# SWORD '99: surveillance of work-related and occupational respiratory disease in the UK

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Systematic reports from chest and occupational physicians under the SWORD and OPRA (Occupational Physicians Reporting Activity) surveillance schemes continue to provide a picture of the incidence of occupational respiratory disease in the UK. An estimated total of 4393 incident cases (comprising 4530 diagnoses) were reported during the 1999 calendar year, an increase of 1427 cases over the previous year. Benign pleural disease was the single most frequently reported condition (28% of all diagnoses reported). Occupational asthma cases (1168; 26%) remained high, as did mesothelioma (1032; 23%). Analysis of trends over the past 8 years shows an increase in mesothelioma cases, but little change in asthma. The annual incidence per 100 000 employed people, 1996–1999, for mesothelioma, lung cancer and pneumoconiosis was high amongst construction workers (28.7), miners and quarrymen (26.5), woodworkers (18.9) and gas, coal and chemical workers (15.2). Trends in mesothelioma incidence by birth cohort continue to show an increase in construction workers and a continuing decline in shipyard and insulation workers. The relative proportion of pneumoconiosis cases attributed to coal mining has fallen steadily in workers born since ~1920 and most cases are now in men who have been employed in quarrying and rock drilling.

Key words: Epidemiology; mesothelioma; occupational asthma; occupational respiratory disease; pneumoconiosis; surveillance.

*Received 2 October 2000; revised 10 January 2001; accepted 18 January 2001*

## Introduction

Surveillance by chest and occupational physicians of work-related respiratory diseases in the UK through the SWORD scheme has continued since 1989. Together with six similar schemes for other types of occupational disease, SWORD has been a constituent part of the Occupational Disease Intelligence Network (ODIN), based at the University of Manchester since 1998. Occupational physicians continue to report through the Occupational Physicians Reporting Activity (OPRA), whence details of respiratory illness are transferred to SWORD. This paper reports on SWORD findings in 1999.

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## Materials and methods

Details of surveillance procedures have been reported previously [1]. As in past years, a core group of some 25 chest physicians were asked to report new cases seen monthly to the scheme; in 1999, an average of 83% did so. The remaining 433 chest physicians were randomly allocated to report in one of 12 monthly samples; the average monthly response in this group was 86%. Of almost 800 occupational physicians participating in OPRA, 89% responded in their allocated month.

Data analysis is similar to the other constituent surveillance schemes of the ODIN network. Elimination of

duplicate reports is performed by systematic searching for limited anonymous identifiers provided with each case report. Total annual numbers of cases of occupational respiratory disease for SWORD and OPRA are calculated by combining monthly reports from core physicians with an estimate of cases reported by sampled physicians, as previously described. In calculating incidence rates for diseases of long latency (mesothelioma, lung cancer and pneumoconiosis), estimated denominators were derived from the 1971 census [2]. In these calculations, cases from the OPRA scheme were not included, as appropriate denominators are not available for populations served by occupational physicians.

## Data summary

By the end of March 2000, SWORD and OPRA had together received reports of 1115 cases of occupational respiratory disease first diagnosed by physicians during the 1999 calendar year. Application of the sampling fraction yielded an estimated total of 4393 incident cases (Table 1). This is the highest annual number of cases estimated from SWORD data since the scheme began and represents an increase of 1427 cases over 1998. As more than one diagnosis may be included on reporting cards, the reported cases represent an estimated 4530 diagnoses. Most of the difference was due to some reports of asthma also mentioning rhinitis.

An increase was seen in most respiratory diseases reported to SWORD this year, in line with the larger number of cases overall. Inhalation accidents, lung cancer and infectious diseases were exceptions. Benign pleural disease was the single most frequently reported disorder, now surpassing occupational asthma. Estimated incident cases of asthma and mesothelioma both reflected the overall increase.

Infectious diseases reported in 1999 included tuberculosis (five cases this year—four in health care workers and one in a food service worker) and two cases of Q fever (in waste disposal workers in the food industry).

