Nurse-initiated telephone follow-up on patients with chronic obstructive pulmonary disease improves patient empowerment, but cannot prevent readmissions

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ABSTRACT

INTRODUCTION: Readmissions reduce quality of life and increase mortality. Furthermore, disease severity and shortened length of stay make it difficult to support disease management during admission. The aim of this study was to explore whether telephone follow-up after discharge may reduce readmission rates, lower mortality and improve disease management in patients with chronic obstructive pulmonary disease (COPD).

METHODS: This was a randomised controlled trial (n = 224) with nurse-initiated telephone intervention after discharge. On day 30, questionnaires about health status and perceptions of disease management were completed. Readmission and death were recorded on days 30 and 84.

RESULTS: There was no significant difference in readmission rates, but significant differences in patients' assessment of own perception of managing dyspnoea, lung symptoms, ability to react to signs of exacerbation and communicate with health professionals. There was a trend towards a higher mortality in the control group, but it was not statistically significant.

CONCLUSIONS: Nurse-initiated telephone follow-up does not reduce readmission rates, but does empower patients with COPD.

FUNDING: The project was funded in part by the Capital Region of Denmark as part of the implementation of The National Plan for Elderly Medical Patients.

TRIAL REGISTRATION: The Danish Data Protection Agency approved the project (j. no.NOH-2015-035) and approval was obtained from The Regional Ethics Committee (notification number 27518).

Patients with COPD are often admitted with an acute exacerbation and their mortality rate is high. Thus, mortality rates at 30 days and one year after discharged were previously reported to be 4.5% and 25.5%, respectively [1, 2]. In total, 58-63% of the patients are readmitted within one year [3, 4]. The frequent admissions are a burden for patients and costly for the healthcare system [1]. During admission it may be difficult to focus on disease management as the disease complexity typically increases and the time of admission shortens. Furthermore, patients may find it difficult to remember all the information they are given [5]. Thus, many patients encounter a variety of problems such as a deficit of knowledge in understanding symptoms experienced or the advice given, both of which create uncertainty and anxiety in the first weeks after discharge [6]. Patients with chronic obstructive pulmonary disease (COPD) often find it exhausting to attend outpatient clinics due to breathlessness and reduced mobility [7]. Nurse-initiated telephone interventions may therefore be one way of following up on admission, discharge and any information given to the patients.

METHODS

This was a single-centre randomised clinical trial.

Study population

Patients were recruited from December 2010 to May 2012 by the primary investigator (PI) in either the Emergency Care or in the Department of Pulmonary and Infectious Diseases at a university hospital in Denmark. During their admission, the patients were asked whether they wanted to participate and they signed an informed consent letter if they agreed to participate. Patients included in the study had been diagnosed with COPD, according to the International Classification of Diseases, tenth version (codes DJ 440, DJ 441, DJ448, DJ448B or DJ 449) with an acute exacerbation or pneumonia. Patients could only be included once. Excluded were patients with cognitive disorders, e.g. dementia, severe hearing problems, people who did not speak Danish or who had no access to a telephone.

Intervention

As inspiration for the upcoming telephone intervention, a pilot study with three semi-structured interviews was conducted to explore the patients' experiences before, during and after an acute admission and to determine how they managed their disease in everyday life.

