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Quality assessment and predictors of survival in long-term domiciliary oxygen therapy

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Quality assessment and predictors of survival in long-term domiciliary oxygen therapy: a two year follow -up of the Swedish Oxygen Register. K. Ström, J. Boe, The Swedish society of Chest Medicine.

ABSTRACT: On January 1, 1987, 560 patients (267 male) were registered as using long-term domiciliary oxygen therapy (LTO) in Sweden. The duration of LTO before this date varied between 10 days and 11 yrs. During a two-year follow-up 12 patients had their LTO withdrawn because they were no longer hypoxic. In 139 patients the arterial oxygen tension (Pao_2) on breathing air was registered three times. In seventeen (12%) of these patients the Pao_2 exceeded 7.5 kPa on all three control occasions. The two year actuarial survival in all patients was 57%. The two year actuarial survival was 77% in patients with kyphoscoliosis, 56% in patients with sequelae of tuberculosis, 54% in patients with chronic obstructive pulmonary disease (COPD) and 39% in patients with fibrosis. In COPD patients survival was predicted by age, sex, current smoking habits, arterial carbon dioxide tension ($Paco_2$) when breathing oxygen and oral steroid medication. A poor Zubrod performance score was associated with a high mortality rate in all patient groups.

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A national register of patients receiving long-term domiciliary oxygen therapy (LTO) for chronic hypoxia due to respiratory failure of varying origin was started by the Swedish Society of Chest Medicine in 1987 [1]. The 560 patients registered as receiving LTO on January 1, 1987 have been followed for two years. The patient selection criteria and prescribing guidelines for LTO had been agreed on [1]. The proposed limit for hypoxia was 7.5 kPa when breathing air with a steady state of hypoxia during 3 wks of optimum medical therapy. Chronic hypoxia caused by respiratory failure is the only inclusion criterion. No exclusion criteria are used. Oxygen therapy is started in hospital, in the vast majority of patients in a chest ward. With very few exceptions these patients are followed regularly in a respiratory clinic, usually as outpatients. The aim of the registration is to assess the quality of LTO in terms of the fulfilment of patient selection criteria regarding hypoxia and the cessation of smoking, the reversal of hypoxia, patient co-operation, the need for hospital care and survival. Predictors of survival and effect of different treatment variables on survival were analysed in COPD patients and in patients with sequelae of tuberculosis.

Methods

The organization of the Swedish Oxygen Register, the record forms and the characteristics of the patients registered at the start of the study have been described in detail elsewhere and will therefore only be presented briefly [1]. All the divisions and departments of Chest Medicine in Sweden, one department of internal medicine and two departments of infectious diseases, caring for patients with respiratory failure, participated in the study, which included approximately 90% of all the patients in Sweden receiving domiciliary oxygen therapy at the time.

The individual record form used for the initial registration contained information on age, sex, cause of hypoxia, smoking habits, history of peripheral oedema, medication, recent arterial blood gas analyses and variables linked to the oxygen treatment. More than one diagnosis could be registered for each patient.

The follow-up record forms which are completed every six months contain information on days spent in hospital due to respiratory disease, smoking habits, packed cell volume, forced expiratory volume in one second (FEV_1), forced vital capacity (FVC), Zubrod performance status (table 1) [2], medication, information on oxygen therapy and patient compliance with oxygen therapy including concentrator meter readings or cylinder use, complications of oxygen therapy and place and cause of death. Arterial blood gas tensions on air and oxygen were taken after the patients had been breathing room air and oxygen, respectively, for at least 20 min.

Table 1. – The Zubrod performance status scale

0 - able to carry out normal activity
1 - restricted in activity, but ambulatory
2 - confined to bed part of, up and about for more than 50% of waking hours
3 - confined to bed for more than 50% of waking hours
4 - totally confined to bed

The oxygen concentrators were checked regularly according to the instructions by the manufacturers including control of oxygen concentration (O_2%). No alarms for a low O_2% were used.

The data processing was carried out with the aid of the Quest data base program [3]. Comparisons between groups were made using Student's unpaired t-test or, if the data showed signs of not being normally distributed, the Mann-Whitney non-parametric test. Fisher's exact test was used to compare the incidence of technical defects occurring with concentrators and high-pressure compressed gas cylinders. Survival curves were calculated using the actuarial method. A log-rank chi-squared test for comparison of survival between groups was used to analyse the association of clinical characteristics at entry and at the first follow-up with survival during the two-year follow-up period [4]. Multivariate statistical methods were used to select the variables that were most closely related to subsequent mortality [5]. A two-sided p-value of <0.05 was considered significant.