An estimate of 264 cases of 'other' respiratory disease was made from 55 actual cases reported in 1999. As in the past, rhinitis comprised the largest group in this category (41 reports). Other noteworthy reports in this category included building-related illness (1), nasal carcinoma in a carpenter (1), hard metal disease from tungsten carbide (1) and anaphylaxis from inhalation of ribavirin (1). As in 1998, a single case of byssinosis was reported.

Chest physicians in the core group are asked to classify incident asthma cases according to the suspected source and aetiology. They classified 87% cases as attributable to sensitization, 11% to irritant exposure and 2% were unspecified. The most commonly identified sensitizing agents in 1999 were isocyanates (21% of reported cases), latex (9%), flour and grain (8%), enzymes (8%), laboratory animals and insects (7%) and cobalt (6%). In 1998, an unusually high proportion of asthma resulted from enzyme sensitization, mainly from a single plant; nothing similar was reported in 1999.

## Long-latency diseases

Table 2 shows estimated cases of long-latency respiratory disease (mesothelioma, lung cancer and pneumoconiosis) reported to SWORD in the 4 years from 1996 to 1999, classified by occupational group, with 1971 census data used as denominators. Although not directly comparable with an earlier analysis of cases reported in 1989–1991, based on the 1961 census [3], certain occupations continued to be at increased risk. Construction workers had the highest rates of both mesothelioma and lung cancer, while miners and quarry

**Table 1.** Summary of diagnoses reported to SWORD in 1999, with estimated totals (actual cases = 1115, estimated cases = 4393)

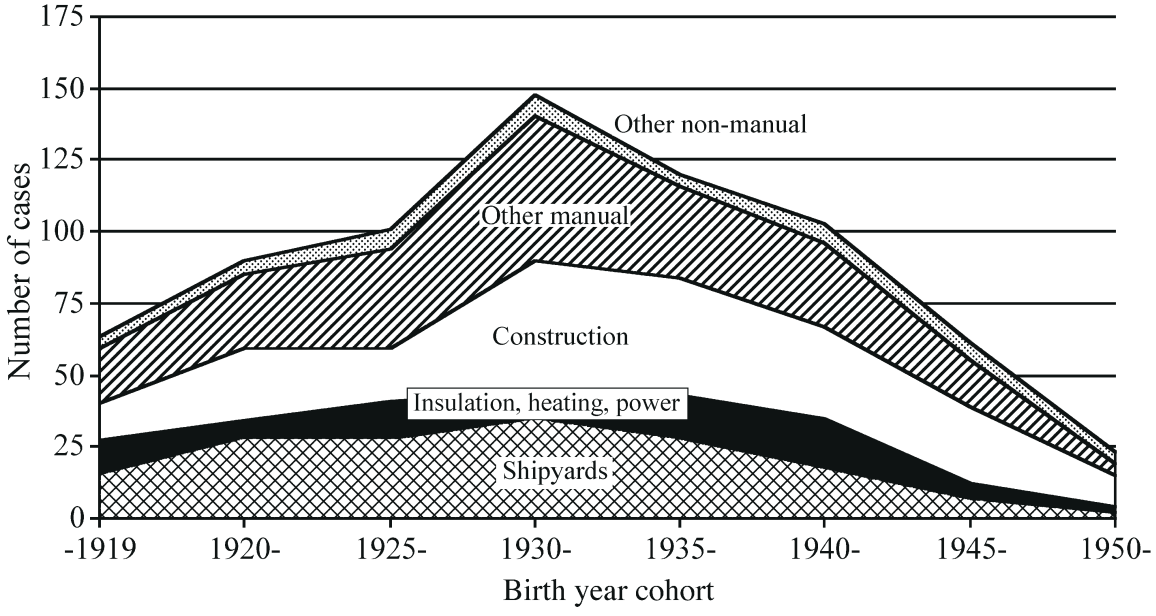
| | *Occupational physicians* | | *Chest physicians* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Group* | *Core* | *Sample* | *Core* | *Sample* | *Total* | *Male (%)* | *Mean age (years)* | *Estimated total, 1999* | *1998 total* |
| Allergic alveolitis | 0 | 1 | 7 | 2 | 10 | 60 | 52 | 43 | 29 |
| Asthma | 10 | 41 | 222 | 37 | 310 | 73 | 43 | 1168 | 822 |
| Bronchitis/emphysema | 1 | 1 | 20 | 8 | 30 | 97 | 65 | 129 | 58 |
| Infectious disease | 0 | 3 | 3 | 2 | 8 | 38 | 43 | 63 | 88 |
| Inhalation accidents | 4 | 7 | 25 | 4 | 40 | 78 | 36 | 161 | 181 |
| Lung cancer | 0 | 0 | 10 | 6 | 16 | 100 | 65 | 82 | 112 |
| Mesothelioma | 3 | 2 | 141 | 72 | 218 | 94 | 65 | 1032 | 701 |
| Benign pleural disease | 2 | 3 | 293 | 78 | 376 | 99 | 64 | 1267 | 629 |
| Pneumoconiosis | 10 | 0 | 59 | 21 | 90 | 99 | 67 | 321 | 225 |
| Other | 2 | 17 | 34 | 2 | 55 | 61 | 38 | 264 | 199 |
| All reports | 32 | 75 | 814 | 232 | 1153 | 88 | 57 | 4530 | 3044 |

