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# The effect of real-time teleconsultations between hospital-based nurses and patients with severe COPD discharged after an exacerbation

**Anne Dichmann Sorknaes[1], Mickael Bech[2], Hanne Madsen[3], Ingrid L Titlestad[3], Lise Hounsgaard[1], Michael Hansen-Nord[4], Peder Jest[5], Finn Olesen[6], Joergen Lauridsen[7] and Birte Østergaard[1]**

**Summary**

We investigated the effect of daily real-time teleconsultations for one week between hospital-based nurses specialised in respiratory diseases and patients with severe COPD discharged after acute exacerbation. Patients admitted with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) at two hospitals were recruited at hospital discharge. They were randomly assigned to intervention or control. The telemedicine equipment consisted of a briefcase with built-in computer including a web camera, microphone and measurement equipment. The primary outcome was the mean number of total hospital readmissions within 26 weeks of discharge. A total of 266 patients (mean age 72 years) were allocated to either intervention (n = 132) or control (n = 134). There was no significant difference in the unconditional total mean number of hospital readmissions after 26 weeks: mean 1.4 (SD 2.1) in the intervention group and 1.6 (SD 2.4) in the control group. In a secondary analysis, there was no significant difference between the two groups in mortality, time to readmission, mean number of total hospital readmissions, mean number of readmissions with AECOPD, mean number of total hospital readmission days or mean number of readmission days with AECOPD calculated at 4, 8, 12 and 26 weeks. Thus the addition of one week of teleconsultations between hospital-based nurses and patients with severe COPD discharged after hospitalisation did not significantly reduce readmissions or affect mortality.

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## Introduction

Chronic obstructive pulmonary disease (COPD) is one of the main causes of morbidity and mortality worldwide and results in an economic and societal burden that is both substantial and increasing.[1] In Denmark, more than 400,000 patients suffer from COPD, approximately 40,000 have severe or very severe COPD, and more than 25,000 COPD-patients are acutely admitted to hospitals each year.[2] Approximately 10% of all deaths in Denmark are caused by COPD. A total readmission rate of 29% within 30 days after discharge for both COPD-related and non-COPD related conditions has been reported, and the readmission rate with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is 18% in non-selected patients. The mortality after AECOPD admission is 10% after 30 days and 16% after 26 weeks.[2] Therefore, it is important to find alternative ways of caring for patients with AECOPD.

Supported early discharge, where a nurse visits a COPD patient at home, can be used to care for patients with AECOPD who would otherwise have been admitted to hospital.[3] Furthermore, supported early discharge with an extensive self-management programme combined with access to a call centre and home visits with nurses and

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doctors has shown a lower rate of emergency room visits when given to COPD patients on the day of their discharge.[3]

However, it is difficult to compare the results from previous studies because the interventions, the duration of hospital admissions and the number of home visits differs between studies. In addition, home visits by a nurse are expensive, especially in the countryside, because of the high staffing needs and lengthy transit times. Telemedicine may therefore be useful.

Randomised controlled trials (RCTs) with the addition of different sorts of telemedicine treatments for COPD patients have shown positive results: lower admission rates, lower percentages of patients with hospital readmissions, emergency visits, and unchanged or reduced mortality.[4–7] However, most of the trials performed have only included small groups of patients, or patients with different diagnoses, and the trials have been based on unclear designs with a combination of different interventions, and with diverse result indicators.[5] Consequently the net results are difficult to determine. This has led to a concern that a new treatment method is being introduced to patients with COPD with insufficient evidence.[8,9]

In a non-randomised intervention study, 100 patients discharged after AECOPD were assigned to either conventional treatment or to teleconsultations. After four weeks, readmissions were 30% in the control group compared to 16% in the teleconsultation group. Patient satisfaction was high.[10]

The aim of the present trial was to investigate the short term and long term effect of one week of daily real-time videoconsultation between hospital-based nurses and patients discharged after hospitalisation with AECOPD compared to conventional treatment.

## Methods

The study was approved by the appropriate ethics committees. It was carried out as a randomised trial at two sites (hospital 1 and hospital 2). Between May 2010 and October 2011 all patients admitted acutely to the acute medical admissions unit and respiratory medicine wards were considered for inclusion in the trial.