The assessments of statistical significance should be treated with caution. Since the influence of multiple variables on survival were analysed,chance alone could be expected to explain the significance of one of the tested variables on the 5% level.

All the patients gave their informed consent. The study was approved by all the regional Ethical Committees, the Swedish Board of Health and Welfare and the Data Inspection Board.

Results

Patients

During the first months of 1987, 560 patients (267 males) with a mean age of 65 yrs were registered as receiving LTO for respiratory failure. The mean duration of LTO before January 1, 1987, was 23 mths (range 10 days -11 yrs). Oxygen was prescribed for a mean of 19 h per day. Chronic obstructive pulmonary disease (COPD) was present in 393 patients (70%) and late sequelae of tuberculosis was the main or contributory cause of hypoxia in 102 patients (18%). Interstitial fibrosis and kyphoscoliosis caused hypoxia in 44 patients (8%) and 40 patients (7%), respectively [1]. Dual diagnoses were present in 115 patients (21%), with a combination of COPD and a restrictive disease in 75 cases (14%). The characteristics of the patients at the registration and at the first follow-up are shown in table 2.

Table 2. – Clinical characteristics at the registration and at the first follow-up in patients with COPD, sequelae of tuberculosis (Tb), interstitial fibrosis (Fibros) and kyphoscoliosis (Scolios) receiving LTO

	COPD	Tb	Fibros	Scolios
Characteristics at the registration				
No. of patients	393	102	44	40
Age yrs	66±10	69±7	66±9	56±12
Percentage females	50	56	59	74
Pao_2 (air) kPa	6.4±1.1	6.6±1.2	6.2±1.1	6.8±1.0
$Paco_2$ (air) kPa	6.6±1.4	6.8±1.2	5.5±1.4	7.1±1.3
Characteristics at first follow-up				
No. of patients	311	88	32	28
FEV_1 *l*	0.7±0.4	0.7±0.3	1.1±0.5	0.7±0.4
FVC *l*	1.7±0.8	1.2±0.4	1.5±0.8	0.9±0.4
Performance status: mean	1.8	1.6	1.9	1.1
median	2.0	1.0	2.0	1.0

Pao_2: arterial oxygen tension; $Paco_2$: arterial carbon dioxide tension; FEV_1: forced expiratory volume in one second; FVC: forced vital capacity; COPD: chronic obstructive pulmonary disease: LTO: long-term oxygen therapy: mean±SD.

At the start of the investigation, 13 patients (2%) were noted as using home ventilators in addition to LTO. During the two years of follow-up another 19 patients received home ventilator treatment in combination with LTO. These 32 patients have been excluded from the statistical analyses of survival.

Evolution of the arterial blood gas values on breathing air

The mean values (±SD) of the arterial oxygen tension (Pao_2) when breathing air were 6.8 (±1.4) kPa (n=369), 6.7 (±1.3) kPa (n=276) and 6.8 (±1.3) kPa (n=198) at the first, second and third follow-up recordings, respectively,with the Pao_2 ranging from 3.1–12.2 kPa.

The analysis of arterial blood gas values on breathing air at follow-up led to the withdrawal of LTO in 12 cases (2%) because of an improvement in hypoxia. At a later stage two of these 12 patients resumed LTO because of hypoxia, whilst another patient needed oxygen therapy temporarily. Among the patients who continued LTO during the two years of observation, 139 patients had the arterial blood gas tensions on breathing air measured on three follow-up visits. In 17 of these 139 patients (12%), the Pao_2 on breathing air exceeded 7.5 kPa on all three control occasions. A history of peripheral oedema was elicited in eight of these 17 patients. In six of the 139 patients (4%), the Pao_2 on breathing air was >8 kPa on the three control occasions and, in three patients with a Pao_2 of >8.7 kPa on three follow-up visits LTO was continued despite the absence of daytime hypoxia at rest.

A value for the arterial oxygen tension on breathing air of >8.0 kPa at one or two consecutive follow-up recordings was followed by a value of Pao_2 (air) >7.5 kPa at future follow-up registrations in 70 -80% of the patients who continued with LTO. An arterial oxygen tension when breathing air of >8.7 kPa predicted a Pao_2 (air) >7.5 kPa at subsequent controls in 89-100% of the patients. This high level of arterial oxygen tension on breathing air was reached by around 6% of the patients at each follow-up registration.