**Table 2.** Long-latency diseases reported to SWORD, 1996–1999 (estimated cases and annual rates per 100 000 workers are based on 1971 census data)

| | *Mesothelioma* | | *Lung cancer* | | *Pneumoconiosis* | | | |
|---|---|---|---|---|---|---|---|---|
| *Occupational group*[a] | *No.* | *Rate* | *No.* | *Rate* | *No.* | *Rate* | *Total cases* | *Overall case rate* |
| Construction workers (XV) | 591 | 18.0 | 84 | 2.6 | 267 | 8.1 | 942 | 28.7 |
| Miners and quarrymen (II) | 3 | 0.3 | 5 | 0.5 | 264 | 25.7 | 272 | 26.5 |
| Woodworkers (VIII) | 252 | 14.7 | 14 | 0.8 | 58 | 3.4 | 324 | 18.9 |
| Gas, coke and chemical workers (III) | 51 | 7.0 | 18 | 2.5 | 42 | 5.8 | 111 | 15.2 |
| Electrical and electronic workers (VI) | 234 | 9.5 | 16 | 0.6 | 48 | 1.9 | 298 | 12.1 |
| Engineering (VII) | 842 | 6.9 | 142 | 1.2 | 165 | 1.3 | 1149 | 9.4 |
| Furnace, forge and foundry workers (V) | 2 | 0.3 | 0 | 0 | 58 | 7.6 | 60 | 7.8 |
| Transport and communication workers (XIX) | 223 | 3.9 | 13 | 0.2 | 39 | 0.7 | 275 | 4.8 |
| Overall | 2731 | 2.7 | 333 | 0.3 | 1030 | 1.0 | 4094 | 4.1 |

[a]1971 Census category shown in parentheses.

**Figure 1.** Mesothelioma: proportional contribution of occupation by 5 year birth cohort; cases reported to SWORD, 1996–1999 (total 709 cases).