Patients were included if they were diagnosed with COPD verified by spirometry ($FEV_1/FVC$ less than 70%), admitted with AECOPD (defined by increased need for medicine and increased dyspnoea, increased expectorate volume or increased coughing), if their age was at least 40 years, and if they were residents of the municipalities of Funen (approximately one tenth of the Danish population) and had given informed consent. The exclusion criteria were: patients not able to communicate via telephone and/or computer screen, participating in the present trial or other scientific studies, systolic blood pressure lower than 100 mmHg, saturation less than 90%, chest X-ray showing signs of malignancy or lobar pneumonia, diagnosed cancer or recurrence of cancer within the last five years, septic shock, acute myocardial infarction (AMI) or other serious medical conditions (for example renal disease requiring dialysis), chronic heart failure with ejection fraction (EF) <30%, or patients not giving informed consent.

### Randomisation and blinding

Randomisation was performed centrally by a telephone voice response service from a computer-generated allocation sequence with a varying block size of 10 and 14. Participants were allocated to the two groups in a 1:1 ratio, and the randomisation was stratified by smoking status (current- or ex-smoker versus never-smoker) and by trial site (hospital 1 or hospital 2).

### Conventional treatment

All COPD patients admitted with exacerbation received conventional treatment according to GOLD guidelines, i.e. inhaler with bronchodilator medication, systemic glucocorticoid treatment, and if needed, antibiotics, non-invasive ventilation or respirator treatment.[1] Prior to discharge, control of inhalation techniques was performed and a decision was made concerning the treatment with which the patient should continue.

All patients were offered an outpatient clinic consultation with a nurse 4 and 12 weeks after discharge where the COPD diagnosis could be confirmed or dismissed in a stable phase. In the acute phase of an exacerbation it is difficult to distinguish between an acute asthma attack and a COPD exacerbation. Spirometry, pulse oximetry, MRC dyspnoea scale, body mass index (BMI), the 36-item Short Form Health Survey (SF-36), need for home care, personal assistance or house cleaning and rehabilitation in the previous half year were measured and recorded. To evaluate whether the patient's general and respiratory condition had changed, the nurses used a checklist to collect the necessary information. Together the nurse and patient made a plan for future course of action, including the patient's need for further examination, advice, teaching, smoking cessation, physical training and rehabilitation.

### Teleconsultations

In addition to conventional treatment, patients in the intervention group received daily teleconsultations by video. Teleconsultations were conducted with patients in their homes and nurses at the hospital for about 7 days between 08:00–15:00, seven days a week. A range from a minimum of 5 days and a maximum of nine days was chosen to provide flexibility, e.g. in case the patient was not at home at the time for the consultation. In the week after the teleconsultations were finished, a telephone follow-up call was made.

The teleconsultations were initiated within 24 hours of discharge. The teleconsultations were performed using the same checklist as used in the outpatient clinic. During the daily nurse observations and patient measurements,

the patient received advice, and the treatment was discussed with the patient. Advice was given on regular treatment, prevention of exacerbation and how to live with the disease. The aim of the advice was to empower the patients and to improve their competence in relation to taking action. With guidance or independently, the patient measured pulse, saturation and spirometry. The patient could take readings of the measurements on the telemedicine equipment, while the nurse collected the patient measurements electronically on a screen at the hospital. The nurse could organise rapid treatment in consultation with a respiratory physician, the patient's general practitioner and/or the home care system if needed. The intervention was documented in the patient's electronic records and on the Case Report Form.

The patient's telemedicine equipment was designed as a briefcase (Figure 1a). The briefcase contained video equipment, an on-off switch, a volume button and an alarm switch. It was connected to measuring equipment in the form of a combined spirometer and a pulse oximeter (Spirotel). The nurse's equipment consisted of a computer with a built-in web camera and microphone, an extra screen for reading patient measurements and a computer linked to the electronic medical records (Figure 1b).

Teleconsultations could take place via an Internet connection (ADSL), wireless network or satellite. The patient's equipment was installed by a technician in the patient's home within 24 hours of discharge on weekdays.

## Data collection

Predefined data concerning demographic, co-morbidity, risk factors, self-reported health status, lung condition, economic information and telemedicine equipment evaluation were collected at baseline, after 4 weeks and after 12 weeks.

## Outcomes

The primary outcome measure was total hospital readmissions (COPD-related and non-COPD-related) per patient within 26 weeks of discharge. Secondary outcomes were mortality, time to mortality and time before first readmission, hospital readmissions per patient and hospital days per patient at 4, 8, 12 and 26 weeks after discharge.

