

Inclusion of Patients with COPD into The Danish National Indicator Project by Administratively Collected ICD-10 Codes:

Estimation of Validity and Completeness



The Danish National Indicator Project

Dublin 2009 ISQua Conference
Bunk AE, Lange P, Hellekist B, Fruasing E, Bartels P, Krog BR, Hansen A, Buck D, Thomsen RW

Background (1)

- Chronic Obstructive Pulmonary Disease (COPD) in Denmark
 - Approximately 300.000 persons^{*-**}
 - Prevalence among Danes 45-84 years: 9% (95% CI 8-10%)^{**}
 - Up to 23.000 acute hospital admissions a year
- Indicator monitoring for patients with COPD in the Danish National Indicator Project (DNIP) from January 1st 2008
 - 6 quality indicators for COPD outpatients
 - 3 quality indicators for COPD patients admitted for acute exacerbation of the disease

^{*}Lakke A, Lange P et al. Developing COPD: a 25 year follow up study of the general population. Thorax 2006; Nov;61(11):935-9.
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Quality indicators for COPD in DNIP

COPD outpatients				
Indicator domain	Indicator	Type	Standard	Time reference
Lung function	Proportion of COPD outpatients who have their FEV ₁ measured and registered as a percentage of expected	Process	≥ 90%	At least once a year
Nutritional status	Proportion of COPD outpatients who have their BMI calculated and registered	Process	≥ 90%	At least once a year
Shortness of breath	Proportion of COPD outpatients who have their shortness of breath measured and registered using the MRC scale	Process	≥ 90%	At least once a year
Smoking	Proportion of COPD outpatients who are inquired about and have their smoking status registered	Process	≥ 90%	At least once a year
Pulmonary rehabilitation	Proportion of COPD outpatients who smoke and who are encouraged to stop smoking	Process	≥ 90%	At least once a year
COPD patients admitted for acute exacerbation				
Non invasive ventilation	Proportion of COPD patients who receive NIV treatment during admission for acute exacerbation	Process	≥ 10%	During each hospitalization
	Proportion of COPD patients treated with assisted ventilation during admission for acute exacerbation, who receive NIV treatment	Process	Not yet determined	During each hospitalization
Mortality	Proportion of COPD patients who die within 30 days of admission for acute exacerbation	Result	Not yet determined	Within 30 days of admission

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Background (2)

- Primary collection of patient data for quality measuring projects is costly and time-consuming
- All data for COPD in the Danish National Indicator Project extracted from The Danish National Patient Registry (DNPR)
 - ICD-10 diagnostic codes for COPD (for the inclusion of patients)
 - Codes for medical procedures and test values (for the calculation of indicator results)

Inclusion of patients with COPD into The Danish National Indicator Project by Administratively Collected ICD-10 codes: Estimation of Validity and Completeness

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Objective

- To examine the *validity* and the *completeness* of ICD-10 diagnostic codes for COPD in the Danish National Patient Registry for patients admitted to hospital for acute exacerbation of the disease

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Methods (1)

- Random samples of hospital records for two groups of patients acutely admitted and discharged from Danish public hospitals in 2008

- Inclusion criteria:

Group 1: Patients with an ICD-10 diagnostic code for COPD as a primary diagnosis *or* as a secondary diagnosis in combination with an ICD-10 diagnostic code for pneumonia or ARF as a primary diagnosis (N=1988)

Group 2: Patients with an ICD-10 diagnostic code for either pneumonia *or* ARF as a primary diagnosis and *no* code for COPD (N=1986)

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- Did all the patients included in the COPD database also suffer from the disease?

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- Did we include all the patients, who suffer from the disease, in the COPD database?

