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Reporting of occupational cancer in Denmark

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SKOV T, MIKKELSEN S, SVANE O, LYNGE E. Reporting of occupational cancer in Denmark. *Scand J Work Environ Health* 1990;16:401-5. Many patients with occupational diseases fail to obtain compensation because their disease is not recognized as occupational and reported to the authorities. The present study examined the reporting of pleural mesotheliomas and sinonasal adenocarcinomas — cancers with well-known associations with occupational exposures to asbestos and wood dust — in Denmark in 1983-1987. The estimated underreporting was around 50 %. Examination of the medical records of patients who had not been reported in 1986-1987 revealed that in most cases the medical records did not contain sufficiently detailed information about occupational exposures. It was recommended that a formal screening interview be carried out whenever a diagnosis is made of a potential occupational cancer. Medical associations may play a major role by issuing guidelines addressing occupational diseases within the fields of their expertise.

Key terms: compensation claim, linkage study.

Previous studies have demonstrated that many patients with an occupational disease fail to obtain compensation because their disease is not reported and compensation is not claimed for. Apparently, this type of situation occurs even for patients with occupational malignancies (1-3).

Reporting of all known and suspected occupational diseases to the Danish Labour Inspection Service is compulsory for Danish physicians. The report to this service also acts as a claim for worker's compensation from the National Board of Industrial Injuries.

Some rare cancers occur almost exclusively among persons who have had certain occupational exposures. Classic examples are mesothelioma, which is closely linked to asbestos exposure, and sinonasal adenocarcinoma, which is closely linked to prolonged wood dust exposure. We are convinced that these relations are well known to all Danish physicians, and especially to all specialists concerned with the diagnosis of mesothelioma and sinonasal adenocarcinoma.

According to the nationwide cancer registration data, a total of 48 pleural mesotheliomas and 10 sinonasal adenocarcinomas were diagnosed in Denmark in 1985. However, only 22 pleural mesotheliomas and six sinonasal cancers were reported to the Danish Labour Inspection Service in 1985. Although these numbers might not be strictly comparable, they indicate some underreporting of occupational cancers to the Labour Inspection Service.

In order to make the comparison between the data of the Danish Labour Inspection Service and the Danish Cancer Registry more exact, we undertook a linkage study utilizing the personal identification number given to all Danes since 1968. The linkage was supplemented with data from the medical records for a subset of the patients.

The aim of the present study was to examine the degree of possible underreporting of mesothelioma and sinonasal adenocarcinoma to the Danish Labour Inspection Service. We further wanted to study factors affecting the reporting of these diseases, and specifically to test whether the medical records contained sufficiently detailed information about occupational exposures to allow the responsible chief physician to fulfill his obligation to report occupational diseases.

Material and methods

All cases of pleural mesothelioma and sinonasal adenocarcinoma diagnosed in the period 1983-1987 and reported to the Danish Cancer Registry before April 1989 were identified. The Danish Cancer Registry has received notifications for all malignant neoplasms diagnosed in Denmark since 1943. Two patients were excluded from the study because the reported diagnosis proved to be wrong (both were lung cancers). Thereafter, 268 cases remained in the study. The distribution by sex and diagnosis is shown in table 1.

The following two institutions receive reports on occupational diseases in Denmark: (i) the Danish Labour Inspection Service (DLIS), where the data are used for priority setting and, in some instances, to initiate factory inspections and (ii) the National Board of Industrial Injuries (NBII), which decides upon compensations on behalf of the private insurance companies from which the compensations are paid. The Register

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Table 1. Reporting of pleural mesothelioma and sinonasal adenocarcinoma to the Danish Labour Inspection Service and/or the National Board of Industrial Injuries, 1983–1987, according to the sex of the patients.

Cancer type	Men				Women			
	Cases reported	Cases not reported	Total	Expected number of occupationally exposed cases ^a	Cases reported	Cases not reported	Total	Expected number of occupationally exposed cases ^a
Pleural mesothelioma	78	100	178	142	3	53	56	25
Sinonasal adenocarcinoma	11	18	29	20	—	5	5	4
Total	89	118	207	162	3	58	61	29

^a See the text for an explanation.

Table 2. Reporting of pleural mesothelioma and sinonasal adenocarcinoma to the Danish Labour Inspection Service and/or the National Board of Industrial Injuries, 1983–1987, according to the age distribution of the patients.