## Sample size

The size of the population was determined on the basis of the results of an earlier study, where the effect of teleconsultations were investigated 4 weeks after discharge.[10] In that study the proportion of total hospital readmission was reduced from 30% to 16% four weeks after discharge. To demonstrate a reduction in the total readmission rate of 14% with a significance level of 0.05 and 80% power and with an anticipated drop-out rate of 20%, a total of 266 patients were needed.

## Statistical methods

The data were entered into a package (EpiData version 3.1) by two different people and double-checked before transfer to a statistical package (Stata version 12) for analysis. Readmission and predefined confounding factors were analysed using the Poisson regression test. Mortality and time before first readmission were analysed with the chi-squared test. Time to death and time to first readmission were modelled using Kaplan-Maier curves.

All subjects were analysed in the groups to which they were randomly allocated in accordance with intention-to-treat analysis. Adjusted analyses not including patients who did not fulfil the inclusion criteria at follow-up were made, and the primary analyses were compared to the adjusted analyses between the groups.

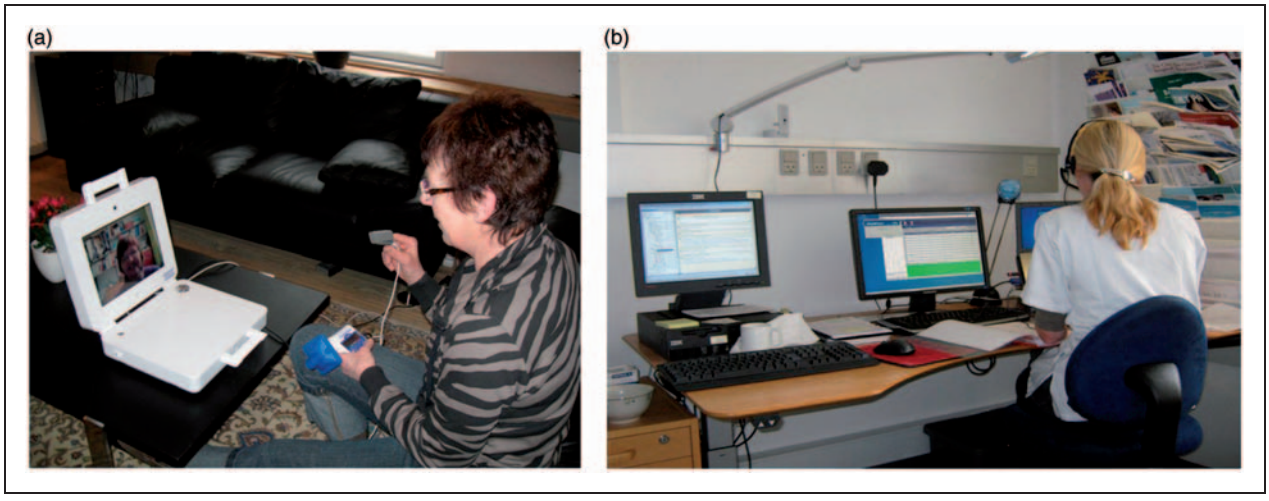


**Figure 1.** Teleconsultations (a) teleconsultation between a patient at home and a nurse at the hospital. Pulse oximetry measurement in progress (b) a nurse having a teleconsultation with a patient. The nurse is wearing a headset and looking at the patient on the computer screen. The screen next to her is for the patient's measurements and the screen on the left shows the patient's electronic record.

## Results

Between May 2010 and October 2011, 16,135 admissions to the acute admissions and respiratory medicine wards were screened for eligibility. In total, 15,861 patients did not meet the criteria for inclusion. Most of the screened patients did not have COPD (13,741 patients). Patients with COPD were not included into the trial for the following reasons: did not have AECOPD (500 patients), participating in other studies (386 patients), not able to communicate via telephone and/or computer screen (281 patients), cancer or recurrence of cancer within the last five years (195 patients), other serious diseases (184 patients), declined to participate (167 patients), chest X-ray showing lobar pneumonia or sign of malignancy (68 patients), severe heart failure (EF <30%) (53 patients), living outside the county of Funen (24 patients), saturation <90% (14 patients), less than 41 years of age (8 patients) or systolic blood pressure <100 mm Hg (2 patients).

There were logistical reasons for the exclusion of 238 patients, e.g. admission/discharge at weekends or transfer to other wards. Of the patients screened for eligibility, eight were consecutively included in a qualitative fieldwork study in a number of predefined weeks if they fulfilled the specified extra inclusion criteria for the qualitative study. Therefore, 266 patients were included in the present trial, see Figure 2.