Evolution of the arterial blood gas values on breathing oxygen

In 218 patients arterial blood gas values on breathing oxygen were recorded at three consecutive follow-up recordings. In 59 of these patients (27%) the Pao_2 when breathing oxygen exceeded 8.7 kPa on all the recorded control occasions and in 181 patients (83%) on at least one control occasion. In 120 patients (55%), the Pao_2 was >8 kPa at the three controls. In ten patients (5%), the Pao_2 when breathing oxygen was <8 kPa at all three controls. The mean degree of hypercapnia among these patients did not differ from that of the rest of the patients, nor did the mean oxygen flow rate.

Smoking habits

LTO is not recommended for smokers. Even so, 44 patients were registered as smokers at the start of the study. The proportion of patients reported as current smokers decreased from 8 to 3% during the two years of follow-up.

Smoking habits were verified using measurements of the carboxy haemoglobin (HbCO) or thiocyanate in proportions varying from 25–35% of the patients at each recorded follow-up. The mean HbCO level was equal among ex-smokers and lifetime nonsmokers and significantly higher among current smokers. HbCO 3% was taken as the cut-off point between smokers and nonsmokers because HbCO was 3% or lower in 94% of the measurements in the lifetime non smokers. However, 40% of the current smokers had a HbCO level in the range of the nonsmokers and would not have been identified as smokers by this measurement alone.

Spirometry and performance status

Measurements of FEV_1, FVC and performance status score were made at the first follow-up (table 2, fig. 1). The mean FEV_1 and FVC values of patients on oral steroid medication did not differ significantly from the mean values for these variables in patients who were not on oral steroid medication.

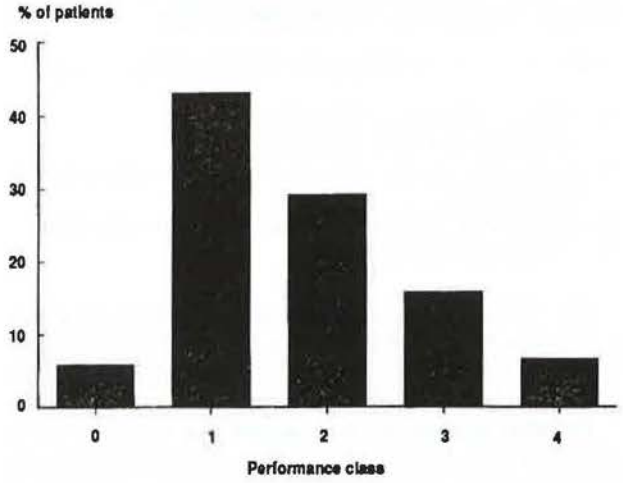

Fig. 1. – Distribution of the Zubrod performance scores at the first follow-up (n=447).

Oxygen therapy

The proportion of patients receiving oxygen from concentrators rose from 45 to 70% during the observation period. The rest used high-pressure compressed gas cylinders. Small high-pressure gas cylinders were available for patients using oxygen during ambulation. The majority of the patients (76% at the start and 80%

at the end of the follow-up period) used double nasal cannulae.

The physicians responsible reported that more than 90% of the patients complied with the oxygen treatment, including the daily hours of oxygen. The correct determination of the actual use of oxygen was not possible despite concentrator meter readings and pharmacy reports of gas cylinder deliveries, partly because of frequent concentrator changes for repair and insufficient filling and/or emptying of the gas cylinders, which were not weighed before and after use. In some 70% of the observation periods with seemingly adequate reports of concentrator meter readings or gas cylinder deliveries oxygen was used for 15 or more hours a day.

Complications of oxygen treatment

The rate of technical defects and breakdowns in the oxygen equipment was considerably higher in the case of concentrators than it was for high-pressure compressed gas cylinders (table 3) ($p<0.001$). As a mean, 11.6% of the concentrators had some reported defect during an average six-month follow-up period, while 2.8% of the high-pressure gas cylinder equipment was reported as having some defect during the same period. No case of fire or burns caused by the oxygen equipment was reported. The most serious breakdown of the equipment was the fact that at least six oxygen concentrators supplied only room air. The meter readings of these defective concentrators varied from 3,660–16,019 h.