Age at diagnosis	Cases not reported	Cases reported	Percentage reported	Total number of cases
20–39 years	7	2	22	9
40–64 years	50	51	50	101
≥ 65 years	119	39	25	158
Total	176	92	34	268

of Reported Occupational Diseases is kept by the Danish Labour Inspection Service. This service passes on reports to the National Board of Industrial Injuries, and, vice versa, the National Board of Industrial Injuries passes on compensation claims to the Danish Labour Inspection Service. Throughout this paper “reporting to the DLIS/NBII,” denotes that the case has been reported to the authorities and compensation claimed for.

By means of the unique personal identification number the 268 persons identified in the Danish Cancer Register were sought in the computerized Register of Reported Occupational Diseases. At the time of the linkage, this register contained all cases reported during the period 1983–1987. In addition, the cases identified in the Danish Cancer Register were sought in the data base of the National Board of Industrial Injuries, which contained cases reported until September 1989.

After the linkage, the medical records of the patients with pleural mesothelioma and sinonasal adenocarcinoma diagnosed in 1986–1987 who had not been reported to the DLIS/NBII were requested from the hospital departments which had reported the cases to the Danish Cancer Registry. When it was necessary to elucidate the medical history further, the medical records from other departments in which the patients had been treated were requested too. Data about the diagnosis and about the exposure, as recorded in the medical records, were extracted. The exposure data were classified into the following five categories: category 1: cases in which a positive history of exposure

to asbestos or wood dust was evident from the medical record of the patient, but no reporting had taken place; category 2: cases in which no data were found in the medical records about exposures, even though the diagnosis was made before death, so that it would have been possible to ask the patient about potential exposures; category 3: cases in which the exposure history as reported in the medical records was negative, but the information was so scarce that exposure had not been ruled out with reasonable reliability — typically the information in the record had the form “Never exposed to asbestos” without further comments; category 4: cases in which no data were found in the medical records about exposure and the final diagnosis was not arrived at until after death — typically the diagnosis was lung cancer, until autopsy with histological examination revealed that the tumor was a mesothelioma; and category 5: cases in which the medical record contained a reasonably exhaustive, negative exposure history.

Results

Among the 268 cases of pleural mesothelioma and sinonasal adenocarcinoma, 92 (34 %) had been reported to the DLIS/NBII. Only three reported cases involved women. Seventy-eight cases (85 %) involved men with pleural mesothelioma (table 1).

Reporting differed between the age groups — 50 % of the middle-aged patients were reported, but only about 25 % of the patients in the younger and older age groups (table 2).

Table 3 shows that the frequency of reporting to the DLIS/NBII was highest for cases diagnosed in 1985 and 1986. A slight decline was seen from 1985 to 1986.

Among the 81 cases of pleural mesothelioma and sinonasal adenocarcinoma diagnosed in 1986–1987, 31 men and 20 women had not been reported to the DLIS/NBII. The evaluation of the medical records of these 51 patients is shown in table 4. In 10 cases the medical record contained a reliable, negative exposure history. In 18 cases the diagnosis had not been sus-

Table 3. Reporting of pleural mesothelioma and sinonasal adenocarcinoma to the Danish Labour Inspection Service and/or the National Board of Industrial Injuries, 1983–1987, according to the year of diagnosis of the patients.

Year of diagnosis	Cases of mesothelioma among the men			Cases of adenocarcinoma and mesothelioma among both sexes		
	Cases reported	Total number of cases	Percentage reported	Cases reported	Total number of cases	Percentage reported
1983	17	47	36	22	69	32
1984	12	42	29	12	60	20
1985	25	39	64	28	58	48
1986	21	42	50	25	64	39
1987	3	8	37	5	17	29
Total	78	178	.	92	268	.

pected before death, and no exposure history existed in the medical records. All of these were cases of pleural mesothelioma. In 16 cases no exposure history had been recorded although the patient was alive at the time of the diagnosis, and in four cases an exposure history of a poor quality was recorded.

Finally, in three cases of pleural mesothelioma, the medical record gave clear evidence of occupational exposure to asbestos, but the case was not reported. One such case was a 53-year-old mechanic who had worked for 12 years in a shipyard, 20 years before the diagnosis. The medical record specifically mentioned that low-dose asbestos exposure had taken place. The second case was a 78-year-old carpenter who had worked in a shipyard for many years. The third case was a 83-year-old bricklayer, the medical record of whom described exposure to asbestos for about two years, 50 years before the diagnosis.

