

Impact of comorbidities on the duration of COPD patients' hospital episodes

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Abstract The duration of inpatient episodes due to COPD and the factors that affect it have recently been an object of increasing attention, as the aim has been to shorten inpatient periods and thereby to cut health-care costs. All hospital episodes of patients aged over 45 for a primary diagnosis of COPD equal or less than 150 days in duration were drawn from the treatment register maintained by the National Research and Development Centre for Welfare and Health. The lengths of these 152 569 inpatient periods were analysed for sex, age and secondary diagnoses by covariance analysis. The mean age of men at the beginning of the hospital episode was 70.6 years and that of women 70.1 years. Men accounted for 76.9% of all inpatient episodes. Covariance analysis of the data with age standardised as 70.5 years yielded a mean hospital episode length of 8.9 (95% confidence interval (CI) 8.8–9.0) days. The mean length of hospital episodes without a secondary diagnosis was 7.7 (95% CI 7.6–7.7) days and that with a secondary diagnosis was 10.5 (95% CI 10.5–10.6) days. The longest inpatient episodes were recorded for the patients with secondary diagnoses of pneumonia, 14.7 (95% CI 14.2–15.2) days, and cerebral ischaemia, 14.2 (95% CI 13.5–14.9) days. Concurrent diseases prolonged the hospital episodes of COPD patients. At the beginning of a hospital episode, it is possible to estimate its duration and the need for different treatments based on the patient's age and secondary diagnoses. © 2002 Elsevier Science Ltd. All rights reserved.

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Keywords COPD; secondary diagnosis; hospital episode; hospital discharge register.

INTRODUCTION

More and more hospital services are needed to treat COPD in the oldest age groups of the population, and this trend has been estimated to continue (1). The hospital episodes of COPD patients are often long and thus contribute significantly to the costs of health care. Increasing attention has recently been paid to the length of COPD patients' hospital episodes and the factors that contribute to it, with the ultimate aim of shortening inpatient periods (2,3). The purpose of this study was to analyse the correlation between COPD patients' comorbidities and the length of their hospital episodes based on a hospital discharge register. The results will help us to estimate the period of inpatient treatment needed by COPD patients with multiple pathologies.

METHODS

The data of patients aged over 45 years concerning hospital episodes with COPD as the primary diagnosis in the years 1987–1998 were collected from the Finnish treatment register maintained by the National Research and Development Centre for Welfare and Health (ICD 9: 491, 492 and 496; ICD 10: J41–44). There were altogether 153 390 hospital episodes of this kind. All hospital treatment days were counted as hospitalisation days, the days of arrival and departure together making up 1 day. Inpatient episodes longer than 150 days were excluded from analysis. Such long inpatient episodes numbered 832. After these exclusions, a total of 152 569 hospital episodes remained, including 1 358 130 inpatient days. The length of the hospital episode was recorded in relation to the patient's sex, age and secondary diagnosis. The patients were divided into age groups of 46–75 years and over 75 years. The secondary diagnoses were coded into 11 categories, of which the first was COPD without a secondary diagnosis. Each of the other categories corresponded to one of the most common diagnoses, except the last category, which was

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labelled "miscellaneous". Covariance analysis was used to determine the differences between these categories.

RESULTS

The average age of men at the beginning of the hospital episode was 70.6 years and that of women 70.1 years. Men accounted for 76.9% of all hospital episodes. The mean duration of hospital episodes was 8.7 (SD 11.0) days for men and 9.5 (SD 11.9) days for women. Subjects aged over 75 accounted for 29.1% of the inpatient episodes. A secondary diagnosis was recorded for 43.1% of the hospital episodes primarily due to COPD in 1987–1998. Secondary diagnoses were recorded for 42.0% of the COPD patients aged 46–75 years and 45.8% of those aged over 75 years. The most common secondary diagnoses were cardiovascular diseases, which occurred in 18.5% of all hospital episodes.

Covariance analysis

The mean length of hospital episodes without a secondary diagnosis was 7.5 (95% confidence interval (CI) 7.5–7.6) for men and 8.1 (95% CI 7.9–8.2) for women. When a secondary diagnosis was present, the corresponding mean length was 10.3 (95% CI 10.2–10.4) for men and 11.4 (95% CI 11.2–11.6) for women. The longest inpatient episodes were recorded for men with pneumonia, 14.8 (95% CI 14.3–15.3) days, and cerebral ischaemia, 13.9 (95% CI 13.2–14.7) days, and for women with pneumonia, 14.5 (95% CI 13.4–15.6) days, and cerebral ischaemia, 15.8 (95% CI 13.8–17.9) days.

Covariance analysis of the data with age standardised as 70.5 years showed the mean duration of hospital

episodes in the whole series to be 8.9 (95% CI 8.9–9.0) days. Without a secondary diagnosis, the duration of inpatient treatment was 7.7 (95% CI 7.6–7.7) days, while with a secondary diagnosis it was 10.5 (95% CI 10.5–10.6) days. The inpatient episodes with pneumonia and cerebral ischaemia as secondary diagnoses were longest (Table I). All secondary diagnoses prolonged the inpatient periods significantly.