Table 3. – Follow-up periods with reported technical defects or breakdowns in the oxygen equipment as a percentage of observed follow-up periods

Oxygen equipment	% 6 monthly controls with defect	No. of 6 months controls with defect
High-pressure compressed gas cylinders	2.8	14
Oxygen concentrators		
de Vilbiss	8.2	8
Zefir	8.7	24
Briox	16.7	37
OECO	10.1	20

Allergic contact dermatitis caused by the epoxy resin constituents of the nasal cannulae was confirmed by skin tests in five patients [6]. The frequency of reported dermatitis caused by nasal cannulae decreased to 1–2% after a change to cannulae without epoxy resin constituents.

A negative psychological impact on the patient or on the patient and his relatives,caused by the oxygen treatment was reported in a small proportion of the follow-up recordings (0–9%). This was more common when gas cylinders were used and among patients who were prescribed oxygen therapy for more than 16 hours daily, irrespective of the type of treatment.

Days spent in hospital

The number of days that were spent in hospital due to respiratory disease was related to diagnosis and the stage of the disease (table 4). Survivors generally spent a smaller part of the observation period in hospital than non-survivors, thereby indicating that hospital care was mainly needed in the terminal stage of the disease. Permanent care in a nursing home was needed by 20 patients (3.6%).

Table 4. – Number of days spent in hospital due to respiratory disease (median and range in parenthesis)

Diagnosis	Days in hospital per yr	% of patients without hospital stays
COPD	18 (0–363)	17
Sequelae of tuberculosis	11 (0–308)	17
Interstitial fibrosis	27 (0–261)	14
Kyphoscoliosis	7 (0–290)	31
All patients	18 (0–363)	18
survivors	8 (0–363)	22
non-survivors	30 (0–308)	14

COPD: chronic obstructive pulmonary disease.

Survival and predictors of survival

The two-year actuarial survival was 57% in all patients and varied according to the cause of hypoxia (figs 2 and 3). The two year survival rate was 77% in patients with kyphoscoliosis, 56% in patients with sequelae of tuberculosis, 54% in COPD and 39% in interstitial fibrosis. In the case of both COPD patients and patients with chronic hypoxia from other causes, the Zubrod performance status was the best predictor of survival.

Survival of patients with COPD

In the univariate analysis the following parameters at entry were found to be associated with survival: age, sex, arterial carbon dioxide tension ($Paco_2$) when breathing oxygen, current smoking habits, oral steroid medication and prescribed hours of daily oxygen treatment (table 5). Women had a higher survival rate than men. High values for age, $Paco_2$ (oxygen) and the prescribed hours of oxygen were associated with lower survival rates, as was oral steroid medication and current smoking.

