The occurrence of acute dyspnea in primary care

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Abstract

Context: Acute dyspnea is a frequent presenting symptom in primary care. However, little is known about the occurrence of dyspnea in primary care and possible underlying causes. In this study we tried to gain information about the occurrence of dyspnea in primary care, predictors of referral, hospitalization and death and possible underlying causes.

Research question: What is the proportion of acute dyspnea in primary care, what are possible predictors of referral, hospitalization and death and what are the most frequent underlying causes?

Material and methods: Twenty five general practitioners (GPs) in Flanders (Belgium) recorded patient-doctor contacts for 4 periods of 2 weeks during one year. Age and gender of all consulting patients in those periods were recorded. Of all patients with dyspnea, the following was recorded: visit at the surgery versus visit at the patient's home, new episode of dyspnea versus exacerbation of known dyspnea, tentative diagnosis, referral to specialist consultant, hospitalization. Of all patients with dyspnea a second form was completed one month after initial contact with the following information: definitive diagnosis, diagnosis based on signs and symptoms, laboratory results, X-ray, electrocardiogram, echocardiography, spirometry, CT/MRI/SPECT/other imaging techniques, referral to specialist consultant, hospitalization and death.

Results: Twenty two of the 25 GPs completed recordings during all four periods. During 194 GP weeks, 14,620 patient-doctor contacts were recorded, more women than men contacted the GP, both generally as well as with dyspnea. Acute dyspnea was a reason for contacting the GP in 317 patient-doctor contacts (2.2%; 95% CI = 1.9-2.4). There was no significant association between the proportion of dyspnea and age and gender groups. Immediate referral and hospitalization was most frequent in patients 61-90 years old. Forty-five patients (14.2%; 95% CI = 10.4-18.0) were referred to a specialist consultant immediately, 34 additional patients (10.7%; 95% CI = 7.3-14.1) had been referred after one month. Patients were preferably referred to pneumology (35 patients), cardiology (28 patients), but also to pediatrics (5 patients) and geriatrics (4 patients). Fourteen patients (4.4%; 95% CI = 2.4-7.3) were hospitalized immediately, 11 additional patients (3.5%; 95% CI = 1.7-6.1) had been hospitalized after one month. Hospitalization occurred preferably at pneumology (15 patients), cardiology (5 patients) en geriatrics (3 patients). Six patients (1.9%; 95% CI = 0.7-4.1) died within one month after initial contact. All patients were 61-90 years old and 5 were male. Causes of death were respiratory insufficiency due to a malignancy in the lungs, heart failure and acute exacerbation of chronic obstructive pulmonary disease (COPD).

The risk of immediate referral, hospitalization and death is higher in men and in older patients, especially if the contact is at the patient's home. Dyspnea in patients 0-30 years is predictive of asthma. Patients consulting with dyspnea at the surgery suffer significantly more frequent from

asthma or acute bronchi(oli)tis than other conditions. A new episode of dyspnea is more often associated with acute bronchi(oli)tis than with other conditions.

Conclusion: Dyspnea is a frequent reason for consulting the GP. Several predictors of referral, hospitalization, death and diagnostic categories were found.

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Introduction

Acute dyspnea is a frequent reason for consulting in primary care, it accounts for 4% of all consultations (1). Dyspnea has many different causes. It can sometimes be very challenging to discover the underlying problem, but most of the cases are due to a cardiac or respiratory disorder (2) (3). Dyspnea is defined as the sensation of difficult or uncomfortable breathing, it includes the perception of labored breathing and the patient's reaction to this sensation (4) (5). Many studies about dyspnea have been performed in hospital setting, however little is known about its epidemiology, management and underlying causes in primary care.

In 2011, Frese et al. (6) published the results of a study which explored the characteristics of patients with dyspnea in day-to-day primary care setting. They concluded that emergency cases are rare in the general practitioner's consultation and that the majority of underlying causes are respiratory infections and exacerbations of previously known chronic diseases.

Since information about dyspnea in primary care is scarce, especially in Belgium, we performed an observational study in primary care in Flanders. Purpose of this study was to get information about the epidemiology, diagnostic categories, investigations, referrals, hospitalization and death in patients with acute dyspnea in primary care. We also studied the predictive effect of age and gender on referral, hospitalization, death and diagnostic outcome categories.

Material and methods

Study design

All patients contacting one of the participating general practitioners (GPs) were included and we identified patients with acute (new or worsening) dyspnea. We contacted a pragmatic sample of Flemish GPs by email.

Case recordings were performed during 4 periods of 2 weeks (one period in each season) between March 1, 2012 and February 28, 2013. During these periods, gender and age of *all* patients were recorded in four different categories: 0-30 years, 31-60 years, 61-90 years, > 90 years. The GP completed a short form for each patient who consulted with complaints of dyspnea or was diagnosed with dyspnea by the GP. This form included the following information: gender (M/F), age (years), contact in the surgery or visit at home, first occurrence of dyspnea or sudden worsening of a known dyspnea, exacerbation of known dyspnea, tentative diagnosis, referral to specialist consultant, hospitalization.

After one month and based on all information available at that moment, the GP completed a second form for each patient with dyspnea. This form included the final diagnosis, based on: signs and symptoms, laboratory results, electrocardiogram, X-ray, echocardiography, spirometry, CT/MRI/SPECT/other imaging techniques, other investigations if available, referral to specialist consultant, hospitalization, death (with date).

In-/exclusion criteria

Patients of all ages and both genders were included, when presenting with an episode of acute dyspnea or with an exacerbation of known dyspnea. When a patient contacted more than once for the same episode of dyspnea, only the first contact was recorded. Excluded were patients who consulted during out of hours on duty work, unless it concerned the GP's own patient.

