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Disease profile of 5000 patients observed at a Respiratory Department of a general hospital in Flanders (Belgium)

by

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Abstract

Objective: *An observational study was carried out with patients attending the pneumology department of the St-Jozef Clinic in order to analyse the relationship between disease incidence, hospitalisation and bronchoscopic examination and the risk factors age, gender and smoking habits.*

Methods: *More than 5000 patients (ambulatory or hospitalised) were enrolled from 1991 until 1996.*

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Results: *Sex distribution was male n = 3286 (57.2%), female n = 2456 (42.8%). The incidence of the major diseases was as follows: chronic obstructive pulmonary disease (COPD) n = 1693 (29.5%); asthma n = 1003 (17.5%); lung cancer n = 295 (5.1%). Current or ex- smoking resulted in an odds ratio for lung cancer of 32.8 (95% C.I.: 12.2 – 88.5). The lung carcinoma sex ratio was 8.8 male to female. The histological examination of the lung carcinomas determined 52 patients suffered from small cell (17.6%), 65 from squamous cell (22.0%), 66 from adenocarcinoma (22.4%), 111 (37.6%) from non-small other and 1 (0.3%) from mixed type lung cancer. Lung cancer and COPD, male patients and patients with smoking habits significantly increased the occurrence of hospitalisation and the need for bronchoscopic examinations.*

Conclusion: *Current or ex- smoking increases dramatically the incidence of lung cancer and the need for additional medical care.*

The incidence of adenocarcinoma seems to be higher in this region than in Flanders as a whole. The government could use these findings to stimulate smoking prevention and cessation campaigns.

Key-words

Asthma, bronchoscopy, COPD, hospitalisation, lung cancer, smoking.

Introduction

As a pulmonary physician in a regional clinic with a solo practice, I designed a prospective observational study to investigate the distribution of the different pulmonary diseases. It would be of interest to investigate the influence of gender, age and smoking habits on these diseases, and if possible on the use of technical investigations and on hospitalisation rates.

To the best of my knowledge, such information is up to now not available.

Therefore, when the personal computer became available for the medical practice, I asked a computer specialist to create the database software to investigate these questions. I used the ICD-9 coding for

patients diseases. One statistician and one epidemiologist assisted me for the computation of the estimates and for the interpretation of the results.

We think the gathered information is relevant for understanding the practice of a pulmonary physician.

This information can be useful for the epidemiologists and for the government to justify more efforts for primary and secondary prevention of the main respiratory diseases.

Methods

The study was approved by the Regional Council of Physicians of Limburg. The data were extracted from the medical records and anonymised prior to data processing and statistical analysis. The study was notified to the Commission for the protection of the privacy of personal data.

The trial monitored all consecutive patients (ambulatory or hospitalised) from November '91 to June '96; for each patient the medical record included information on gender, date of birth, smoking history, disease diagnoses using the ICD9 classification, hospitalisation/bronchoscopy, prescription drug use and clinical examination. Postinfectious bronchial hyperactivity is defined as persistent cough after bronchial infection in patients with normal chest and sinus radiography and normal pulmonary function.

Chronic obstructive pulmonary disease (COPD) (1) was defined as airflow obstruction not due to asthma or a specific disease. Emphysema without airflow obstruction is not classified as COPD.

The histological classification of lung cancer is based on the 1981 WHO classification (2). Data on broncho-pulmonary examinations and hospitalisation were recorded since January 1994.

The data were entered in OmniDoc®.

The authorised database was converted into files with DBF format.

MS Access 7.0 was used for querying the database. SPSSWIN version 6.1 to 7.5 were used for analysis.

Categorical variables are summarized in frequency tables using absolute frequencies and percentages. Continuous variables are summarized by computation of mean, median and standard deviation. Associations between several simultaneous risk factors and one disease were analysed using logistic regression. Adjusted odds ratios were computed.

For statistical purposes, patients, even if involved in more than 1 disease, were classified in one of 5 categories, depending on the underlying disease which was considered most important; lung cancer was judged more important than (in descending order) COPD, asthma, other respiratory diseases, and non-respiratory diseases.

Results

Sample description

From November 1991 until the first half of 1996, 5742 patients most of which with specified respiratory disease attended the clinic for one or more visits (ambulatory or hospitalised).

There were 2456 (42.8%) female and 3286 (57.2%) male patients.

Age and sex distribution at the first visit are summarized in figure 1.

