Length of stay and interval to readmission in emergency hospital treatment of COPD

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Abstract

Background: increasing attention has recently been attached to the length of hospital stay and related factors in the treatment of COPD.

Objectives: to assess the trend in the duration of inpatient episodes following emergency admissions for COPD by age and sex, and the frequency of readmissions, as well as the correlations between the frequency and duration of inpatient episodes.

Design: retrospective study.

Setting: the Finnish hospital discharge register.

Subjects: the 72,672 inpatient episodes following emergency admissions of patients aged over 44 years that ended in 1993–2001 and had COPD as the principal diagnosis.

Results: the mean duration of inpatient episodes was 8.5 days (SD 8.2) in 1993, but 6.8 days (SD 6.6) in 2001. The figure for 45- to 64-year-old men was 6.5 days (SD 6.6) and that for men aged >64 years, 7.8 days (SD 6.8). The corresponding figures for women were 7.1 days (SD 6.8) and 8.8 days (SD 8.4). The average interval between the end of one inpatient episode and the beginning of the next was 195.4 days (SD 327.7). This interval was longest when the inpatient episode lasted for 7 days (interval 215 days).

Conclusions: the length of hospital stay for COPD exacerbation seems to be decreasing, and elderly women have the longest inpatient episodes. With the current treatment modalities, a 1-week stay in hospital results in the longest interval to readmission. The situation may change if supported home care at exacerbation can be increased.

Keywords: COPD, length of hospital stay, readmission, elderly

Introduction

COPD is a global problem that causes a notable burden on public health care. The increasing need for inpatient care at COPD exacerbation is a significant factor in health care costs [1]. It has been estimated that hospital episodes account for 70% of the total costs of COPD treatment [2]. Consequently, the length of inpatient episodes due to COPD and related factors has recently begun to attract more and more attention [3, 4]. The purpose of this study was to find out, based on a hospital discharge register, the trend in the duration of inpatient episodes following emergency admission for COPD by age and sex in Finland during the period 1993–2001.

Furthermore, the frequency of readmissions and its correlations with the duration of inpatient episodes, age and sex were also determined.

Methods

The hospital discharge register maintained by the Finnish National Research and Development Centre for Welfare and Health was reviewed and records of emergency admissions of patients aged over 44 years that ended during 1993–2001 and had COPD as the principal diagnosis were picked out. There were 72,672 inpatient episodes that fitted these criteria. In the ninth version of the classification of diseases, used in 1993–1994, relevant cases had the diagnostic codes 491, 492
and 496, while in the tenth version, adopted in 1995, they had the diagnoses J41, J42, J43 and J44. The inpatient periods coded as emergency admissions were included.

The number of inpatient episodes was calculated, and the interval (in days) between the end of one inpatient period and the beginning of the next was determined for men and women in the age groups of 45–64 years and >64 years. The interval to readmission was determined separately in three categories of inpatient episode duration: 1–3 days, 4–10 days and >10 days. The patient’s age was determined based on his/her age at the beginning of the inpatient episode. Inpatient episode durations and intervals were further analysed in terms of type of hospital, specialisation, secondary diagnoses, subsequent treatment and weekday of discharge. The days of admission and discharge were regarded as 1 day. If the patient was admitted and discharged on the same day, the duration of the inpatient episode was considered to be 1 day. Long inpatient periods of 90 days or more were excluded from the analysis. These long inpatient periods numbered altogether 130. SPSS for Windows software was used for statistical analysis. One-way analysis of variance (ANOVA) was used to test differences between means.

**Results**

Altogether 25,541 individuals aged >44 years had 72,672 inpatient episodes due to COPD that ended during the period 1993–2001. There were 7186 such episodes in 1993, and their annual number increased steadily to 8,371 in 2001. The majority of the episodes were for men (73.6%). The mean age of the men at the beginning of the inpatient episode was 72.2 years (SD 8.5) and that of the women 71.9 years (SD 9.4). Using all records, the mean age on admission was 71.7 years (SD 8.6) in 1993 and 72.1 years (SD 8.7) in 2001.

**Length of stay**

The average length of stay in hospital was 7.8 days (SD 7.6), being 8.5 days (SD 8.2) in 1993 and 6.8 days (SD 6.6) in 2001 (Figure 1). The mean duration of inpatient episodes among the men aged 45–64 years was 6.5 days (SD 6.6), and that among the men aged >64 years was 7.8 days (SD 7.5); the corresponding figures for women being 7.1 days (SD 6.8) and 8.8 days (SD 8.4), respectively. Differences between sexes in both age groups were highly significant (P=0.000).

A total of 15.5% of the inpatient episodes were located in university hospitals, where their mean duration was 7.6 days (SD 6.5), whereas in the other hospitals was 7.9 days (SD 7.8). Departments of pulmonary diseases were the location for 39.8% of the inpatient episodes, with a mean duration of 8.8 days (SD 7.4) versus 7.2 days (SD 7.7) in other departments (P=0.000). Reference was made to a secondary diagnosis in connection with 35.6% of the inpatient episodes, with a mean duration of 9.0 days (SD 8.7) versus 7.2 days (SD 6.9) for treatments without a secondary diagnosis (P=0.000). Altogether, 21.5% of the episodes terminated on a Friday, and these had a mean duration of 7.4 days (SD 7.0), whereas only 2.2% terminated on a Sunday, with a mean duration of 5.5 days (P=0.000). A total of 3.2% of the inpatient episodes ended in the death of the patient, these having a mean duration of 11.2 days (SD 14.3) versus 7.7 days (SD 7.3) for the other episodes (P=0.000).