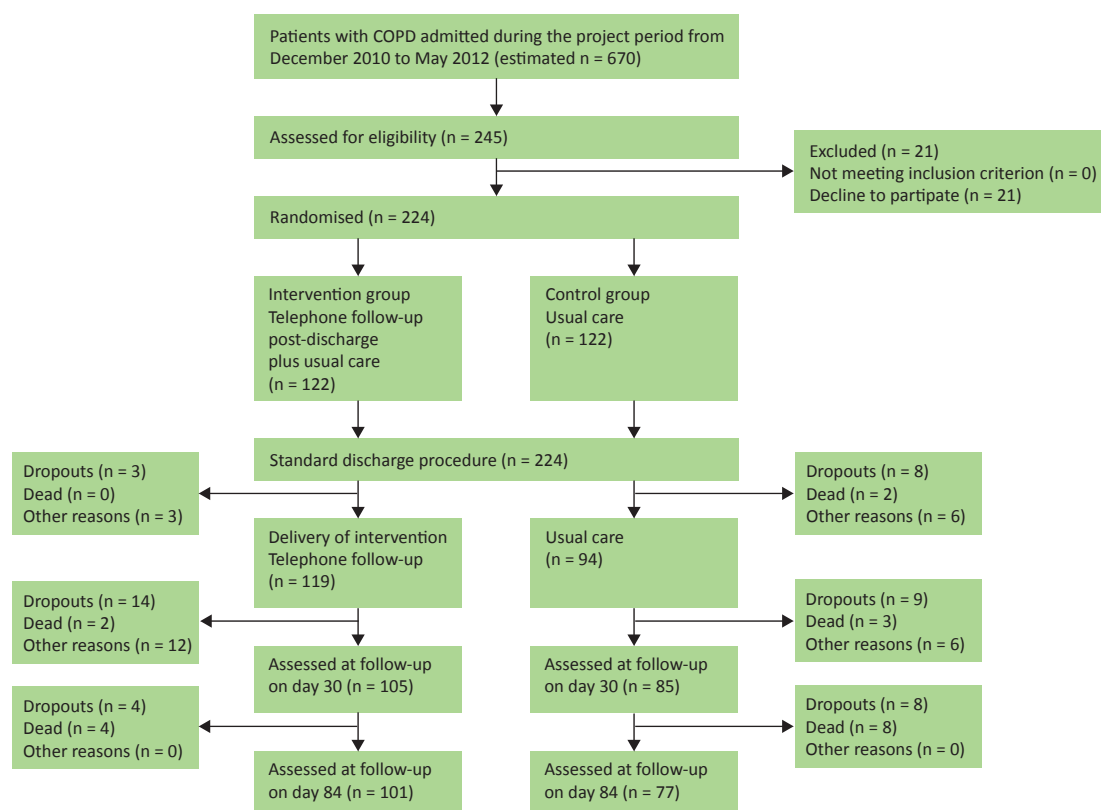Both groups received usual care consisting of a final

Flow chart showing numbers of participants and dropouts in the two groups.

COPD = chronic obstructive pulmonary disease.

medical round, where the patients were assessed regarding smoking and pulmonary rehabilitation, and an appointment made in the outpatient clinic three month after discharge. Furthermore, a discharge summary was sent to their general practitioner. In addition, the intervention group received nurse-initiated telephone follow-up consisting of two telephone follow-up calls on day 2 and day 30 after discharge. Within this period, additional telephone calls were offered if either the nurse or the patient found that this was required. Besides the PI, calls were made by two nurses from the outpatient clinic, all with more than five years of experience in respiratory nursing. The telephone calls were guided by a semi-structured manual, but always took their starting point from the patient's present needs. The manual was inspired by the pilot test, patient education focusing on empowerment [8, 9] and centred on admission, awareness of signs of exacerbations and disease management. The chosen methods help clarify the individual patient's needs and focused on supporting active participation in own disease management. During the first call on day 2, the patients were asked about their experiences with the hospitalisation and invited to ask any questions re-

lated to disease, symptom management, inhalation medicine, medicine in general, outpatients' visits or homecare. The additional telephone calls were aimed at providing knowledge to support disease management in daily life, but nevertheless took into account any of the patient's present needs. If problems occurred during the conversation, the nurse could use the normal options for actions such as discussing the problems with a pulmonary specialist, contacting primary care or relatives after obtaining the patient's permission. On day 30, the last follow-up call was made. The control group had one telephone call on day 30 during which they answered a questionnaire.