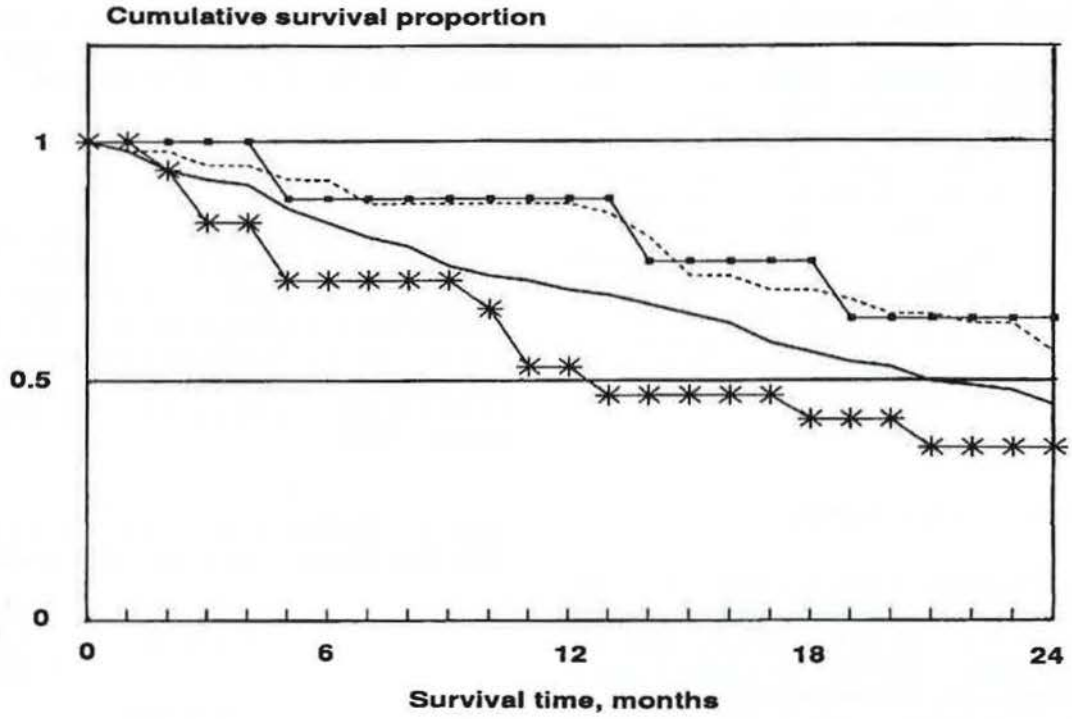

Fig. 2. – Survival of male patients receiving LTO according to diagnosis: COPD (n=195), sequelae of tuberculosis (Tb) (n=40), interstitial fibrosis (Fibrosis) (n=18), kyphoscoliosis (Scoliosis) (n=8). COPD: chronic obstructive pulmonary disease; LTO: long-term oxygen therapy; ——— : COPD; - - - - : Tb; —✳— : Fibrosis; —□— : Scoliosis.

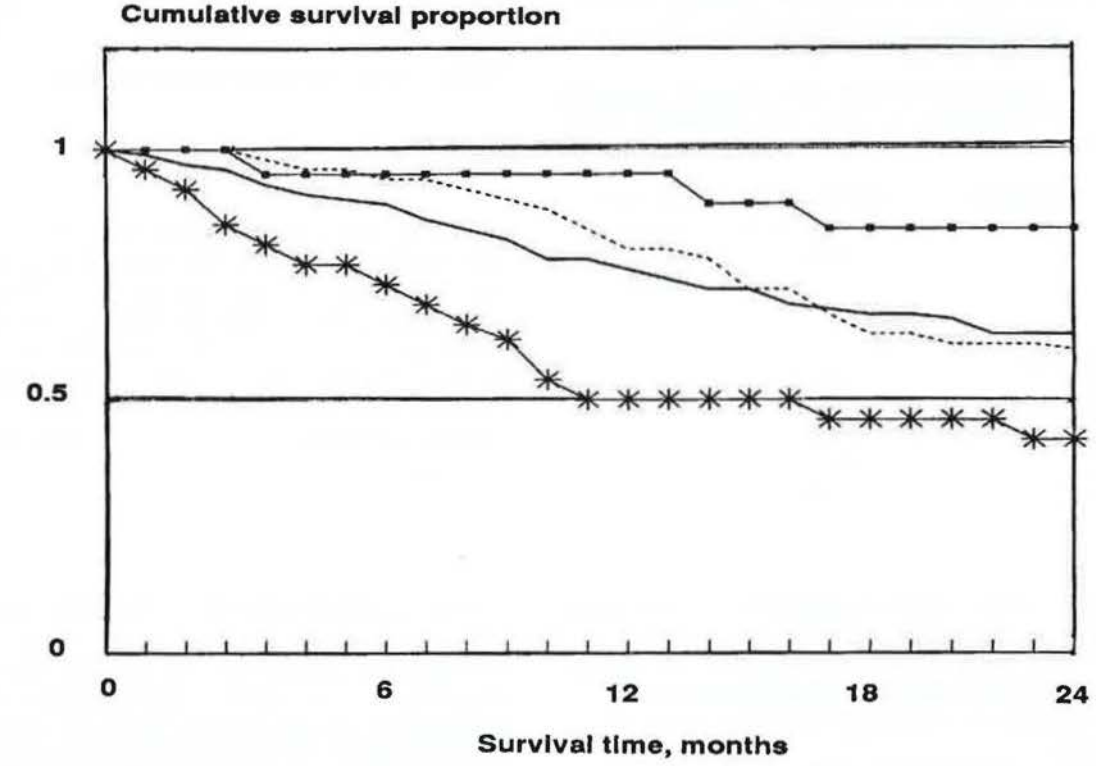

Fig. 3. – Survival of female patients receiving LTO according to diagnosis: COPD (n=188), sequelae of tuberculosis (Tb) (n=51), interstitial fibrosis (Fibrosis) (n=26), kyphoscoliosis (Scoliosis) (n=19). ——— : COPD; - - - - : Tb; —✳— : Fibrosis; —□— : Scoliosis. For further definitions see legend to figure 2.