**Interval to readmission**

A total of 13,305 patients had only one inpatient episode; 12,236 patients had more than one inpatient episode, and the average interval between the end of one episode and the beginning of the next was 195.4 days (SD 327.7). A total of 12.1% of the patients had 10 or more inpatient episodes. The interval to readmission was 19.3 days longer for women than for men. The variation in the interval to readmission relative to the duration of inpatient episodes in the different age and sex groups is shown in Table 1.

The correlation between the duration of inpatient episodes and the interval to readmission is shown in Figure 2. The interval became longer as the inpatient episodes grew longer, being longest when the mean duration of inpatient treatment was 7 days. The longest mean interval to readmission was 215 days (95% confidence interval [CI] 206–229). When the duration of inpatient episodes increased beyond 7 days, the interval to readmission became shorter.

The interval to readmission in the university hospital was 191.9 days (SD 328.6) and that in the other hospitals 196.1 days (SD 327.6), while the interval in departments of pulmonary diseases was 197.3 days (SD 329.6) versus 194.1 days (SD 328.6).

**Table 1. Interval to readmission in two age groups, by sex and by duration of inpatient episodes**

<table>
<thead>
<tr>
<th>Duration of inpatient episode (days)</th>
<th>Aged 45–64 years</th>
<th>Aged &gt;64 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>1–3</td>
<td>159.5</td>
<td>174.9</td>
</tr>
<tr>
<td>4–10</td>
<td>162.8</td>
<td>186.4</td>
</tr>
<tr>
<td>&gt;10</td>
<td>155.1</td>
<td>175.6</td>
</tr>
<tr>
<td>Total</td>
<td>190.6</td>
<td>201.3</td>
</tr>
</tbody>
</table>

**Figure 1.** The average length of hospital stay in days for men (squares) and women (circles with dots) in two age groups during 1993–2001.
in death were of a mean duration of 195.6 days (SD 341.3). The intervals preceding inpatient episodes terminating to a secondary diagnosis, the interval was 212.5 days (SD 350.9) versus 186.7 days (SD 314.8) without a secondary diagnosis. It should be noted, however, that the age on admission as women are concerned, through ageing of the population health services by COPD may well increase, especially as far COPD as a result of smoking [8]. The burden imposed on smokers, who seem to have an even higher risk of hospitalization than men, as they appear to be more likely to develop COPD as a result of smoking [8]. The burden imposed on health services by COPD may well increase, especially as far as women are concerned, through ageing of the population [9]. It should be noted, however, that the age on admission in our data rose by only 0.4 years over the 9 years studied here.

The average duration of inpatient treatment of COPD in different patient series has been ~8 days [7, 10], and our findings are in accordance with this. The first inpatient period due to COPD is usually the shortest, while later hospital episodes tend to be prolonged by higher age, increasing severity of COPD and concurrent morbidity [10, 11]. We found that episodes terminating in death tended to be longer than usual, and also episodes located in departments of pulmonary diseases, evidently because these tended to include the most difficult cases. Based on our results, the mean duration of Finnish COPD patients’ inpatient episodes is similar to that in other countries [12]. According to our findings, the duration of inpatient episodes at the stage of COPD exacerbation seems to continue to shorten among both men and women. The mean duration of inpatient episodes became 1.7 days shorter during the 9-year follow-up, while the interval to readmission was approximately 6 months. A parallel trend was seen in a Canadian study [7]. Treatment times for all diseases have admittedly become shorter, so that the mean duration over the whole range of specialties for patients aged >64 years is reported by Statistics Finland to have decreased from 19.5 days in 1992 to 7.6 days in 2001. This has been attributed to more efficient outpatient care.

According to previous findings, efforts to cut down the duration of inpatient episodes may result in a ‘revolving door’ phenomenon [13], i.e. patients discharged too early need to be readmitted sooner. According to the findings of a Dutch study, short inpatient episodes did not increase the risk of readmission [14], but our observations show that short inpatient episodes shortened the interval to readmission, with a 1-week duration of inpatient treatment resulting in the longest interval. Crockett et al. [11] reported that inpatient episodes longer than 7 days increased the need for readmissions, but this was probably due to the fact that the patients who had been treated for >1 week were elderly (mean age 73.8 years) and had many comorbidities. Our findings were parallel to this: as the duration of inpatient episodes increased, the interval to readmission shortened.

We also found that intervals to readmission were longer among more elderly patients. Patients in the younger age groups are likely to be suffering only from COPD, which may be more serious when presenting at an early age. The elderly patients, on the other hand, may have been admitted to hospital with other main diagnoses. The risk of admission due to exacerbation of COPD was greatest among the patients who had had more than three inpatient episodes within the past year [15]. Possible ways of minimising inpatient treatment could include a control visit 1 month after discharge [16], increased physical activity [17] and rehabilitation [18].

The duration of inpatient treatment at COPD exacerbation could probably be shortened further by making use of new alternative forms of treatment such as a combination of inhalation steroid and long-acting beta-agonist [19, 20], or tiotropium [21]. Cotton et al. pointed out that, after
assessment at the pulmonary unit, nurses specialising in pulmonary diseases could take care of COPD patients at home even during exacerbation. The duration of inpatient episodes was cut to one-half in this way, while the number of inpatient episodes did not increase compared with patients who stayed in hospital longer [4]. Supported home care at COPD exacerbation under supervision by nurses is a safe and economic alternative for some COPD patients, as it shortens the hospital stay [22, 23]. Hernandez and co-workers concluded in their recent study that home care at COPD exacerbation helped to cut costs [24].

To sum up, the duration of inpatient treatment at COPD exacerbation seems to be becoming shorter among both younger and older COPD patients. With the current treatment modalities, a 1-week inpatient episode results in the longest interval to readmission. The situation may change if the treatment available at exacerbation can be made more effective by providing supported home care, for example.

References


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