Outcomes
The primary outcome was readmission rate. Mortality and disease management were secondary outcomes. Both numbers of readmissions and baseline data were collected through medical records as historical data. Readmissions and deaths were recorded on day 30 and day 84 after discharge. The days chosen were based on a prior Danish study [10]. On day 30, both groups answered a questionnaire consisting of generic questions

about health status and assessment of own perception and ability to manage COPD and related symptoms. We developed a questionnaire based on selected questions from the Short Form-12 questionnaire [11], the participating nurses' experience, the experience gained from the pilot study and from literature in general. The intervention group also answered a question whether their awareness of the telephone intervention made them feel secure at the time of discharge and whether they would accept telephone follow-up another time.

Randomisation, statistics and sample size calculation
Patients were randomised to one of two groups based on "odd or even" minute of time of admission. Continuous data are presented as means and standard deviations, discrete data as counts and percentages. Comparisons between randomisation groups were performed using the Pearson's chi-squared test or Fisher's exact test, as appropriate. The design is paired with a power of 0.80 and α at $p = 0.05$. A power calculation was made based on the assumption that the readmission rate could be reduced by 15% [10, 12]. According to the power calculation, 97 persons were required in each group.

Trial registration: The Danish Data Protection Agency approved the project (j. no. NOH-2015-035) and approval was obtained from The Regional Ethics Committee (notification number 27518).

RESULTS
In total, 224 patients were enrolled. The limited number of patients is due to the fact that patients were enrolled only by the PI on her days of work. Due to practical issues, enrolment took place during admission and not at the time of discharge, meaning that in some cases (n = 9) the diagnosis changed after enrolment from COPD to, e.g., asthma or lung fibrosis. **Figure 1** shows the number of participants and dropouts throughout the 84-day period. Reasons for dropouts other than mortality were: no contact possible (n = 9), admitted to another ward (n = 4) and patients who decided not to participate anyway (n = 5).

We found no clinically significant differences according to baseline characteristics between the two groups (**Table 1**). The mean time of admission was seven days with no difference between the groups.

A total of 335 telephone follow-up calls were performed in the intervention group. The average time spent per call was as follows: six minutes on preparation, 11 minutes on the conversation and 12 minutes on follow-up and documentation.

The evaluation of the satisfaction with the telephone calls showed that 22% of the patients were feel-

ing insecure at the time of discharge based on lack of readiness. Often patients perceived that receiving information about discharge on the same day it took place, was hectic, unstructured and had not been planned properly, which led to extensive coordination and large amounts of information being given within a short time span. Telephone follow-up contributed to improving the quality of patient care by identifying regulatory failure or ambiguities, such as lack of outpatient visits, incorrect medication, and it generated a sense among the patients of not have been left alone. In total, 93% of the patients agreed or agreed strongly that awareness of the telephone intervention gave them a sense of security at discharge, and 99% would accept telephone follow-up another time.

Readmission and mortality
We found no significant differences in readmission rates between the two groups. After 30 days, the readmission rate was 33% for the intervention group and 34% (p = 0.84) for the control group. After 84 days, the numbers

TABLE 1

Baseline characteristics for the patients included in the study.

Demographic data	Intervention group	Control group
Male, n (%) (N = 119/94)	46 (38.7)	37 (39.4)
Age, yrs, mean (± SD) (N = 119/94)	69.72 (± 10.3)	70.90 (± 9.79)
Living arrangements, n (%) (N = 119/94)		
Spouse	56 (47.1)	41 (43.6)
Single	52 (43.7)	46 (48.9)
Living with other family	4 (3.4)	4 (4.3)
Others	7 (5.8)	3 (3.2)
Smoking status, n (%) (N = 119/93)		
Smoker	49 (41.2)	35 (37.6)
Ex-smoker	66 (55.4)	57 (61.3)
Never smoker	4 (3.4)	1 (1.1)
MRC dyspnoea scale[a], n (%) (N = 108/68)		
1	5 (4.6)	0 (0.0)
2	16 (14.8)	5 (7.4)
3	30 (27.8)	19 (27.9)
4	32 (29.6)	25 (36.8)
5	25 (23.2)	19 (27.9)
Fev1, % of predicted, mean (± SD) (N = 113/88)	38.0 (± 14.8)	37.3 (± 14.8)
BMI , kg/m^2, mean (± SD) (N = 106/86)	24.9 (± 6.4)	24.8 (± 6.94)