Table 5 shows the decisions made by the National Board of Industrial Injuries concerning compensation for the 92 cases reported in 1983–1987. Only seven were dismissed because there was no evidence of exposure. Five were dismissed because the persons had been self-employed when they were exposed (and therefore were not entitled to compensation, which is only given to employees), and 11 cases were shelved for various administrative reasons (eg, there were no surviving relatives who would be entitled to receive the compensation). In 65 cases of mesothelioma and four cases of sinonasal adenocarcinoma (altogether 75 % of those reported) the claim for compensation was admitted by the National Board of Industrial Injuries. All 69 cases involved men.

Discussion

It has long been known that occupational exposures to asbestos and wood dust play a major role in the causation of pleural mesothelioma and sinonasal adenocarcinoma. In the hospitals, the legal obligation to report on occupational diseases lies formally with the chief physician, and if he/she is to be able to fulfill this obligation, a thorough exposure history must

Table 4. Evaluation of the medical records of cases of pleural mesothelioma and sinonasal adenocarcinoma diagnosed in 1986–1987 and not reported to the Danish Labour Inspection Service or the National Board of Industrial Injuries.

Category	Sinonasal adenocarcinoma		Pleural mesothelioma		Total
	Men	Women	Men	Women	
1 Exposure history positive — case not reported	—	—	3	—	3
2 No exposure history — patient alive at diagnosis	3	2	9	2	16
3 Exposure history of poor quality	—	—	1	3	4
4 No exposure history — diagnosis arrived at after death	—	—	9	9	18
5 Exposure history negative	2	—	4	4	10
Total	5	2	26	18	51

Table 5. Decisions made by the National Board of Industrial Injuries concerning compensation for the cases of pleural mesothelioma and sinonasal adenocarcinoma reported in 1983–1987.

	Sinonasal adenocarcinoma		Pleural mesothelioma		Total
	Men	Women	Men	Women	
Compensation granted	4	—	65	—	69
Dismissed — no exposure	1	—	4	2	7
Dismissed — self-employed	3	—	2	—	5
Shelved	3	—	7	1	11
Total	11	—	78	3	92

be recorded whenever a diagnosis is made of mesothelioma or sinonasal adenocarcinoma. Our study clearly demonstrates that such a history is not always recorded.

Expected number of occupationally exposed cases

Many patients fail to receive compensation because of the lack of an exposure history; exactly how many in

our material is difficult to say, since we do not have individual data about occupational exposure from sources other than the medical records. An estimate of the number of occupationally exposed cases can be made fairly easily for sinonasal adenocarcinoma on the basis of the study by Andersen et al (4) which covered Jutland (ie, one-third of the Danish population, over the period 1965–1974). Seventy percent of the sinonasal adenocarcinoma cases (both sexes combined) occurred among persons who had worked for many years in wood-working occupations.

Regarding mesothelioma, an equivalent Danish case survey does not exist. Assuming that the incidence rate among women in rural areas could be taken as the base-line incidence for unexposed persons, Olsen & Andersson (5) calculated that 70 % of pleural mesotheliomas occurring in Denmark around 1980 were excess cases due to occupational asbestos exposure (equivalent to 80 % of the cases among the men and 45 % of the cases among the women).

The frequencies reported in the literature on asbestos exposure among mesothelioma cases range from 11 % (6) to 100 % (7). Most studies have included strongly selected populations, inadequate exposure ascertainment, or very long time periods. The existing population-based studies of mesothelioma cases have given slightly lower figures than those calculated by Olsen & Andersson (5). For example, in the United States, Peto et al (8) found that 76 % (69 of 91) of the men and 12 % (3 of 25) of the women diagnosed with mesothelioma in Los Angeles County in 1974–1978 had been exposed to asbestos in the work environment, and Vianna & Polan (9) also found 12 % (6 of 52) exposed cases among women in New York State. The incidence rate for mesothelioma in Denmark around 1980 was among the highest ever recorded on a national basis (10); this level probably explains why the frequency of occupational exposure calculated by Olsen & Andersson (5) was higher than the frequencies found in surveys from other countries.

In table 1 Andersen's (4) and Olsen & Andersson's (5) figures have been used to make a rough estimate of the number of cases which should have been reported to the DLIS/NBII. Ninety-two patients were reported, and around 190 should have been "expected," so at least 98 patients are missing. For the subset of patients who were diagnosed in 1986–1987, we calculated in the same way that around three cases of sinonasal adenocarcinoma and 16 cases of pleural mesothelioma among the men and around five cases of pleural mesothelioma among the women are missing.