One patient died after randomisation but before discharge, readmission could be determined in 261 patients at 4 weeks, in 257 patients at 8 weeks, in 253 at 12 weeks, and in 242 patients at 26 weeks. All included patients, as well as patients who declined to be seen at the outpatient clinic accepted that the collected data could be analysed.

Five patients in the intervention group did not receive teleconsultations; one patient died after randomisation, but before discharge, and four patients withdrew their consent after randomisation, but before the telemedicine equipment was installed. Furthermore, of the 266 randomised patients, 18 did not meet the inclusion criteria; 14 patients did not meet spirometry criteria for COPD at follow-up in a stable period of their disease and four patients were diagnosed with cancer after randomisation but within the intervention period. Adjusted analyses without these patients showed no significant differences in readmissions and mortality between the primary analyses compared to the adjusted analyses between the groups.

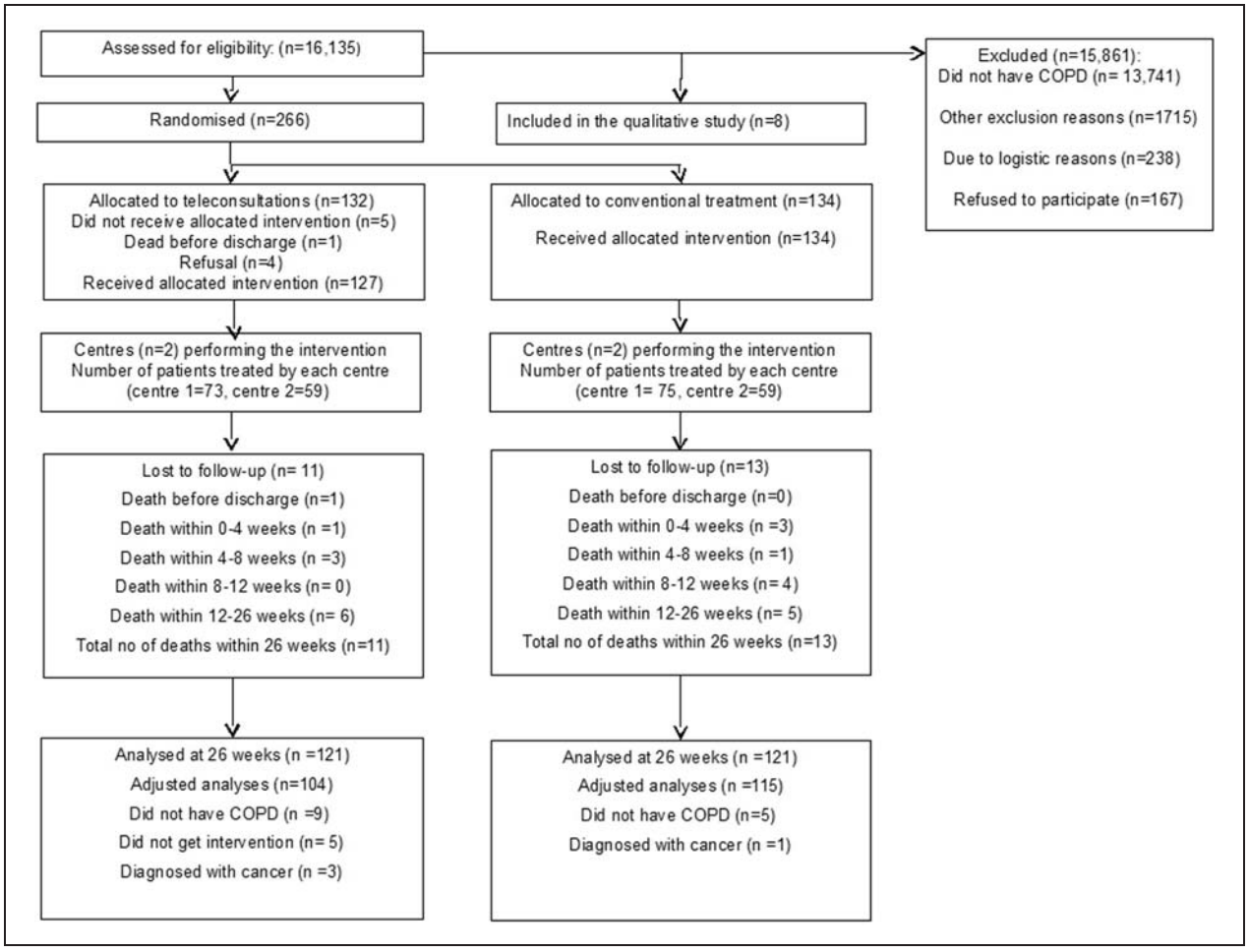


**Figure 2.** Participant flow diagram.

### Baseline characteristics

The demographic and baseline variables are summarised in Table 1. There were no significant differences between the groups regarding age, sex, marital status, work status, smoking habits, education, clinical characteristics or comorbidity. However, there was a non-significant tendency that the intervention patients had lower $FEV_1$ and lower school education than the control patients, and the control patients used Long Term Oxygen Therapy (LTOT) more than the intervention patients.

### Primary outcome

There was no significant difference in total hospital readmissions ($P = 0.62$) between the groups within the 26 week trial period (Table 2).

### Secondary outcomes and control for confounders

There were no significant differences between the two groups at any time in any outcomes during the 26 weeks of the trial period (Tables 2 and 3). The time to first