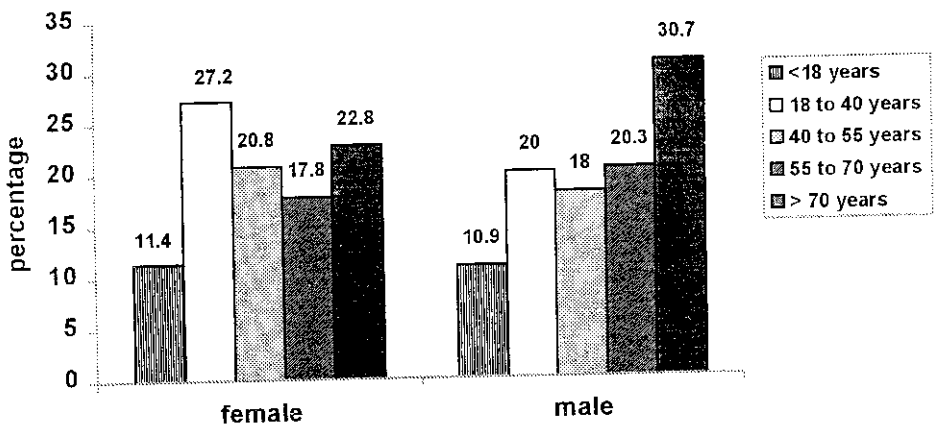

Fig. 1: age and sex distribution of patients at the first visit
Women – mean: 47.4, median: 48.1, SD: 22.1
Men – mean: 50.7, median: 55.7, SD: 22.1

Data on smoking history were available for 3877 (67.5%) patients; there were 1292 (33.3%) non-smokers, 1616 (41.7%) current and 969 (25.0%) ex- smokers.

The smoking prevalence is related with disease in **table 1**, with age and gender in **table 2**.

TABLE 1
% of current or ex-smokers by disease

Disease *	n	n of current or ex-smokers	% of current or ex-smokers
Lung cancer	248	244	98.4
COPD	1424	1331	93.5
Asthma	519	164	31.6
Other respiratory diseases	1344	682	50.7
Non respiratory diseases	342	164	48.0
Overall	3877	2585	66.7

* all patients were classified according to their most serious disease.

In this classification, are considered:

Lung cancer: all patients with lung cancer
COPD: all patients with COPD except those having also lung cancer
Asthma: all patients with asthma except those having also lung cancer or COPD
Other respiratory diseases: all patients with respiratory diseases except those having also lung cancer, COPD or asthma
Non respiratory diseases: all patients with diseases except those with any of the above respiratory diseases

Respiratory diseases

The distribution of the most frequent diagnoses appears in **table 3.**

Nearly 85% (n = 5035 or 87.7%) of all patients did suffer from at least one of the above mentioned respiratory diseases. Among these, in 3684 (73.2%) 1 respiratory disease and in 1351 (26.8%) 2 or more major respiratory diseases were documented.

The most common associations are provided in **table 4**.

TABLE 2
Status of current or ex-smokers by gender and by age category

	n	n of current or ex-smokers	% of current or ex-smokers
Women			
Age group			
< 18	40	6	15.0
18-40	463	234	50.5
40-55	388	222	57.2
> 55	640	173	27.0
TOTAL	**1531**	**635**	**41.5**
Men			
Age group			
< 18	36	6	16.7
18-40	452	270	59.7
40-55	485	405	83.5
> 55	1373	1269	92.4
TOTAL	**2346**	**1950**	**83.1**
Overall	**3877**	**2585**	**66.7**

TABLE 3
Distribution of the diagnoses among the 5742 patients

	n of diagnoses	% of total patients	gender (as%) M	gender (as%) F	median age in years
1 COPD	1693	29.5	73.5	26.5	64.8
2 Asthma	1003	17.5	47.7	52.3	35.0
3 lung cancer	295	5.1	92.7	7.3	68.3
4 other respiratory diseases:					
non specific postinfectious bronchial hyper activity	909	15.8	48.6	51.4	44.6
allergic rhinitis	815	14.2	53.4	46.6	26.5
chronic sinusitis	448	7.8	50.9	49.1	29.5
pneumonia	335	5.8	59.4	40.6	57.1
emphysema	231	4.0	52.4	47.6	51.1
interstitial lung disease	68	1.2	54.4	45.6	59.3
pulmonary embolism	64	1.1	48.4	51.6	61.7
pneumo-thorax	41	0.7	75.6	24.4	47.9
exsudative pleuritis	100	1.7	58.0	42.0	62.9
	6002				

Note: This is the distribution of the diseases, not of the patients; so the total count exceeds 5742 since more than 1 disease is present in some patients.

TABLE 4
Common diagnoses associations

Major disease	n with major disease	Associated disease	n suffering from both diseases	% of n with major disease
Asthma	1003	allergic rhinitis	544	(54.2)
Asthma	1003	chronic sinusitis	107	(10.7)
Lung cancer	295	COPD	111	(37.6)

Clinic visits, hospitalisation and bronchoscopic investigation

Number of visits

Nearly one patient out of 2 was followed-up for more than 1 visit (n = 2926 or 51%); the median number of visits in this group is 3.0 for a median follow-up period of 89 days.