This estimate of around 50 % underreporting cannot be very precise, and it should also be kept in mind that pleural mesotheliomas are difficult to diagnose, as reflected in the high proportion of postmortem diagnoses in our material (18 out of 44 mesotheliomas in 1986–1987). This problem probably contributed to the underreporting.

Consequences of nonreporting

The purpose of the Industrial Injuries Compensation Act is to make up for the economic losses caused by chronic occupational diseases. At present, a 50-year-old employed factory hand who develops a mesothelioma may be entitled to around DKK 290 000 once, plus DKK 160 000 per year for the rest of his life, and a person above retirement age receives around DKK 220 000. If the compensation is not claimed for until after the death of the patient, the relatives are entitled to around DKK 60 000 (equivalent to around GBP 5500).

The Register of Reported Occupational Diseases is supposed to provide a basis for priority setting in the Danish Labour Inspection Service. To serve this purpose, the Register must somehow reflect the occupational diseases which exist in the Danish population. Unfortunately, the register is far from complete. Only 50 % of the estimated number of occupationally exposed cases of pleural mesothelioma and sinonasal adenocarcinoma are reported.

The variations with age and time indicate that reporting of occupational diseases is not a simple result of the legislation. The increase in the reporting observed from 1984 to 1985 is probably in part due to a campaign run by the workers' unions to make Danish physicians report occupational diseases. If a more complete reporting is desirable, undoubtedly much can be achieved through campaigns from the Danish Labour Inspection Service and the workers' unions and through the news media. Still, it seems to us that the effect of such campaigns will be limited as long as the importance of a thorough exposure history is not recognized. In our study, the exposure history was absent or of poor quality in 75 % (38 of 51) of the cases not reported. It is difficult to understand how the chief physician can fulfill his or her obligation to report occupational diseases if an exposure history is not recorded.

If this is the state of affairs with well-known occupational cancers like mesothelioma and sinonasal adenocarcinoma, one wonders about cancers which are not as unequivocally associated with occupational exposures (eg, lung cancer, which in crude numbers is the most frequent occupational cancer). How often is an exposure history taken when a lung cancer is diagnosed for a smoker?

We suggest that a more formal screening interview for occupational exposures be carried out whenever a diagnosis is made of a cancer for which occupational risk factors are well established in the literature. The interview should be supplemented with a self-administered questionnaire including a list of occupations and exposures relevant to the type of cancer in question. If exposure cannot be ruled out, the patient should be referred to a specialist in occupational medicine for a more-detailed evaluation of the occupational history. Recommendations along these lines were issued by the British Association of Urological Surgeons as early as

1961, and a revised guide was published in 1988 (2). This idea could be adopted by associations of lung medicine and otorhinolaryngology, and indeed by any medical association, addressing the occupational diseases within their field.

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References

1. Kelson M. Report on the EEC collaborative study to develop methods to study the etiology of accidents and diseases connected with work. European Commission, 1985. (Final report February 1985.)
2. BAUS Subcommittee on Industrial Bladder Cancer. Occupational bladder cancer: a guide for clinicians. *Br J Urol* 1988;61:183-91.
3. Baxter PJ. Occupational bladder cancer and the hospital clinician. *Br J Ind Med* 1989;46:73.
4. Andersen HC, Andersen I, Solgaard J. Nasal cancers, symptoms and upper airway function in woodworkers. *Br J Ind Med* 1977;34:201-7.
5. Olsen JH, Andersson M. Asbestinduceret cancer i Danmark [Cancer induced by asbestos in Denmark]. *Ugeskr Læger* 1986;148:3328-33.
6. Ratzner ER, Pool JL, Melamed MR. Pleural mesotheliomas. *Am J Radiol* 1967;99:863-80.
7. Borow M, Conston A, Livornese L, Schalet N. Mesothelioma following exposure to asbestos: a review of 72 cases. *Chest* 1973;64:641-6.
8. Peto J, Henderson BE, Pike MC. Trends in mesothelioma incidence in the United States and the forecast epidemic due to asbestos exposure during World War II. In: Peto R, Schneiderman M, ed. Quantification of occupational cancer: Banbury report 9. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory, 1981.
9. Vianna NJ, Polan AK. Non-occupational exposure to asbestos and malignant mesothelioma in females. *Lancet* 1978;1:1061-3.
10. Andersson M, Olsen JH. Trend and distribution of mesothelioma in Denmark. *Br J Cancer* 1985;51:699-705.

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