BMI = body mass index; FEV1 = forced expiratory volume in the 1st sec.; MRC = Medical Research Council; SD = standard deviation.
a) Scale 1-5, corresponding to the modified MRC 0-4.

TABLE 2

The patients' assessment of managing chronic obstructive pulmonary disease (COPD) and the ability to communicate with physicians and nurses. The values are n (%).

	Intervention group	Control group	p-value
Sufficient knowledge			0.109[a]
(N = 105/83)			
Agree strongly	31 (30)	15 (18)	
Agree	50 (48)	43 (52)	
Neutral	9 (8)	15 (18)	
Disagree	15 (14)	10 (12)	
Managing dyspnoea			0.002[b]
(N = 104/83)			
Agree strongly	46 (44)	16 (19)	
Agree	47 (45)	52 (63)	
Neutral	2 (2)	6 (7)	
Disagree	9 (9)	9 (11)	
React on signs on exacerbations			< 0.001[b]
(N = 104/83)			
Agree strongly	42 (40)	14 (17)	
Agree	51 (49)	40 (48)	
Neutral	9 (9)	21 (25)	
Disagree	2 (2)	8 (10)	
Manage COPD symptoms in daily life			0.028[b]
(N = 103/83)			
Agree strongly	42 (41)	18 (22)	
Agree	53 (51)	53 (63)	
Neutral	5 (5)	9 (11)	
Disagree	3 (3)	3 (4)	
Communicate with health professionals			< 0.001[b]
(N = 101/83)			
Agree strongly	59 (58)	33 (40)	
Agree	32 (32)	49 (59)	
Neutral	5 (5)	1 (1)	
Disagree	5 (5)	0 (0)	

a) Pearson's χ^2-test.; b) Fisher's exact test.

were 32% and 27%, respectively (p = 0.66). On day 30, the mortality rate was 1.9% in the intervention group and 3.4% in the control group. On day 84 the numbers were 5.6% and 12.5%, respectively. There was a trend towards a higher mortality in the control group, although it was not statistically significant (p = 0.09).

### Patients' assessment of managing chronic obstructive pulmonary disease

As shown in **Table 2**, significant differences were found between the two groups with respect to: How they assessed their own perception of managing dyspnoea, symptoms in daily life, their ability to react to signs of exacerbation, and their perception of their ability to communicate with physicians and nurses. The main difference between the two groups was that the intervention group was more likely to move the answers from the category Agree to the category Strongly agree.

DISCUSSION

There is currently a focus, medically as well as politically, on preventing acute exacerbations and admissions [13], both of which affect the patients' quality of life in a negative manner [14]. Preventing or decreasing (re)admission rates are typical endpoints in studies concerning patients with COPD. However, it could be discussed whether it is realistic to prevent admission of the patients with the most severe COPD due to the complexity of the disease and the number of multi-disease cases. It was previously established that a high risk of recurrence of acute exacerbations exists within eight weeks of recovery and that acute exacerbations occur at an increasing frequency as the disease progresses [15]. In our study, no difference regarding readmissions rate in the two groups was found. An embedded bias resulting from the support provided by the nurse and from the close contact established between patient and nurse may possible produce a more rapid admission compared with control patients who have to assess their condition and need of medical contact themselves. We did not examine whether there were any change of the number of contacts to, e.g., general practitioners in the study groups.

