

Management of chronic obstructive pulmonary disease in general practice in Denmark

Anders Løkke^{1,2}, Jens Søndergaard³, Merete K. Hansen⁴, Klaus Roslind⁵ & Peter Lange^{6,7}

ABSTRACT

INTRODUCTION: In recent years, increased awareness and focus on chronic obstructive pulmonary disease (COPD) has evolved. Alongside, a growing interest has emerged in quality of care including early diagnosis, smoking cessation, rehabilitation and relevant medication as tools for achieving a better prognosis.

METHODS: The aim of this study was to analyse the quality of real-life management of COPD in a representative sample of Danish general practices. Our main focus was to measure the fulfilment of ten specific quality-of-care indicators at the annual control visit for management of COPD, as suggested by the Danish Society of General Practitioners (DSAM), by extracting relevant data from the electronic patient medical records (PMR) of the general practitioners' (GP) electronic patient filing systems.

RESULTS: In total, 82 GP clinics participated in the study. Approximately half were solo clinics and the rest were various types of partnership clinics. The records of 1,556 COPD patients (51.3% males) with an average age of 69.7 years (range: 36-97 years) were included. We found the level of registration of the quality-of-care standards to be very low, as only 11.1% (95% confidence interval: 7.9-15.8%) of the PMR recorded an acceptable (80-99%) or excellent (100%) registration.

CONCLUSIONS: Improvement of adherence to COPD guidelines among GPs is of paramount importance to improve management and reduce the overall burden of COPD. However, this study demonstrates that substantial room for improvement remains.

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TRIAL REGISTRATION: The trial was approved by the Danish Health Authority and the Danish Data Protection Agency.

Chronic obstructive pulmonary disease (COPD) causes a substantially impaired quality of life, increases the risk of premature death and represents a significant burden for the healthcare systems as well as for the individual patient and the patient's relatives [1, 2].

COPD is characterised by airflow limitation that is not fully reversible.

In recent years, increased awareness and focus on COPD has evolved in Denmark because of the recogni-

tion of an even higher incidence of and mortality from COPD than in other Western countries [3, 4].

Former studies in general practice in Denmark have shown that focusing on relevant aspects of COPD can lead to an improvement in the quality of both the diagnostic process and treatment [5-7]. To improve the quality of COPD care, new disease management programmes describing correct COPD management in sectors of the healthcare system have recently been implemented in every region of Denmark. As part of the programme, an annual primary care control visit during a stable period is recommended for all patients – barring the most disabled patients who are followed at hospital out-patient clinics. The most recent agreement between Danish Regions and general practitioners (GPs) supports a transition of outpatient COPD care from hospitals to GPs. It is therefore highly relevant to investigate the present quality of COPD care in general practice.

The present study, named OptiKOL (short for registering treatment in general practice – going through COPD parameters), was initiated to investigate the quality of real-life management of COPD in a sample of Danish general practices.

METHODS

We aimed to recruit approximately 90 GPs who were willing to participate in the study, corresponding to approx. 2.5% of Danish GPs. To ensure a representative sample, we included GPs from all Denmark, including both city and countryside practices and a mix of various types of GP clinics: solo practices, companionships and occupational clinics. A total of 196 GP clinics were invited of which 92 accepted to participate and among which 82 clinics would eventually complete data collection.

The OptiKOL project was approved by the Committee of Multi-Practice Studies in General Practice, according to The European Federation of Pharmaceutical Industries and Associations codex, and by the Danish Association of the Pharmaceutical Industry. The study was approved by the Danish Data Protection Agency.

Written information about the project together with the invitation to participate were distributed to the GPs by representatives of the sponsoring company.

During the six-month study period from March to November 2013, the participating GPs were asked to enrol a random sample of 20 patients with COPD who

ORIGINAL ARTICLE

- 1) Department of Medicine, Vejle, Little Belt Hospital
- 2) Faculty of Health Sciences, University of Southern Denmark
- 3) Research Unit for General Practice, Institute of Public Health, University of Southern Denmark
- 4) DTU Compute, Section for Statistics and Data Analysis, Technical University of Denmark
- 5) Aaruplægerne, Aarup,
- 6) Section of Social Medicine, Department of Public Health, University of Copenhagen
- 7) Respiratory Section, Medical Department O, Herlev-Gentofte Hospital, Denmark

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had visited the clinic for annual control of their known COPD at some point in 2012. The eligibility criteria for the study were as follows:

Inclusion criteria

- COPD for at least two years
- Age > 35 years.

Exclusion criteria

- Asthma
- Terminal illness or living at a nursing home
- Patients not expected to be mobile enough to attend a COPD control visit at their GP.