Covariance analysis also showed the duration of hospital episodes of the patients aged 46–75 years without a secondary diagnosis to be 7.2 (95% CI 7.2–7.3) days and the corresponding duration among those aged over 75 to be 8.7 (95% CI 8.5–8.8) days. The corresponding figures for the patients with a secondary diagnosis were 9.7 (95% CI 9.6–9.8) in the younger group and 12.5 (95% CI 12.3–12.6) in the older group. The longest inpatient episodes in the younger age groups were due pneumonia, 13.2 (95% CI 12.6–13.7) days, and cerebral ischaemia, 12.1 (95% CI 11.3–12.9) days. The longest inpatient episodes in the older age group were similarly recorded for those with pneumonia, 17.8 (95% CI 16.9–18.8) days, and cerebral ischaemia, 17.8 (95% CI 16.5–19.0) days.

DISCUSSION

The Finnish Hospital Discharge Register covers all Finnish hospitals, both private and public. Its reliability has been found to be good, with up to 95% correspondence between the register and the patient records (4). During the study period 1987–1998, only two diagnostic classifications were used, which means that the diagnostic practices were probably relatively uniform.

During 1972–1992, inpatient episodes due to COPD increased among both men and women in Finland. The overall number of inpatient episodes was highest among

TABLE I. Number of hospital episodes for COPD during 1987–1998 and their average duration as days of treatment by secondary diagnosis and their length as standardised for age by covariance analysis

	N	Mean length	Standardised of treatment length of treatment (95% CI)
No secondary diagnosis	86 744	7.6	7.7 (7.6–7.7)
Pneumonia and influenza	2159	14.9	14.7 (14.2–15.2)
Asthma	8 380	9.0	9.4 (9.2–9.6)
Lung cancer	959	9.4	9.4 (8.7–10.1)
Other pulmonary disease	8048	10.3	10.5 (10.2–10.7)
Coronary disease	11 177	10.6	10.3 (10.1–10.5)
Cerebral ischaemia	978	14.5	14.2 (13.5–14.9)
Other vascular disease	16 145	10.6	10.4 (10.3–10.6)
Diabetes	1 726	9.9	9.8 (9.2–10.3)
Other than lung cancer	1 594	11.0	10.7 (10.2–11.3)
Other secondary diagnosis	14 659	10.8	10.9 (10.7–11.0)
Total	152 569	8.9	8.9 (8.8–9.0)

men aged over 75, but the number increased most clearly among women during the follow-up period. Altogether 16% of the hospital episodes were for women (5). According to our findings, the percentage of hospital episodes among women increased up to 23%, probably due to the increase of smoking among women. Within 50 years, the share of smoking women has doubled, while the share of smoking men has decreased in Finland. In Canada, the number of hospital episodes due to COPD among the population aged over 75 increased, and that among women even doubled, during the period 1982–1994 (1).

The length of hospital episodes due to COPD has been reported to vary from 6.4 to 8.7 days in different series (1,6). Our results agree with those of Mushlin *et al.* According to our findings, high age and comorbidities prolonged the duration of hospital episodes, which phenomenon has also been previously reported among COPD patients (7). In an Italian study, the most common comorbidities in patients with serious COPD were hypertension (28%), diabetes (14%) and coronary artery disease (10%) (8). According to Incalz, the duration of COPD patients' hospital episodes was significantly affected by the presence of more than three concurrent diseases (9).

COPD is one of the risk factors of pneumonia. According to Marrie *et al.*, one-third of pneumonia patients had COPD (10). Exacerbation of COPD is often due to a viral or bacterial infection, which may develop into pneumonia. Systemic corticosteroid treatment administered to counteract the exacerbation of COPD has also been found to increase the risk of pneumonia (11). According to our findings, COPD patients required a week of inpatient treatment due to exacerbation of COPD without pneumonia, while concurrent pneumonia doubled the duration of hospital treatment. COPD patients often have extremely poor pulmonary function and hypoxemia, and it is hence reasonable to prepare for a 2-week hospital episode in the case of a COPD patient with pneumonia.

According to our observations, cardiovascular diseases are quite common among COPD patients, probably due to the high prevalence of smoking, which is a risk factor for both. When cardiovascular diseases were present concurrently with COPD, they significantly prolonged hospital episodes. The patients with a secondary diagnosis of coronary or other vascular disease required inpatient periods nearly 3 days longer than the others. It is well known that COPD has a significant impact on cardiovascular function and vice versa. According to Vilkmann *et al.*, coronary and other vascular diseases were the most common causes of death (37%) among COPD patients (12). In the case of patients with cerebral ischaemia, the reason for the prolonged need for inpatient treatment upon exacerbation of COPD is probably the difficulty of using inhalators and respiratory devices.

The hospital episodes due to exacerbation of COPD were always prolonged when the patient had a secondary diagnosis. Among the study population, diabetes was one of the most common secondary diagnoses, and it increased the length of hospital episodes by about 2 days. Although hyperglycaemia is the most common side-effect of cortisone treatment, systemic corticosteroid treatment has been shown to shorten the duration of inpatient treatment for exacerbation of COPD.

Our findings suggest that, based on the COPD patient's sex, age and comorbidities, it is possible to estimate the duration of hospital treatment and the necessary therapeutic measures (monitoring, home hospital, inpatient unit, ICU)/need for after-care upon admission into the emergency unit, as especially pneumonia and cerebral ischaemia almost double the hospital episode. The discharge of COPD patients with concurrent pneumonia or cerebral ischaemia cannot be unduly hastened, to avoid the revolving door phenomenon. COPD patients without comorbidities could be targeted with increasing precision (and increasingly reliability) to short-term emergency care, monitoring or supervised home care/home hospital, which has been the obvious goal recently (2).

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