The distribution of the number of visits and the follow-up period across the diseases can be summarized as in **table 5.**

Number of admissions and bronchoscopic examinations (n = 2931).

Data on hospitalisation and bronchoscopic examination were recorded from November 1994 on and are available for 2931 patients, based on the National Health Insurance code.

The distribution of gender, age, smoking history in this sample is similar to the distribution in the total sample.

TABLE 5
Distribution of the number of visits by disease

	total patients	patients with more than 1 visit		median delay (days)	median	median observation time
Disease	n	n	(%)	between 2 visits	n of visits	In days
Asthma	980	637	(65.0)	49.0	3.0	126.0
COPD	1553	853	(54.9)	72.0	3.0	288.0
NSCLC	243	161	(66.3)	50.0	5.0	191
SCLC	52	29	(55.8)	26.3	12.0	301.0
Other resp.dis.	2207	997	(45.2)	15.0	2.0	20.0
Non respiratory diseases	707	249	(35.2)	11.0	2.0	12.0
TOTAL	**5742**	**2926**	**(51.0)**	**38.0**	**3.0**	**89.0**

In this table, patients were classified as in table 1.

The percentages of asthma, COPD and lung cancer in this period are respectively 16.4, 23.6 and 6.0%, and similar to those obtained in the total study.

The occurrence of hospitalisation and bronchoscopic examination is influenced by the following factors: gender, disease and smoking experience. This is summarised in **table 6**.

But so far, each of the 3 factors was analysed separately, unadjusted for the effect of the 2 other ones; which can be misleading if these factors are strongly related to each other (3).

Forward stepwise logistic regression was performed to assess the adjusted effects of a single factor both on hospitalization and on performing a bronchoscopy (4). The model incorporated the variables gender, smoking (yes/no), and "main disease" (lung cancer, COPD, asthma, other respiratory disease, and other diseases). The categorical variable "main disease" has been analysed using contrasts comparing each of the pneumological diseases with the non respiratory diseases.

In this way a picture was obtained of the importance of each of the diseases mentioned above with respect to other diseases treated in a pneumological setting.

TABLE 6
Occurrence of hospitalisation and bronchoscopy by disease, gender and smoking experience

	n of subjects	n (%) of subjects with at least 1 hospitalisation		n (%) of subjects with at least 1 bronchoscopy	
Disease category					
Lung cancer	175	152	(86.9)	98	(56.0)
COPD	956	468	(49.0)	94	(9.8)
Asthma	482	78	(16.2)	1	(0.2)
Other respiratory diseases	1042	282	(27.1)	77	(7.4)
Non respiratory diseases	276	168	(60.9)	39	(14.1)
Gender					
Female	1215	380	(31.3)	62	(5.1)
Male	1716	768	(44.8)	247	(14.4)
Smoking experience					
Yes	1484	708	(47.7)	219	(14.8)
No	646	136	(21.1)	25	(3.9)

In this table, only patients with data on hospitalisation / bronchoscopy were included (n = 2931).

Table 7 provides the odds ratios and their 95% confidence interval on the occurrence of hospitalisation or bronchoscopy, after adjustment for age, smoking experience, disease category and gender.

Lung cancer

The lung cancer distribution is based on the 1981 WHO classification. The inter-observer reproducibility of the tumor classification is high for small cell, squamous cell and adenocarcinomas only (5). For this reason, comparison of the observed data with external registers of lung cancer will concern only these histological categories. All the samples were investigated by the same pathologist.

Table 8 summarises the distribution of the histological types of our lung cancers with that of the Flemish Register on lung cancer of 1994 (Fortuin (6)).

The observed percentage of small cell lung cancer (SCLC) is, for both male and female patients, close to the percentages from the Flemish Register; the observed distribution is significantly different from the register distribution mainly because of a substantial shift from the squamous cell type to the adenocarcinoma type.

TABLE 7
Occurrence of hospitalisation and bronchoscopy by gender, smoking experience and disease category

	Role on hospitalisation		Role on bronchoscopy	
	O.R.	95% C.I	O.R.	95% C.I.
Gender (female to male)	Not in model		0.44	(0.30 – 0.68)
Smoking experience (non-smoker to smoker)	0.49	(0.38 – 0.64)	Not in model	
Disease category (each category to other non-resp. disease)				
Lung cancer	4.08	(2.25 – 7.40)	10.13	(5.00 – 20.50)
COPD	0.68	(0.45 – 1.00)	1.05	(0.54 – 2.04)
Asthma	0.36	(0.22 – 0.59)	0.07	(0.01 – 0.51)
Other respiratory diseases	0.43	(0.29 – 0.64)	1.15	(0.57 – 2.32)

TABLE 8
Histological classification of lung cancer

	Gender			
	Male		Female	
Histological type	Observed data %	Flem. Reg. %	Observed data %	Flem. Reg. %
Adenocarcinoma	21.0	13.6	39.1	26.0
Squamous cell carcinoma	23.5	47.4	4.3	27.3
SCLC	17.6	18.4	17.4	19.3
Other	37.9	20.6	39.1	27.3

Lung cancer and smoking history

The distribution of lung cancer by smoking history was described in **table 1**.