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Methods (2)

- Standardised registration forms sent to pulmonary and general medical departments at the hospitals
- Audit with review of hospital records conducted at the hospitals by senior physicians
- Did the patient truly have COPD?
- COPD defined as:
 - Spirometry with an FEV_1/FVC ratio $< 0,7$ *or*
 - A clinical diagnosis of COPD

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Methods (3)

- Data analysis, calculating the predictive value of the *presence* of an ICD-10 diagnostic code for COPD (Group 1)
- Data analysis, calculating the predictive value of the *absence* of an ICD-10 diagnostic code for COPD (Group 2)
- Stratified analyses for two subpopulations in Group 2:

Stratum A: Patients coded with an ICD-10 code for *pneumonia*
 Stratum B: Patients coded with an ICD-10 code for *ARF*

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Results: Group 1

Validity of the ICD-10 diagnostic codes for COPD

Table 1. Predictive value of the **presence** of a diagnostic code for COPD

Geographic region	Patients with COPD codes	COPD present	COPD absent	Missing data	True positive % (95% CI)	False positive % (95% CI)
Region 1	240	162	13	65	93 (88;96)	7 (4;12)
Region 2	435	358	26	51	93 (90;96)	7 (4;10)
Region 3	360	317	24	19	93 (90;95)	7 (5;10)
Region 4	540	282	41	217	87 (83;91)	13 (9;17)
Region 5	413	337	20	56	94 (91;97)	6 (3;9)
All Denmark	1988	1456	124	408	92 (91;93)	8 (7;9)

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Results: Group 2

Completeness of the ICD-10 diagnostic codes for COPD

Table 2. Predictive value of the absence of a diagnostic code for COPD - codes for pneumonia or ARF present

Geographic region	Patients with pneumonia or ARF codes	COPD present	COPD absent	Missing data	True negative % (95% CI)	False negative % (95% CI)
Region 1	240	22	148	70	87 (81;92)	13 (8;19)
Region 2	435	62	324	49	84 (80;87)	16 (13;20)
Region 3	360	60	257	43	81 (76;85)	19 (15;24)
Region 4	539	53	243	243	82 (77;86)	18 (14;23)
Region 5	412	103	271	38	72 (68;77)	28 (23;32)
All Denmark	1986	300	1243	443	81 (78;83)	19 (17;22)

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Results: Group 2, stratum A

Completeness of the ICD-10 diagnostic codes for COPD

Table 3. Predictive value of the absence of a diagnostic code for COPD - codes for pneumonia present

Geographic region	Patients with pneumonia codes	COPD present	COPD absent	Missing data	True negative % (95% CI)	False negative % (95% CI)
Region 1	223	19	142	62	88 (82;93)	12 (7;18)
Region 2	393	52	301	40	85 (81;89)	15 (11;19)
Region 3	342	55	246	41	82 (77;86)	18 (14;23)
Region 4	480	38	227	215	86 (81;90)	14 (10;19)
Region 5	383	89	260	34	74 (70;79)	26 (21;30)
All Denmark	1821	253	1176	392	82 (80;84)	18 (16;20)

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Results: Group 2, stratum B

Completeness of the ICD-10 diagnostic codes for COPD

Table 4. Predictive value of the **absence** of a diagnostic code for COPD - codes for ARF present

Geographic region	Patients with ARF codes	COPD present	COPD absent	Missing data	True negative % (95% CI)	False negative % (95% CI)
Region 1	17	3	6	8	67 (30;93)	33 (7;70)
Region 2	42	10	23	9	70 (51;84)	30 (16;49)
Region 3	18	5	11	2	69 (41;89)	31 (11;59)
Region 4	59	15	16	28	52 (33;70)	48 (30;67)
Region 5	29	14	11	4	44 (24;65)	56 (35;76)
All Denmark	165	47	67	51	59 (49;68)	41 (32;51)

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Results: Group 2, stratum B

Completeness of the ICD-10 diagnostic codes for COPD

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Conclusions

- The predictive value of a discharge diagnosis of COPD in the Danish National Patient Registry is satisfactory for the inclusion of patients into a nationwide quality database
- COPD is underdiagnosed or underrecorded in patients coded with pneumonia or acute respiratory failure as a primary discharge diagnosis
- Administratively collected discharge diagnoses of COPD may be an acceptable alternative to inclusion of patients by costly and time-consuming primary data collection

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- The predictive value of a discharge diagnosis of COPD in the Danish National Patient Registry is satisfactory for the inclusion of patients into a nationwide quality database
- COPD is underdiagnosed or underrecorded in patients coded with pneumonia or acute respiratory failure as a primary discharge diagnosis
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