Table 5. – Association of clinical characteristics with survival of COPD patients receiving long-term oxygen therapy

Characteristic	p value	
	COPD patients	Patients with sequelae of tuberculosis
Sex	0.023	>0.20
Age	0.002	0.0018
$Paco_2$ (oxygen)	0.006	0.086
Current smoking	0.028	0.030
Oral steroid medication	0.001	0.018
Prescribed daily hours of oxygen	<0.001	>0.20
Performance status at first follow-up	<0.001	<0.001

COPD: chronic obstructive pulmonary disease; $Paco_2$: arterial carbon dioxide tension.

significant correlation with survival. The Zubrod performance status at the first follow-up registration was a good predictor of survival during the subsequent observation period with a higher survival rate for patients with a good performance score ($p<0.001$) (fig. 4). The FEV_1 and FVC values on the same occasion did not predict survival during the remaining observation period. A multivariate statistical method was used to analyse the correlation of the latest registered values of these variables with subsequent mortality. Sex, oral steroid medication and daily hours of prescribed oxygen treatment were of no importance as predictors of death when the performance status was considered. This was due to the fact that oral steroids and the prescription of oxygen therapy for more than 16 h daily mainly occurred in patients with a poor Zubrod performance score. In addition to performance status, age had a significant impact on survival ($p<0.01$).

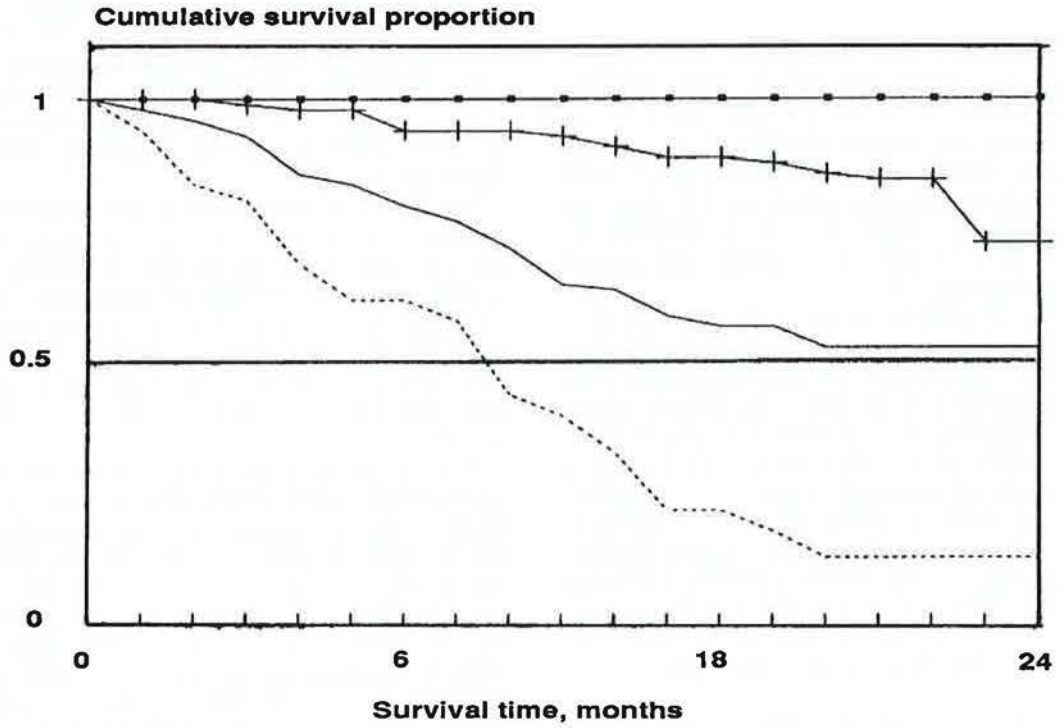

Fig. 4. – Survival of COPD patients receiving LTO according to Zubrod performance score 0–4: 0 (n=13), 1 (n=125), 2 (n=81), 3 and 4 (n=32). —□—: score 0; —|—: score 1; ———: score 2; - - - - score 3 and 4. For further definitions see legend to figure 2.

Arterial blood gas tensions during the breathing of air, the Pao_2 when breathing oxygen, the total duration of LTO in months, the absence or presence of a history of peripheral oedema, the oxygen delivery system and flow rate, medication with theophylline, cardiac glycosides, oral $beta_2$-agonists or diuretics showed no

A significant correlation was found between current smoking and $Paco_2$ when breathing oxygen with higher values of $Paco_2$ when breathing oxygen in smokers ($p<0.05$). The negative effect of current smoking on survival remained after the elimination of the effect of higher $Paco_2$ during oxygen therapy.