Nearly all lung cancer cases are current or ex-smokers.

Logistic regression models found smoking experience to be a factor which increases significantly the occurrence of lung cancer.

The odds ratio (O.R.) for lung cancer among smokers as compared to non-smokers, after adjustment for age and gender is 32.8 (95% C.I. = 12.2-88.5).

Discussion

This observational study describes the distribution of patients attending a pneumology department, and that of their major respiratory diseases.

There are more male than female patients (the overweight of male patients is situated in the group of patients older than 70 years) **(figure 1)**. For smoking related diseases, the difference in smoking habits between genders can explain the patient's gender distribution of these diseases **(table 2)**. However, it should be noted that data on smoking habits are missing for 32.5% of the patients.

The two diseases most frequently diagnosed are COPD (30%) and asthma (18%).

COPD and lung cancer are associated with smoking (94%), older age (65 years old), male gender (74%) whereas for the asthmatic patients the median age is 35 year, the male/female ratio is near to 1, and only 32% are smokers or ex-smokers.

The smoking prevalence among female patients is increasing in the present generation, which means that the future will bring more female COPD and lung cancer patients. This could also change the female (43%) versus male (57%) distribution of patients.

Table 1 shows a very strong correlation between smoking and lung cancer. Out of 248 cases, only 4 patients never smoked.

About 5% of the patients suffer from lung carcinomas (table 3). When compared with data from the Flemish Register on lung carcinomas, the observed patient population has significantly more adenocarcinomas but less squamous cell carcinomas with a similar NSCLC/SCLC ratio of 4.7 **(table 8)**. The reason for the higher percentage of adenocarcinomas is unknown; asbestos is not an issue in this area and other hypotheses (this is a fruit area with extensive use of pesticides) cannot be verified. A similar percentage of adenocarcinomas has been reported in the Triëste Cancer Register (7) where occupational exposure to asbestos was involved as risk factor.

Deep inhalation of cigarette smoke has also been reported to be more closely related to adenocarcinoma than to other lung cancer types (8); it is more frequent in our female patients which is in agreement with data published elsewhere (9). Low-tar cigarettes seem to be related with an increased incidence of adenocarcinoma of the lung (10).

Almost 50% of all patients did attend the department only once, meaning that care of their problem was taken in one consultation. This is to a great extent due to the common aspecific postinfectious bronchial hyperactivity (15.8%), a less well recognized entity of patients with a persistent cough for several weeks after a bronchial infection without radiographic or pulmonary function abnormalities.

Nearly 51% of all patients did attend the department more than once. For those patients who return, the median number of visits for which data are available is 3, 3, 5, 12 for respectively asthma, COPD, NSCLC and SCLC. Other respiratory diseases only require a follow-up visit after about 2 weeks.

The observed difference in median number of visits between SCLC and NSCLC reflects the different therapeutic approach (chemotherapy versus surgery). This difference could disappear in the near future now that new chemotherapeutic regimens are being applied in the treatment of NSCLC (11, 12).

According to the regression analysis, hospitalisation is strongly dependent on the type of respiratory disease with an O.R. of 4.1 and 0.4 respectively for lung cancer and asthma as compared to the other diseases. For lung cancer, the effect is even more pronounced on the occurrence of bronchoscopy.

Being female reduces the probability of undergoing a bronchoscopic examination (O.R. = 0.4) even when adjusted for all other factors (smoking status, age, disease category). This could mean that for patients with the same disease, the pulmonary physician would have the tendency to perform less frequently a bronchoscopy in female than in male patients.

Smoking increases significantly the occurrence of hospitalisation.

Conclusion

COPD is still the most frequently observed disease in a respiratory department from a general hospital. Bronchial asthma is second in order. Also short-lasting bronchial hyperactivity is a common diagnosis. Lung cancer patients represent about 5% of the total population. Almost half the patients with COPD and almost all lung cancer patients were hospitalised.

Therefore COPD and lung cancer, both strongly related to smoking habits, are the respiratory diseases that require most hospitalisations.

These data argue for continuous and eventually increasing efforts to reach smoking prevention and cessation.

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