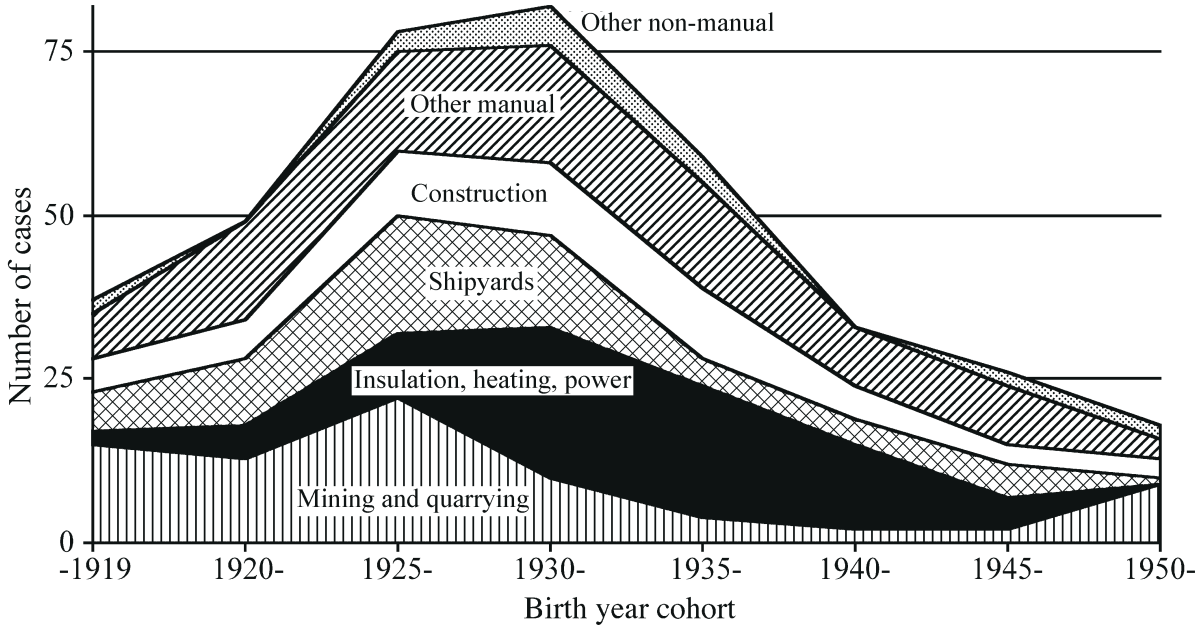



workers had by far the highest rate of pneumoconiosis. Inspection of more detailed occupational groupings showed that the other occupations with high rates of mesothelioma (based on 60 or more estimated cases) were metal workers and riveters (80 cases/100 000/year), dockworkers (45), maintenance fitters (32), plumbers and gas fitters (25) and carpenters and joiners (20). Figures for lung cancer incidence in individual occupations were less stable, because of the low numbers in many occupations. Electroplaters and dip platers, glass and ceramics furnacemen, and non-coal mine and quarry workers followed coal gas and coke workers with the highest rates.

Figures 1 and 2 show trends by year of birth in the proportion of cases of mesothelioma and pneumoconiosis by occupation, using cases reported during the period from 1996 to 1999. Trends for mesothelioma show little change from those reported from SWORD data during the 1989–1994 period [4], but with a decline in the proportion of cases attributable to shipyard work and an increase in cases in construction, persisting into birth cohorts from 1950 onwards.

Somewhat different patterns are seen for pneumoconiosis, with an increased proportion among insulation workers born between 1930 and 1945. A steady decline in the proportion of cases attributable to mining is seen, though with some suggestion, based on small numbers, of a relative increase in the cohort born after 1945. Of the 18

**Figure 2.** Pneumoconiosis: proportional contribution of occupation by 5 year birth cohort; cases reported to SWORD, 1996–1999 (total 382 cases).




pneumoconiosis cases born in 1950 or later, five had been employed in quarrying and related industries, and only four in the coal industry.

## Time trends

Now that SWORD has completed its eleventh year, there is increasing interest in reviewing trends. There are several difficulties in doing this: first, sampling of chest physicians was introduced in 1992 and of occupational physicians in 1996; secondly, participation has fluctuated somewhat over the years; and thirdly, our estimated totals are subject to considerable and fluctuating sampling error. As a result, data for 1989–1991 are not comparable with later years; thus, to avoid the magnification of sampling error, it may be better to consider actual numbers of cases reported rather than estimates. Because of annual fluctuations in the general level of reporting, data on trends are probably best expressed as proportional rates. In Table 3, a preliminary analysis of core plus sample cases reported by chest physicians for 1992–1999 is presented for asthma, mesothelioma, benign pleural disease and other diseases combined. The proportional rates suggest that there has probably been some increase in both benign and malignant pleural disease, some decrease in the miscellaneous group, but no evidence of change in asthma. Examination of cases reported by either core or sample physicians alone does not significantly alter the patterns shown here.