**Table 1.** Baseline characteristics.

| | Intervention (n = 132) | Control (n = 134) | *P*-value |
|---|---|---|---|
| Age, years (SD) | 71 (10) | 72 (9) | 0.63 |
| Sex, female, n (%) | 79 (60) | 83 (62) | 0.80 |
| Education, n (%) | | | |
| Primary school (<7 years) | 80 (61) | 75 (56) | 0.12 |
| Secondary school (8–10 years of school) | 36 (27) | 51 (38) | |
| Upper secondary school (12–13 years of school) | 8 (6) | 4 (3) | |
| Marital status, n (%) | | | |
| Cohabiting | 62 (47) | 66 (49) | 0.72 |
| Education, n (%) | | | |
| Completed an education/training | 41 (59) | 35 (70) | 0.25 |
| Smoking, n (%) | | | |
| Current smoker | 48 (37) | 46 (34) | 0.12 |
| Previous smoker | 78 (60) | 85 (63) | 0.16 |
| Never smoked | 4 (3) | 3 (2) | 0.37 |
| Pack-year mean (SD) | 40 (19) | 42 (18) | 0.45 |
| Clinical characteristics, mean (SD) | | | |
| Body mass index $kg/m^2$ | 25 (5.5) | 25 (6.4) | 0.62 |
| $FEV_1$, litre | 0.78 (0.32) | 0.82 (0.35) | 0.28 |
| $FEV_1$, % | 33 (13) | 37 (14) | 0.13 |
| $FEV_1$/FVC | 48 (14) | 47 (13) | 0.73 |
| Pulse/min | 85 (15) | 89 (17) | 0.07 |
| Saturation, % | 93 (5) | 93 (3) | 0.23 |
| MRC dyspnoea scale, units | 4.24 (0.96) | 4.25 (0.94) | 0.92 |
| Need for LTOT, n (%) | 11 (9) | 15 (12) | 0.83 |
| Co-morbidity, n (%) | | | |
| Infections | 69 (52) | 74 (55) | 0.62 |
| Heart diseases (diagnostic code I00–52) | 46 (35) | 48 (36) | 0.63 |
| Cerebrovascular diseases (diagnostic code I52–99) | 12 (9) | 11 (8) | 0.80 |
| Depression (diagnostic code F32–39) | 2 (2) | 3 (2) | 0.74 |
| Diabetes (diagnostic code E10–14) | 18 (14) | 15 (11) | 0.92 |
| Osteoporosis (diagnostic code M80–85 | 22 (17) | 26 (19) | 0.56 |
| Cancer (diagnostic code C30–C39) | 0 (0) | 1 (1) | 0.34 |
| Hospital admissions per patient one year before index admission, mean (SD) | | | |
| Total number of admissions | 2.75 (2.32) | 2.64 (2.5) | 0.70 |
| AECOPD | 2.27 (2.17) | 2.20 (2.03) | 0.78 |

FEV1 = forced expiratory volume in 1 second; FVC = forced vital capacity; LTOT = long term oxygen therapy; AECOPD = acute COPD exacerbation.

