equal proportions of the total. The most striking sex differences are in the rates for bronchitis (chronic and unspecified), emphysema and chronic airways obstruction, and malignant disease in elderly men and women; in both these categories the rate for men is over twice that for women.

From 1979 to 1985 the estimated number of hospital deaths and discharges due to respiratory diseases rose from 401 430 to 525 420, but remained at about 10% of the total for all causes. Figure 1 shows the trends in rates for specific respiratory diseases; the increase for obstructive airways diseases is largely accounted for by an increase in deaths and discharges for asthma,

which has more than offset a steady decline in deaths and discharges for chronic bronchitis and emphysema (the latter two categories shown by dotted lines).

In 1985 the average number of hospital beds used daily for all respiratory diseases was 16 127 or 11% of the total available.

GENERAL PRACTICE

Data from the Third National Morbidity Study 1981–2 suggest that each general practitioner in England and Wales may expect just under 1000 consultations each year for respiratory diseases, or about 20 a week (this does not include consultations for non-specific symptoms such as "cough"). These represent 22% of all male and 17% of all female consultations (data not tabulated here). About 70% are for acute respiratory infection, 10% for asthma, and a further 5% for chronic obstructive airways diseases. Consultation rates for acute respiratory infection are particularly high in children under 5 years of age, for whom the rate exceeds one consultation per child per year.

General practice diagnostic patterns have also been analysed in a report from the Office of Health Economics. In 1984 six of the top 20 diagnoses were respiratory, accounting together for 11% of all diagnoses. Bronchitis (unspecified, ICD code 490) accounted for 2.7% of all diagnoses and acute upper respiratory infection (ICD code 465) for a further 2.1%.

General practitioner prescriptions account for about 85% of all prescriptions issued in the United Kingdom. In 1982 9.0% of all drugs so prescribed were classified as respiratory.¹⁵ A further 9.5% were broad spectrum antibiotics, of which many were probably for respiratory infections. Unpublished figures from the Department of Health and Social

Table 4 Hospital discharges and deaths: rates per 100 000 population by age and sex, 1985 (Hospital Inpatient Enquiry: England)

Disease category (ICD codes)	Male—age (y):						Female—age (y):					
	0–4	5–14	15–44	45–64	65 or more	All ages	0–4	5–14	15–44	45–64	65 or more	All ages
Acute respiratory infection	2029	147	22	20	104	182	1299	115	28	21	55	118
Pneumonia	173	32	19	66	685	124	126	26	15	46	472	112
Bronchitis, emphysema, chronic airways obstruction	133	7	4	172	1047	179	59	3	5	99	339	88
Asthma	1015	347	69	103	92	179	497	207	103	125	107	145
Malignancy of respiratory tract	1	1	12	340	902	193	3	<1	8	133	215	71
Respiratory tuberculosis	3	2	6	9	22	8	0	2	4	8	7	5
Other respiratory disease	721	782	284	311	815	452	488	824	285	209	506	385
All respiratory disease	4073	1316	416	1022	3666	1316	2471	1178	448	640	1701	924
All discharges and deaths	17573	7166	5597	10818	26316	10327	12295	5216	9045	10129	20873	11138
Respiratory causes, % of all discharges and deaths	23	18	7	9	14	13	20	23	5	6	8	8

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Fig 1 Hospital discharges and deaths for respiratory disease for England (Hospital Inpatient Enquiry 1979–1985). The dotted lines represent separately the rates for asthma and for the other diseases that make up ICD codes 490–492.

Security indicate that prescriptions for drugs used in the treatment of asthma rose from 3.6% of the total in 1977 to 6.0% in 1986. In 1977 2.57 million prescriptions were issued for inhaled bronchodilators (0.7% of the total); by 1986 the figure had risen to 10 million (2.9% of the total). Over the same period prescriptions for theophylline preparations rose from 2.38 million to 3.82 million.