## Cases of the Month

Case descriptions of special interest continue to be circulated to physicians participating in SWORD. Among the cases described this year, two were of reactive airways dysfunction syndrome (RADS): one in a tanker driver exposed to a mixture of gaseous hydrofluoric and nitric acids, and the other in a cook supervising the reheating of commercially prepared Christmas puddings. In the latter case, it was surmised that superheating of the film wrappers of the puddings resulted in the formation of pyrolysis products, primarily aldehydes and acetic acid, which caused mucosal irritation and subsequent bronchial hyperresponsiveness. Cases of asthma were also reported in workers exposed to formaldehyde and to uncombusted diesel fumes. Bronchial provocation tests in the case of asthma from formaldehyde showed a 41% fall in $FEV_1$ immediately upon challenge with the chemical, with a 4 h period before returning to normal. Finally, several workers in a group of 14 who developed respiratory symptoms after exposure to sewer gas complained of a variety of autonomic symptoms, including sweating, weakness, gastrointestinal symptoms and loss of libido.

## Comment

After more than a decade, SWORD continues to gather data successfully on occupational respiratory disease throughout the UK, without serious evidence of any decline in reporting—indeed, quite the reverse. The long-term nature of the surveillance scheme now permits

**Table 3.** Distribution of new cases of respiratory disease reported by chest physicians to SWORD, 1992–1999

| *Diagnosis* | *1992* | *1993* | *1994* | *1995* | *1996* | *1997* | *1998* | *1999* |
|---|---|---|---|---|---|---|---|---|
| Occupational asthma | | | | | | | | |
| Cases | 312 | 257 | 279 | 284 | 229 | 274 | 204 | 259 |
| % | 26 | 23 | 28 | 29 | 26 | 27 | 22 | 25 |
| Mesothelioma | | | | | | | | |
| Cases | 146 | 178 | 172 | 126 | 136 | 203 | 190 | 213 |
| % | 12 | 16 | 17 | 13 | 15 | 20 | 21 | 20 |
| Benign pleural disease | | | | | | | | |
| Cases | 337 | 355 | 300 | 317 | 312 | 331 | 306 | 371 |
| % | 28 | 31 | 30 | 32 | 35 | 32 | 34 | 35 |
| Other diagnoses | | | | | | | | |
| Cases | 424 | 350 | 248 | 267 | 221 | 214 | 208 | 203 |
| % | 35 | 31 | 25 | 27 | 25 | 21 | 23 | 19 |
| All reports[a] | 1219 | 1140 | 999 | 994 | 898 | 1022 | 909 | 1046 |

[a]Core and sample cases combined.

a cautious examination of trends in both long- and short-latency diseases, with allowance for annual fluctuations in reporting levels. Most cases of short-latency respiratory disease, asthma in particular, show no consistent signs of a decrease, despite physician and employer awareness of hazardous exposures. The apparent increase in some long-latency conditions, particularly mesothelioma, is in line with the upward trend forecast to continue for some years to come. Reasons for a similar increase in benign pleural disease are less certain, but may be artefactual, as these non-specific radiographic abnormalities may be discovered incidentally during clinical evaluations undertaken for varied reasons.

Risks for long-latency pulmonary diseases, including malignancies and pneumoconiosis, remain high for workers in construction, mining, power generation and electrical work, while the evolving pattern of pneumoconiosis points to some change in emphasis from coal mining to quarrying and rock drilling.

## Acknowledgements

The authors are again grateful to the SWORD and OPRA participating physicians, with special thanks to those who submitted Cases of the Month (P. S. Burge, W. M. Edmondstone, D. Fishwick, P. J. Ryan, A. Seaton and M. Watt). Thanks are also due to the project secretaries, Sue Whittaker, Tracy Field and Shabnam Montgomery. The ODIN surveillance schemes, including SWORD and OPRA, are supported in part by a grant from the Health & Safety Executive.

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