Survival of patients with sequelae of tuberculosis

Age, current smoking habits and oral steroid medication showed a significant correlation with the two-year survival rate in patients with hypoxia caused by the late sequelae of tuberculosis ($p<0.05$). The Zubrod performance status at the first follow-up recording was a good predictor of survival during the remaining observation period ($p<0.001$).

Cause and place of death

The majority of the patients (238) who died, did so in hospital (84%) and the respiratory disease was considered to be the cause of death in 208 patients (87%). Cardiovascular disease was a main or a contributory cause of death in 37 patients (15%) and, in 28 patients (11%), neither respiratory nor cardiovascular disease caused death. One patient committed suicide.

Discussion

Investigations show that the arterial oxygen tension might improve during the one to three months observation period in COPD patients assessed for long-term domiciliary oxygen therapy [7, 8]. Results from Liverpool indicate that many patients on LTO fail to fulfil the patient selection criteria for LTO and can have normal arterial oxygen tensions on breathing air when reassessed 4-22 mths after starting their oxygen concentrator treatment [9].

The number of patients in our study who had their LTO withdrawn because of an improvement in hypoxia was quite small. According to our selection criteria, LTO could be questioned in those 12% of the patients whose Pao_2 when breathing air exceeded 7.5 kPa at three consecutive registrations. Half these patients had a history of peripheral oedema as a sign of cor pulmonale and LTO could therefore still be indicated according to our criteria and those of Nocturnal Oxygen Therapy Trial Group (NOTT) and Medical Research Council Working Party (MRC) [1, 10, 11]. In 4% of the patients, who had a Pao_2 (air) of >8 kPa at all follow-up recordings, the justification for continued LTO is doubtful.

Finding a Pao_2 (air) of >8.0 kPa on one or two follow-up visits did not predict a value of Pao_2 of >7.5 kPa on the next control occasion with an accuracy greater than 70 and 80%, respectively. Finding a Pao_2 (air) of above 8.7 kPa predicted normoxia more precisely and testing the withdrawal of LTO in these patients seems justifiable.

One reason why we found a smaller proportion of patients on LTO without hypoxia than WALSHAW *et al.* [9] in Liverpool, could be that the patient selection criteria issued by the Swedish Society of Chest Medicine are somewhat more liberal than the guidelines issued by the Department of Health and Social Security (DHSS) in England. The fact that, with very few exceptions, LTO in Sweden is started and supervised by chest physicians is probably the most important reason why few patients without hypoxia are treated. A recent British retrospective study revealed a low proportion of LTO patients who did not fulfil the DHSS guidelines when assessed by chest physicians (15%) in contrast to a high proportion (66%) when the treatment was recommended by general practitioners [12].

LTO is not recommended for patients who cannot give up smoking, partly because of the risk of burns [13]. It is common practice to start LTO on condition that the patient does not smoke, but if the patient takes up smoking again he/she may continue an effective oxygen treatment. The higher mortality rate of the current smokers, which was the same as that of the male MRC control patients, emphasizes the importance of persuading patients to stop smoking.

The arterial oxygen tension when breathing oxygen was unsatisfactory in 5 or 17% of the patients depending on which the minimum Pao_2 level when breathing oxygen was considered to be -8 or 8.7 kPa, respectively, as recommended by the European Society of Pneumology (SEP) task group [14]. The low oxygen flow rate and the $Paco_2$ similar to that found in patients with a higher Pao_2 when breathing oxygen suggests that a higher oxygen flow rate could have been prescribed in these patients without provoking symptomatic hypercapnia.

The rate of technical defects and breakdowns in the oxygen concentrators was unexpectedly high. The obvious risk of a concentrator delivering room air instead of oxygen-enriched air stresses the importance of using alarm systems for the oxygen concentration both for the safety and confidence of the patients [15]. Because of our experience, such alarms are now mandatory on new oxygen concentrators in Sweden.

The varying duration of LTO before the start of the investigation makes comparisons of survival rates with those of other investigators difficult. The annual survival rate of COPD patients receiving LTO was fairly constant during the first eight years in a long-term follow-up from Sheffield [16]. Survival was not associated with the total duration of LTO in our COPD patients and we think that a comparison is therefore justified. The annual mortality rate for our COPD patients is considerably higher than that in the Sheffield study and in the controlled NOTT and MRC trials. Surveys of populations of patients using oxygen concentrators in England also reveal a markedly higher mortality rate than that seen in the controlled trials [17, 18]. Differences in patient selection criteria with the absence of exclusion criteria in the field studies are probable explanations for the high mortality rates.