COPD patients were identified through the GPs electronic record systems by searching for the International Classification of Primary Care code (ICPC code) R95: COPD.

If the GP clinic did not use ICPC codes as a standard, we searched for the COPD medication considered by the individual GP clinic to be the first and second choice of treatment for COPD patients in the particular GP clinic (see **Figure 1** for an overview of the inclusion strategy).

Subsequently, all electronic patient record forms (PMR) and/or additional patient record-related material (e.g. spirometry printout and paper notes) were

carefully revised to secure the correct diagnosis and to check if the patient met the inclusion and/or exclusion criteria.

This review performed by the GP produced a net list comprising patients who were eligible for the study. Twenty eligible patients were identified at random from the net list and included in the study. If the net list comprised fewer than 20 patients, all patients who met the inclusion criteria and none of the exclusion criteria were included in the study.

The quality of registration was assessed for each patient as the percentage of the ten predefined annual COPD control quality-of-care standards registered in the patient-relevant material within the year in which the patient had been examined in the clinic as part of the annual control:

- 0-49% quality-of-care registration: poor registration
- 50-79% quality-of-care registration: inadequate registration
- 80-99%: quality-of-care registration: acceptable registration
- 100% quality-of-care registration: excellent registration.

Data analysis

The focus of the study was to measure the fulfilment of ten specific quality-of-care standards for management of COPD at the annual control visit as suggested by the Danish Society of General Practitioners (DSAM) [8]. For each of the ten predefined annual COPD control quality-of-care standards, the number of patients having this particular standard registered somewhere in their patient record form was reported. Also, the number of patients with one and up to ten annual control quality-of-care standards registered was counted. Finally, we recorded the number of patients falling in each of the four quality-of-care categories: Poor, Inadequate, Acceptable and Excellent.

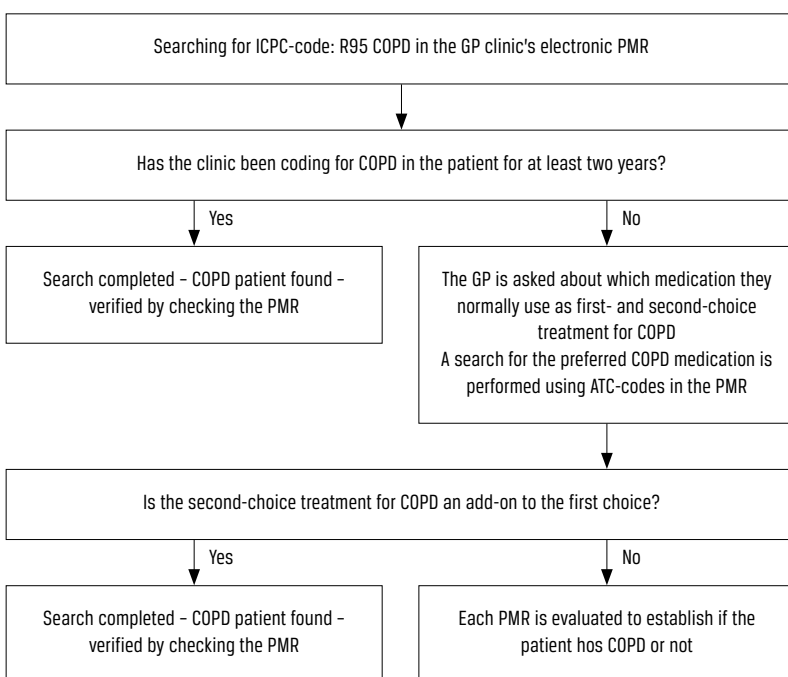
Percentages with 95% bootstrap confidence interval (CI) relating each reported number of patients to the total number of patients (1,556) was given. The bootstrap CIs reflect the hierarchical nature of the collected data, i.e., patients were sampled from 82 clinics [9].

Trial registration: The trial was approved by the Danish Health Authority and the Danish Data Protection Agency.

RESULTS

Among the 82 participating GP clinics, approximately half were solo general practices and the rest were partnership clinics. Records of 1,556 COPD patients (51.3% males) with an average age of 69.7 years (range: 36-97 years) were included in the study (**Table 1**).

FIGURE 1 / Flow diagram displaying the search strategy used by the general practitioners to identify chronic obstructive pulmonary disease patients eligible for enrolment in the study.



ATC = anatomical therapeutic chemical; COPD = chronic obstructive pulmonary disease; ICPC = International Classification of Primary Care; PMR = patient medical record.