Costs

In 1984 the total health expenditure in the United Kingdom was about £17.3 billion.¹⁸ Hospital services accounted for most of this (£10.28 billion), general practitioner services accounting for £1.23 billion, pharmaceutical expenditure £1.75 billion, and miscellaneous services (ambulances, administration, etc) a further £2.06 billion. The data presented in this paper suggest that about 10% of all hospital expenditure, pharmaceutical services, and miscellaneous services and 20% of general practitioner services are for respiratory disease. Thus the total health expenditure on respiratory disease in the UK in 1984 was about £1.66 billion, or £30 per person per year—a little less than 10% of the overall health expenditure.

Discussion

Respiratory disease clearly remains an important cause of death and of both acute and chronic sickness. In England and Wales in 1985 it accounted for one in five of all deaths in men, and for one in eight of all deaths in women; most of these were from lung cancer, chronic obstructive airways diseases, and pneumonia. In the same year 10% of all hospital admissions (20% in children under 14 years) were due to respiratory disease. In 1981–2 about one in five of all general practice consultations were for respiratory disease and in 1982 at least 45 million working days were lost on account of it (13% of the total).

This study focuses on respiratory disease and no systematic attempt has been made to rank the resultant health burden against other disease categories. Some comparisons, however, may be interesting. In the age group 45–64 years respiratory malignancy accounted for 13% of all male deaths in 1985, compared with 39% from ischaemic heart disease (ICD codes 410–414). In the National Morbidity Survey of 1981–2 about 27% of all registered patients consulted for respiratory diseases (2% for asthma), compared with 13% for musculoskeletal and connective tissue diseases (3% for back pain) and less than 2% for ischaemic heart disease. In 1986 8% of Post Office medical retirements (or deaths in service) in men were attributed to respiratory disorders; 20% were due to ischaemic heart disease, and 29% to musculoskeletal disease.

These data have been collected from various sources, in some cases from large national surveys and in others from routinely collected statistics. Difficulties in interpretation inevitably arise, particularly in the comparison of data obtained from different sources at different times. The accuracy of diagnostic categories is likely to vary considerably between the various sources and is likely to be least reliable for self reported illness. Self assessed morbidity from the General Household Survey has, however, been found to correlate well with morbidity as assessed by general practitioners¹⁹; and in general there is good agreement between the various sources. In some cases detailed interpretation of data is difficult; hospital admission data, for example, do not distinguish hospital discharge from inpatient death or the number of patients admitted from the total number of admissions. An increase in the total number of admissions may therefore reflect a change in admission policy (an increase in the number of admissions per patient) rather than an increase in the number of different patients admitted. Similarly, drug prescription data may reflect an increased disease prevalence or an increase in the number of drugs available, or a change in medical perception of a disease and its treatment.

Fig 2 Changes in asthma morbidity and mortality.

Some of the most consistent trends are seen in asthma over the last 10 years (fig 2). There have been substantial increases in hospital discharges and deaths, rates of general practice consultations, drug prescription rates, and mortality ascribed to this cause. It is not possible to say how much of this is attributable to diagnostic transfer (for example, away from "chronic bronchitis" in adults or "wheezy bronchitis" in children) and how much to a real increase in the incidence or severity of asthma. Burney²⁰ has reported an increase in asthma mortality in the 5–34 year age group, in which diagnoses are considered to be most consistent.

Although notification rates for tuberculosis continue to fall, the decline has been slower than many predicted. This is partly due to the high rates of tuberculosis in immigrants from the Indian subcontinent²¹ as well as to a slowing of the rate of decline in the white population.²² It remains to be seen whether there will be further slowing of the decline in notifications or even an increase, as in the United States, where it has been attributed to the rising prevalence of human immunodeficiency virus infection.²³

Over the past 10 years there has been a steady decline in the proportion of adults who smoke. If this continues, it is likely in due course to be reflected in a decline in the mortality and morbidity rates for obstructive airways diseases and, eventually, in a fall in the mortality rate for lung cancer. Over the past few years, however, mortality rates for chronic non-malignant respiratory disease (all forms) have changed little and the small fall in mortality from respiratory cancers in men has been offset by a rise in women. Hospital discharge and death rates for chronic bronchitis and emphysema have fallen since 1979 but there has been a small increase in the rates for lung cancer.

Unpublished data from the General Household Survey of 1975 and the Hospital Inpatient Enquiry of

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