**Table 2.** Mean number of readmissions.

| | Control Mean (SD) | Intervention Mean (SD) | Difference Mean (95% CI) | *P*-value |
|---|---|---|---|---|
| Total readmissions | | | | |
| 4 weeks | 0.31 (0.69) n = 131 | 0.39 (0.72) n = 130 | −0.08 (−0.25, 0.09) | 0.35 |
| 8 weeks | 0.57 (1.00) n = 130 | 0.73 (1.27) n = 127 | −0.16 (−0.44, 0.12) | 0.26 |
| 12 weeks | 0.86 (1.40) n = 126 | 0.89 (1.45) n = 127 | −0.03 (−0.38, 0.32) | 0.87 |
| 26 weeks | 1.56 (2.40) n = 121 | 1.42 (2.07) n = 121 | 0.14 (−0.40, 0.68) | 0.62 |
| AECOPD readmissions | | | | |
| 4 weeks | 0.28 (0.62) n = 131 | 0.36 (0.70) n = 130 | −0.09 (−0.25, 0.07) | 0.28 |
| 8 weeks | 0.47 (0.81) n = 130 | 0.63 (1.18) n = 127 | −0.16 (−0.40, 0.09) | 0.20 |
| 12 weeks | 0.72 (1.16) n = 126 | 0.77 (1.32) n = 127 | −0.05 (−0.35, 0.25) | 0.75 |
| 26 weeks | 1.28 (2.10) n = 121 | 1.22 (1.92) n = 121 | 0.06 (−0.43, 0.54) | 0.82 |

**Table 3.** Mean number of hospital days.

| | Control Mean (SD) | Intervention Mean (SD) | Difference (95% CI mean) | *P*-value |
|---|---|---|---|---|
| Total hospital days | | | | |
| 4 weeks | 1.18 (3.27) (n = 131) | 1.02 (2.23) (n = 130) | 0.16 (−0.52, 0.83) | 0.65 |
| 8 weeks | 2.70 (7.29) (n = 130) | 2.34 (5.10) (n = 127) | 0.36 (−1.16, 1.88) | 0.64 |
| 12 weeks | 3.93 (8.98) (n = 126) | 2.77 (5.64) (n = 127) | 1.17 (−0.64, 2.98) | 0.21 |
| 26 weeks | 6.37 (11.44) (n = 121) | 4.94 (8.24) (n = 121) | 1.43 (−0.97, 3.84) | 0.24 |
| AECOPD hospital days | | | | |
| 4 weeks | 1.10 (3.19) (n = 131) | 0.97 (2.20) (n = 130) | 0.13 (−0.53, 0.79) | 0.71 |
| 8 weeks | 2.13 (5.92) (n = 130) | 2.06 (4.70) (n = 127) | 0.07 (−1.22, 1.36) | 0.92 |
| 12 weeks | 3.25 (7.70) (n = 126) | 2.46 (5.20) (n = 127) | 0.80 (−0.79, 2,39) | 0.32 |
| 26 weeks | 5.16 (9.73) (n = 121) | 3.88 (7.39) (n = 121) | 1.29 (−0.80, 3.37) | 0.23 |

readmission was longer in the intervention group (151 days) compared to the control group (134 days), but not significantly ($P = 0.49$) (Figure 3). There was no significant difference in time to death (75 days in the intervention group compared to 74 days in the control group), see Figure 4. Inclusion of risk factors did not change this.

For hospital 2 there was a weak tendency of an effect of teleconsultations reducing the total hospital readmissions per patient, the number of hospital readmissions with AECOPD per patient, total hospital readmission days per patient and hospital readmission days with AECOPD per patient at 4, 8, 12 and 26 weeks in comparison to hospital 1 (Tables 4 and 5, see online archive).

Intervention patients had a median of 6.6 consultations (0-9) and 1 follow-up telephone call. Twenty-seven of them conferred with an in-house respiratory physician