Table 2 describes the degree of fulfilment for the ten quality-of-care standards among the 1,556 patients who were seen at their GP for the annual COPD control visit in 2012. For each of the quality-of-care standards, the number and percentage of patients who had this particular parameter registered in the patient journal is given. Wide differences were seen among registrations of quality-of-care standards, ranging from 100% for exacerbations (this was done by looking up for every patient if prescription of prednisone and/or antibiotics had been issued or not) to 12.3% for measurements of peripheral oxygen saturation using pulse oximetry. In-between these extremes fell, among others, smoking status (75.8%) and lung function (approx. 40%).

Table 3 shows the number of patients according to the number of control quality-of-care standards that were registered in their patient journal.

In more than 50% of the patient journals, no more than three of the ten quality-of-care standards were registered at the annual COPD-control visit. These were: number of exacerbations during the past year, smoking status and vaccination against influenza. The remaining seven quality-of-care standards were recorded only between 12% (95% CI: 8.9-17.1%) and 43% (95% CI: 38.0-47.4%) with the measurement of peripheral oxygen saturation by pulse oximetry as the lowest. Only 1.3% (95% CI: 0.4-4.7%) of the 1,556 patients had all ten standards of care documented in their electronic record form. Only 28% (95% CI: 23.1-33.0%) of the patients had six or more quality-of-care standards registered, whereas 10% had just one quality-of-care standard registered. The mean number of registered quality-of-care standards was four.

The overall quality of registration of the standards with respect to the four predefined groups that were mentioned in the Methods section was as follows: poor 72.3%; inadequate 16.6%; acceptable 9.8%; and excellent 1.3%

DISCUSSION

This real-life study of the quality of COPD care in Danish general practices, focusing on the fulfilment of ten specific quality-of-care standards, shows that the level of registration was very low, as only 11.1% (95% CI: 7.9-15.8%) of the 1,556 COPD patient records had acceptable or excellent documentation of the quality-of-care standards. This result is disappointing – especially when considering the fact that we are studying the PMRs of known COPD patients attending an annual control for their COPD.

We can speculate as to the reason for the poor result. All of the included GPs had electronic PMR, which should facilitate easy registration. It is possible, however, that some quality-of-care standards were actually measured at an earlier visit, but not registered. However, the in-

TABLE 1 / Basic characteristics of the enrolled general practitioners and the number of patients recruited.

Type of clinic	Solo	Partnership	Co-working clinics	Total
Included clinics, n	40	36	6	82
Patients in clinic, average, n	1,784	4,314	2,242	2,928
Patients included in the present project, n	729	709	118	1,556
Males/females, n	377/352	365/344	53/65	799/761
Age, average, yrs	69.5	69.8	70.1	69.7

TABLE 2 / Number of patients for whom each of ten predefined quality-of-care standards were registered at the annual control visit* (82 general practitioner clinics).

	n	% (95% CI)
Exacerbations during the last yr registered, total	1,556	100 (-)
Smoking status registered	1,180	75.8 (70.6-80.2)
Influenza vaccination	876	56.3 (52.0-60.4)
FEV1, % of predicted	664	42.7 (38.0-47.4)
FEV1, volume	617	39.7 (34.8-44.6)
Weight or BMI	573	36.8 (32.1-42.2)
MRC dyspnoea scale registered	321	20.6 (16.2-26.0)
Inhalation technique checked	300	19.3 (14.9-24.8)
Rehabilitation offered	222	14.3 (11.6-18.1)
Pulse oxymetry performed	192	12.3 (8.9-17.1)

CI = confidence interval; FEV1 = forced expiratory volume in 1st sec.; MRC = Medical Research Council.

a) The annual control quality-of-care standards number of exacerbations during the last year was registered for all patients, and no bootstrap confidence interval could be obtained.

TABLE 3 / Number of patients listed according to the number of chronic obstructive pulmonary disease control quality-of-care standards, which were registered at the annual control visit (1,556 patients, 82 general practitioner clinics).

Registered COPD annual control quality-of-care standards, n	Patients	
	n	% (95% CI)
1	149	9.6 (7.7-11.9)
2	271	17.4 (15.3-19.9)
3	319	20.5 (17.8-23.7)
4	221	14.2 (12.0-16.8)
5	165	10.6 (8.9-12.6)
6	147	9.4 (7.7-11.5)
7	111	7.1 (5.5-9.2)
8	93	6.0 (4.2-8.6)
9	59	3.8 (2.5-5.7)
10	21	1.3 (0.4-4.7)

CI = confidence interval; COPD = chronic obstructive pulmonary disease.

cluded GPs were paid for the time spent going through all relevant patient-related material. Yet, we cannot entirely dismiss the possibility that the GPs included patients for

whom the annual check-up was easy to identify, and this probably favours selection of patients with a higher number of fulfilled indicators.