However, the importance of disease management, empowerment and rapid treatment of exacerbations may be supported by the trend towards a lower mortality in the intervention group which indicates patients were admitted at an earlier and less severe stage of their acute exacerbation that thanks to a focus on management of exacerbations. Bourbeau et al [16] showed that patients who receive disease-specific self-management education and are supervised for one year have fewer hospitalisations, emergency department visits and unscheduled physician visits. However, a study comprising a comprehensive care management programme that intended to prevent hospitalisations of patients with COPD reported a higher mortality in the intervention group. Nevertheless, the study has not provided data to substantiate full explanation of the excess mortality observed [17].

Discharge problems are often related to misunderstandings and informational needs. In complex and acute hospital settings, patients may find it difficult to understand and relate to new information and they are often reluctant to disturb healthcare professionals with questions [6]. Telephone follow-up after discharge is seen as a way of exchanging information, providing health education and health quality aftercare service [6]. Questions and uncertainties that may occur in the home setting can be countered and it is possible to enhance patients' ability to manage everyday life with COPD by focusing on how to integrate the demands of the disease into their daily routine beyond simply increasing their knowledge of pathophysiology [18]. In line here-
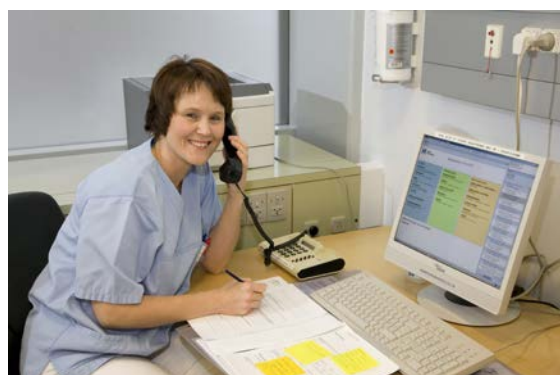
Sabine Mazurek during nurse-initiated telephone follow-up with a newly admitted patient.

with, Wong et al [19] show that a nurse-initiated telephone follow-up is effective in increasing self-efficacy in the management of dyspnoea. However, a systematic review exploring telephone follow-up found it difficult to determine the effect of follow-up delivered in the first month after discharged in regard to psycho-social and physical outcomes due to low methodological quality and heterogeneity of the studies [6].

In this study, the average time spent on each telephone call is almost 30 minutes when preparation, conversation and documentation are included. A discussion point is whether the intervention should be identical for all. In future work on telephone interventions, it could be interesting to find ways to select and differentiate types of follow-up. For some patients, if any questions arise after discharge, it will probably be enough to receive a telephone number allowing the patients to call a health professional. Other patients, however, are not likely to establish contact themselves. Especially in a vulnerable population, which has difficulty assessing the health services, a telephone follow-up scheme could be relevant [7].

Limitations of the study

The study was initiated as a development project and not as research. This has given rise to some methodical limitations due to the practical implementation of the study. The two groups were randomised based on "odd or even" minute of time of admission, meaning that the enrolling nurse (PI) was not blinded to the randomisation. However, all the patients were admitted and recorded at the Emergency Care Unit, so the PI had no influence on the recorded time of admission. Methodically, the study could have been optimised through random allocation using a system of sequentially numbered opaque sealed envelopes or a computer-based system.

Likewise, the interviewing nurse was not blinded, which involves a risk of introducing allegiance and social desirability bias.

CONCLUSIONS

The nurse-initiated telephone follow-up produced no significant difference in readmission rates, but significant differences were observed in patients' assessment of their own perception of managing dyspnoea, lung symptoms, ability to react to signs of exacerbation and communicate with health professionals. We recorded a trend, although not statistically significant, towards a higher mortality in the control group. The patients who receive follow-up experience a sense of security and virtually everyone will accept the offer again. Furthermore, telephone calls increase the quality of patient care, as several errors and ambiguities were identified and resolved.

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