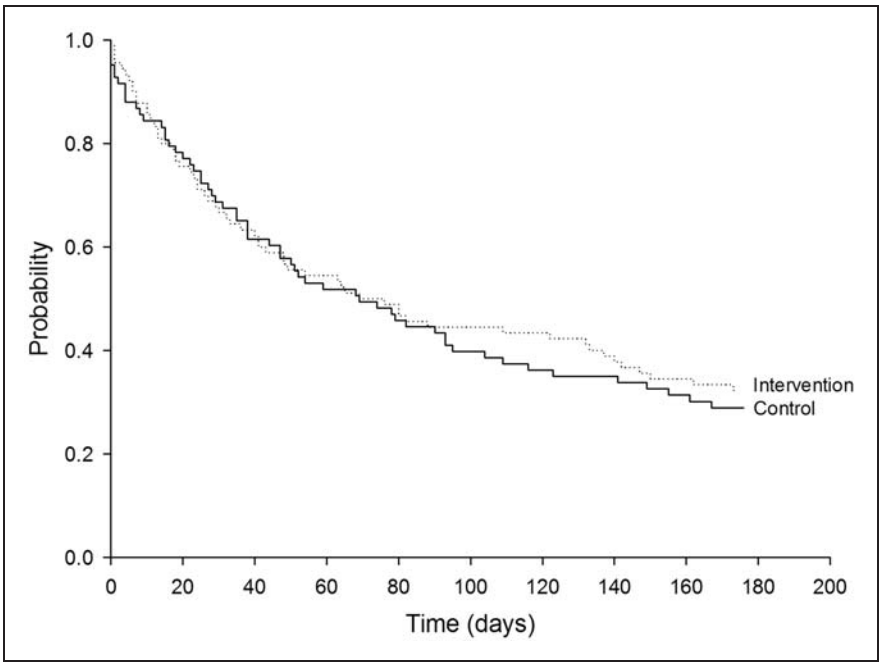


**Figure 3.** Readmission estimates.

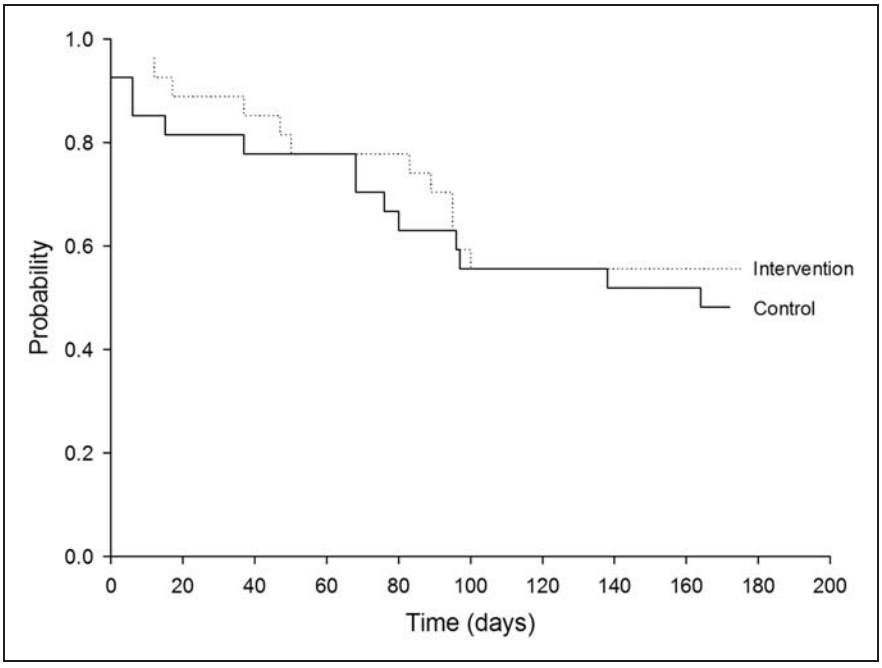


**Figure 4.** Survival estimates.

due to respiratory problems (in total 38 consultations, 7 patients >1 consultation). Two patients were seen acutely in the outpatient clinic and one was subsequently re-admitted. Five patients were advised to consult their general practitioner because of medical problems not related to the respiratory system. The home care nurse was contacted regarding five patients due to minor medical problems not related to the respiratory system, and the technicians were contacted 36 times amongst 29 patients.

## Discussion

The present study investigated the effect of one week of real-time video consultations between hospital-based nurses and patients discharged after hospitalisation

with AECOPD. The addition of teleconsultations to conventional treatment did not affect mortality, and there was no significant reduction in hospital readmission, duration of admissions or mortality during a period of 26 weeks from discharge.