One could argue that not all of the quality-of-care standards are equally relevant (e.g. oxygen saturation). However, the remaining selected quality-of-care standards are all recommended by the Danish College of General Practitioners [8] and are very reasonable to assess at least once annually in patients with COPD. For example, training in correct inhalation technique is highly relevant for all COPD patients but was only documented in 19.3% (95% CI: 14.9-24.8%) of the cases. Spirometry results were only registered in 39.6% (95% CI: 34.8-44.6%) concerning forced expiratory volume in the first second (FEV1) (litres) and 42.7% (95% CI: 38.9-47.4%) for FEV1 (% of predicted) although almost every GP in Denmark does have a spirometer. Furthermore, the standards are more or less the same as identified by the national Danish Registry of COPD (DRKOL) as indicators of good quality of care, and all GPs in Denmark are supposed to fill in from 2020 (with exception of saturation and vaccination status). Within a few years, valid data from the GP sector will begin to emerge in DRKOL, and it will be highly interesting to see if these measurements reveal a higher level of fulfilment from the very beginning or will need some time and focus to rise above this level.

The GP's participating in this study volunteered and are therefore likely to have a special interest in and knowledge about COPD – although we do not know for sure as they have not been asked about this. Even so, the results obtained in this study likely represent maximum obtainable values. Likewise, we strongly believe that any missing values are truly missing – the measurements were never done because the GPs were paid for the time spent going through all their patient-related documentation. This assumption seems to be underpinned by an observational study from 2013 by Koefoed et al demonstrating that a very low proportion of patients who received a first-time prescription of inhalation medication, had a spirometry performed [10]. Hence, our results may probably be generalised to the whole population of general practices in Denmark and probably to similar healthcare systems in other countries.

Previous Danish studies have focused on educational COPD programmes in general practice as a way to improve the quality of treatment and adherence to COPD guidelines. The study by Ulrik et al [7] only showed a significant impact of the educational programme with regard to use of spirometry in a subgroup of participating clinics with a high potential for improvement. Previous studies of COPD treatment in general practice in Denmark (KVASIMODO I and II) showed that the treatment regime for the majority of COPD patients included

inhaled corticosteroids, irrespective of disease severity [5, 6]. Studies from England, Australia and the United States recorded similar results, and concluded that guidelines are followed only to a very limited degree [11-13].

Kayyali et al studied COPD care delivery in five European countries [3] and showed that COPD is hugely demanding for all healthcare systems across countries, resulting in limited conventional management. They therefore pointed to new, more innovative approaches, such as telehealth and telemedicine, as possible means to improving management. Although it remains – among a wide range of other issues – to be elucidated which patients actually benefit from telemedicine [14], this is going to be implemented nationwide for COPD in Denmark from 2020 following a political decision. If this will bring any benefit remains to be seen.

Furthermore, Kayyali et al and others [15, 16] suggest prioritizing and optimizing current care pathways, services and professional integration between care settings as well as focusing on improved communication between healthcare providers and between patients and healthcare providers.

Another possible solution identified is to delegate the somewhat time-demanding task of managing patients with COPD to other medical staff than GPs – especially nurses [17]. However, this is already being done in a number of GP practices in Denmark – a transition that has been underway for a number of years.

A more radical approach was adopted in The Netherlands where a referral service was established for GPs, allowing them to refer patients with COPD and asthma with a view to establishing the correct diagnosis, performing spirometries, evaluating the need for medication, etc. [18]. This has been a considerable success. However, this solution is relatively resource-demanding and also requires a specialist set-up that might be hard to establish outside cities – although it may be cost effective and a perfect solution, accommodating the patients, the GPs as well as the specialists.

Finally, as mentioned in the introduction, the most recent agreement between Danish Regions and the GPs supports a transition of outpatient COPD care from hospitals to GPs. If this, along with the flow of patient data from the GPs to DRKOL, can improve overall quality of care in COPD will be established in the near future.

In summary, the management and outcomes for patients with COPD in GP have been moving in the right direction for quite some time now, as documented by James et al [19]. Unfortunately, these positive changes are occurring very slowly and, as this study demonstrates, there is room for substantial improvement.

Under-diagnosis and insufficient management of COPD are still common in primary healthcare. Time pressure due to a high number of patients and complex

multi-morbid conditions are causing omission of relevant investigations and procedures like lung-function measurements, smoking-cessation advice, etc. Better local routines, extended consultation time and a holistic approach are needed when managing multi-morbid patients with COPD [20].