The data obtained in the study precludes conclusions relating to the effect of daily hours of oxygen treatment on survival. Patients with a poor performance status score were prescribed oxygen for longer periods of the

day, which explains the association of continuous or near continuous LTO with lower survival rates. The marked association of oral steroid medication with a high mortality rate might be explained by the fact that oral steroids were prescribed more often to patients with a poor performance status. It does not support the finding by other investigators that oral steroid medication prolongs the survival of patients with advanced COPD [19].

The most important predictors of long-term survival in COPD patients receiving LTO have been found to be the spirometric FEV_1 and FVC values [16]. The response of the mean pulmonary artery pressure to breathing oxygen for 24 h or for six months of LTO in the NOTT study has been shown to predict subsequent survival [20, 21]. These invasive indicators cannot be used in routine clinical practice. The oxygen consumption at the end of a symptom limited exercise was shown to predict survival even better than FEV_1 in one trial [20]. The physician's assessment of the patient's performance status was shown to be a good predictor of survival in early studies of the prognosis for COPD patients [22]. A simple clinical indicator like a performance status scale or a dyspnoea scale could be useful when it comes to predicting the prognosis and choosing the most appropriate treatment when alternatives like home ventilation or lung transplantation are available. It is important to identify patients with a short expected survival in order to recognize the palliative character of the treatment in these cases. In the case of short-term survival, the best prognostic factor identified in this trial was the Zubrod peformance status, which is a major determinant of the outcome in inoperable lung cancer [23].

Hypercapnia when breathing air or oxygen has been found to be associated with survival in some trials [11, 20] but not in others [16, 24]. In the MRC trial, a high value for the combination of red cells mass and $Paco_2$ when breathing air was the best discriminant of survival for the first 500 days. A considerable proportion of these patients continued to smoke during LTO. Smoking has been shown to be associated with a higher red cell mass [25] and from our results with a higher $Paco_2$ value. Continued smoking might have contributed to the increased mortality in the MRC patients with an elevated red cell mass and hypercapnia.

In the majority of patients the LTO worked satisfactorily. The annual survival rate for patients receiving LTO was lower than might be expected from the controlled clinical trials of COPD patients, a fact that is probably explained by differences in patient selection. No control groups were possible and the survival curves describe outcome of therapy without evaluation of efficacy. The poor survival of patients with fibrosis would seem to justify a controlled clinical trial against no therapy in these patients.

The number of patients who had their LTO withdrawn because of an improvement in hypoxia was quite small and the question of whether LTO could be withdrawn in a greater proportion of patients with borderline hypoxia remains open.

Predicting the survival of patients receiving LTO is important when alternative treatment options are available. A simple clinical classification, the Zubrod performance status, was found to be a good predictor of survival.

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Evaluation de la qualité et prédiction de la survie pendant le traitement au long cours par l'oxygène à domicile. Suivi de 2 ans par l'Observatoire Suédois de l'oxygène. K. Ström, J. Boe, Swedish Society of Chest Medicine.

RÉSUMÉ: Le ler janvier 1987, 560 patients (dont 267 hommes) ont été enregistrés comme utilisant l'oxygénothérapie au long cours à domicile en Suède. Avant cette date, la durée d'oxygénothérapie variait entre 10 jours et onze ans. Au cours d'une période de suivi de deux ans, douze patients se sont vu retirer leur oxygénothérapie en raison de l'absence d'hypoxie. Chez 139 patients, la pression partielle d'oxygène artériel (Pao_2) sous air a été enregistrée à trois reprises. Chez dix-sept (12%) d'entre eux, la Pao_2 était supérieure à 7.5 kPa lors des trois contrôles. La survie actuarielle à deux ans fut de 57 % pour l'ensemble des patients. La survie actuarielle à deux ans fut de 77% chez ceux atteints de cypho-scoliose, de 56% chez ceux porteurs de séquelles de tuberculose pulmonaire, de 54% dans les bronchopneumopathies chroniques obstructives, et de 39% en présence de fibrose. Les facteurs de prédiction de la survie dans les BPCO étaient l'âge, le sexe, les habitudes tabagiques actuelles, la $Paco_2$ sous oxygène et la prise d'une médication steroide orale. Tant dans les bronchopneumopathies chroniques obstructives que dans les hypoxies chroniques d'autres causes, un score de performance de Zubrod abaissé était associé à un taux élevé de mortalité.
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