The results from hospital 2 showed a weak tendency for teleconsultations to reduce the total number of readmissions and total readmission days, and the number of readmissions and readmission days with AECOPD, but these differences were not significant. In contrast, the results from hospital 1 only showed reduced hospital readmission days and readmission days with AECOPD at 12 weeks and 26 weeks (not significant). Hospital 1 when compared to hospital 2 seemed to have a higher total readmissions and AECOPD readmission per patient one year before the trial as well as 26 weeks after inclusion (not significant). Hospital 2 when compared to hospital 1 seemed to have more admission days in both groups one year before the trial (Tables 4 and 5). This changed after teleconsultation in the intervention group (Table 4 and 5). There was no significant difference in the characteristics of the patients between the two hospitals. A potential factor influencing the difference could be the fact that the nurses from hospital 2 had extensive experience with teleconsultation and technologically-mediated care. A qualitative study showed that technological mediation of nursing changes nurse practices, and that new routines subsequently evolve.[11]

## Comparison with other trials

To the best of our knowledge, the present study is the largest RCT of a well-defined telemedicine intervention targeted at severely ill COPD patients discharged after AECOPD hospitalisation. The telemedicine equipment was installed and removed by a technician, and as a consequence, the nurses' contacts and instructions to the patients were given solely via videoconferencing. Therefore, we believe that our results showed the effects of telemedicine intervention exclusively.

The reason for the overall limited differences in readmission between the two groups observed in the present trial may be explained in several ways. One explanation might be that the duration of the intervention in the present trial was very short: between 5 days and 9 days. This duration was chosen based on the experience from a non-randomised intervention study which used the same telemedicine intervention where the intended duration of teleconsultations was approximately one week.[10] The duration of the intervention in the present trial was much shorter compared to other telemedicine RCTs with COPD patients which have shown significant effects on readmission.[4,6,7,12,13] The latest information from the Danish register for COPD indicates that most COPD patients are readmitted within the first 14 days after discharge.[2] This suggests that it might be useful to continue with the teleconsultations for 14 days in patients with persisting symptoms until the symptoms return to baseline.

The patients participating in the present trial were the frailest COPD patients. They were elderly, the majority had severe or very severe COPD, they had previously been admitted with AECOPD, they had multiple comorbidities, they were current or previous smokers and 10% used LTOT. These are all factors known to be related to increased mortality and morbidity with increased readmissions.[14–20]

The patients in the present trial seemed to have more severe COPD (i.e. higher MRC and lower $FEV_1$), compared to patients in other telemedicine trials. In other trials[4,12,13] the age-group was the same (71–72 years), but the patients had less dyspnoea, higher $FEV_1$ and fewer AECOPD admissions in the previous year before index admission. The positive results showing significantly fewer readmissions in the telemedicine intervention group compared to conventional treatment were seen in patients who received a combination of different types of intervention including telemedicine, or they included patients with different diagnoses or different (6–12 months) follow-up period than in the present trial. Therefore, it is not possible to make a direct comparison between the readmission and mortality results from these different studies. A possible explanation for the high readmission rate and low mortality in the present trial might be that the patients were readmitted at an earlier stage, so they were readmitted before they became seriously ill. That might lead to more readmissions but lower overall mortality.

The mean duration of hospital admission for intervention patients was 3.2 days compared to 3.9 days in the control group. This is similar to or less than the duration per hospital admission for supported early discharge.[21–24] Overall, it is much lower compared to days per admission showed by Hendriksen *et al.* (7.4 days)[7] and in results from the Region of Southern Denmark from 2007 (5.3 days) in groups of non-selected COPD patients. It is not possible to make a direct comparison between trials with selected groups of AECOPD patients as in the present trial and trials with non-selected groups of AECOPD patients as in the trial from Hendriksen *et al.* and trials using register information. Furthermore, duration of admission has been decreasing dramatically within the last ten years.

## Limitations

It was necessary to screen more than 16,000 patients to be able to include 266 patients in the present trial. This was due to the fact that all acute patients admitted to the acute medical admissions unit or the respiratory medicine ward were screened for inclusion in the trial and less than one eighth of them suffered from COPD. More than one eighth of the eligible COPD patients were included in the trial. The most common reason for not being included was that they did not meet the inclusion criterion of having an acute exacerbation. Admissions with other severe diseases such as heart failure, cancer or previous

participation in the present trial were other important reasons for not being included. The inclusion and exclusion criteria were chosen with the aim of obtaining a well-defined homogeneous group of AECOPD patients, but it can be argued that the inclusion and exclusion criteria resulted in a too narrowly-selected group of patients. In addition, the present trial focused on patients having a high risk of readmission. Therefore, it can be argued that the design of the trial intervention itself was a hindrance to prevent readmission, due to the fact that the nurses could not continue with the teleconsultations after nine days, even though the patients had symptoms of a worsening in their disease.

## Conclusion

In conclusion, the addition of one week of teleconsultations by hospital-based nurses after hospitalisation with AECOPD was as effective as conventional treatment, but it did not significantly reduce readmissions or affect the mortality rate.

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