CONCLUSIONS

Improvement in the adherence to COPD guidelines, including both diagnosis and management, among GPs is of paramount importance to reduce the overall burden of COPD.

However, this study demonstrated that even in GP clinics volunteering to participate in the OptiKOL project, there is still substantial room for improvement of the documentation of relevant and important quality-of-care standards for patients with COPD.

CORRESPONDENCE: Anders Løkke. E-mail: aloekke@gmail.com

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LITERATURE

- Løkke A, Hilberg O, Kjellberg J et al. Economic and health consequences of COPD patients and their spouses in Denmark – 1998-2010. *COPD* 2013;2555:131219075355006.
- Løkke A, Hilberg O, Tønnesen P et al. Direct and indirect economic and health consequences of COPD in Denmark: a national register-based study: 1998-2010. *BMJ Open* 2014;4:e004069.
- Kayyali R, Odeh B, Frerichs I et al. COPD care delivery pathways in five European Union countries: Mapping and health care professionals' perceptions. *Int J COPD* 2016;11:2831-8.
- Fabricsius P, Løkke A, Marott JL et al. Prevalence of COPD in Copenhagen. *Respir Med* 2011;105:410-7.
- Lange P, Rasmussen FV, Borgeskov H et al. The quality of COPD care in general practice in Denmark: The KVASIMODO study. *Prim Care Respir J* 2007;16:174-81.
- Ulrik CS, Hansen EF, Jensen MS et al. Management of COPD in general practice in Denmark - participating in an educational program substantially improves adherence to guidelines. *Int J Chron Obstruct Pulmon Dis* 2010;5:73-9.
- Ulrik CS, Sørensen TB, Højmark TB et al. Adherence to COPD guidelines in general practice: Impact of an educational programme delivered on location in Danish general practices. *Prim Care Respir J* 2013;22:23-8.
- DSAM Guideline. <https://vejledninger.dsam.dk/kol/?mode=visKapitel&cid=1046&gotoChapter=1048> (20 Aug 2019).
- Davison AC, Hinkley DV. Bootstrap methods and their application. Cambridge Series in Statistical and Probabilistic Mathematics. Cambridge University Press, 1997.
- Koefoed MM, Søndergaard J, Christensen R et al. Influence of socio-economic and demographic status on spirometry testing in patients initiating medication targeting obstructive lung disease: a population-based cohort study. *BMC Pub Health* 2013;13:580.
- Price D, West D, Brussels G et al. Management of COPD in the UK primary care setting : an analysis of real-life prescribing patterns. *Int J COPD* 2014;9:889-905.
- Reddel HK, Valenti L, Easton KL et al. Assessment and management of asthma and chronic obstructive pulmonary disease in Australian general practice. *Aust Fam Physician* 2017;46:413-9.
- Foda HD, Brehm A, Goldstein K et al. Inverse relationship between nonadherence to original GOLD treatment guidelines and exacerbations of COPD. *Int J COPD* 2017;12:209-14.
- Ambrosino N, Vagheggini G, Mazzoleni S et al. Telemedicine in chronic obstructive pulmonary disease. *Breathe* 2016;12:350-6.
- May CR, Cummings A, Myall M et al. Experiences of long-term life-limiting conditions among patients and carers: what can we learn from a meta-review of systematic reviews of qualitative studies of chronic heart failure, chronic obstructive pulmonary disease and chronic kidney disease? *BMJ Open* 2016;6:e011694.
- Marshall M, Mountford J, Gamet K et al. Understanding quality improvement at scale in general practice: a qualitative evaluation of a COPD improvement programme. *Br J Gen Pract* 2014;64:e745-e751.
- Risgaard H, Søndergaard J, Munch M et al. Work motivation, task delegation and job satisfaction of general practice staff: a cross-sectional study. *Fam Pract* 2017;34:188-93.
- Metting EI, Riemersma RA, Kocks JH et al. Feasibility and effectiveness of an Asthma/COPD service for primary care: a cross-sectional baseline description and longitudinal results. *NPJ Prim Care Respir Med* 2015;25:14101.
- James GD, Donaldson GC, Wedzicha JA et al. Trends in management and outcomes of COPD patients in primary care, 2000-2009: a retrospective cohort study. *NPJ Prim Care Respir Med* 2014;24:14015.
- Sandelowsky H, Hylander I, Krakau I et al. Time pressured deprioritization of COPD in primary care: a qualitative study. *Scand J Prim Health Care* 2016;34:55-65.