Ethical aspects

The study was approved by the Ethical Review Board of the medical faculty of Leuven University (no: ML7968). All patient identifications were coded. Patients were informed about the recording of these data by an informative leaflet in the waiting room of the surgery. Patients had the possibility to refuse cooperation.

Classification

Diagnoses were categorized according to the International Classification of Primary Care (ICPC-2) and classified as heart failure (K77), acute infection of the upper airways (R74), acute bronchitis/ bronchiolitis (R78), pneumonia (R81), chronic obstructive pulmonary disease (COPD, R95), asthma (R96), hyperventilation (R98) and other diagnoses.

Statistical analysis

Descriptive information was presented by proportions or means with their 95% confidentiality interval (CI). 95% CI was calculated using Confidence Interval Analysis (CIA). Differences between groups were considered significant if the 95% CIs did not overlap.

The independent effect of age (10 years categories), gender, visit at the surgery versus visit at home and new versus known dyspnea on the presence of referral, hospitalization or death during the initial doctor-patient contact was investigated via backward stepwise multiple logistic regression analysis. The fit of the calculated model was examined via Hosmer and Lemeshow analysis, a p-value > 0.05 was considered acceptable. Results were presented as odds ratios (ORs) and their 95% CIs.

Results

Patient characteristics

Twenty five of the contacted GPs agreed to participate in the study, 22 provided their recordings for all four periods. We recorded 14,620 patient-doctor contacts during a recording period of 194 GP-weeks, more women than men contacted the GP (OR = 0.98, 95% CI = 0.78-1.22). Basic results are displayed in table 1.

Table 1: distribution of all included patients according to gender and age and proportion of patients with acute dyspnea.

	Number of patients	Patients with dyspnea	
Male	6304	135	2.1%
Female	8316	182	2.2%
0-30 yr	4627	94	2.0%
31-60 yr	5527	98	1.8%
61-90 yr	4253	120	2.8%
> 90 yr	213	5	2.3%
Male 0-30 yr	2152	50	2.3%
Male 31-60 yr	2341	32	1.4%
Male 61-90 yr	1760	52	3.0%
Male > 90 yr	51	1	2.0%
Female 0-30 yr	2475	44	1.8%
Female 31-60 yr	3186	66	2.1%
Female 61-90 yr	2493	68	2.7%
Female > 90 yr	162	4	2.5%

Occurrence of acute dyspnea

Acute dyspnea was recorded in 317 (2.2%; 95% CI = 1.9-2.4) of the patient-doctor contacts (appendix 1). We found no significant association between the proportion of presentation with dyspnea and sex and age categories. Most of the contacts with patients with dyspnea occurred at the surgery, except for patients above age 90, as these contacts occurred solely at the patient's home. Male patients with dyspnea had less visits at home compared to women (OR = 0.56, 95% CI = 0.30-1.05). There were no significant differences in the frequency of an episode of new dyspnea versus an exacerbation of known dyspnea, although there seemed to be a trend towards an increased occurrence of exacerbations of known dyspnea at increasing age (61-90 years old and > 90 years old).

Characteristics of patients with acute dyspnea

Immediate referral to a specialist consultant or hospitalization of patients with dyspnea occurred preferably in patients between 61-90 years old, no immediate referrals or hospitalization occurred in patients above age 90.

Forty five (14.2%; 95% CI = 10.4-18.0) patients with dyspnea were referred to a specialist consultant immediately, 34 (10.7%; 95% CI = 7.3-14.1) additional patients were referred to a specialist consultant within one month after initial contact. Of these patients, 35 patients (11.0%; 95% CI = 7.6-14.5) were referred to pneumology, 28 (8.8%; 95% CI = 6.0-12.5) to cardiology, 5 (1.6%; 95% CI = 0.5-3.6) to pediatrics, 4 (1.3%; 95% CI = 0.3-3.2) to geriatrics, 3 (0.9%; 95% CI = 0.2-2.7) to neuropsychiatry, 2 (0.6%; 95% CI = 0.08-2.3) to gastroenterology, 2 (0.6%; 95% CI = 0.08-2.3) to cardiothoracic surgery, 2 (0.6%; 95% CI = 0.08-2.3) to otorhinolaryngology and 12 (3.8%; 95% CI = 2.0-6.5) to other specialist consultants (accidents and emergency, endocrinology, oncology, nephrology, obstetrics and gynaecology).

Fourteen (4.4%; 95% CI = 2.4-7.3) patients with dyspnea were hospitalized immediately, 11 (3.5%; 95% CI = 1.7-6.1) additional patients were hospitalized within one month after initial contact. Fifteen patients (4.7%; 95% CI = 2.7-7.7) were hospitalized at pneumology, 5 patients (1.6%; 95% CI = 0.5-3.6) at cardiology, 3 patients (0.9%; 95% CI = 0.2-2.7) at geriatrics and 5 patients (1.6%; 95% CI = 0.5-3.6) at other specialties (pediatrics, cardiothoracic surgery, gastroenterology, nephrology). Some patients were hospitalized for several specialties. Disorders that most frequently led to hospitalization were an acute exacerbation of COPD (7 patients), heart failure (5 patients,) pneumonia (5 patients), acute bronchitis (2 patients), anemia (2 patients) and respiratory insufficiency (2 patients).

Six (1.9%; 95% CI = 0.7-4.1) patients with dyspnea died within one month after initial contact. Causes of death were: respiratory insufficiency caused by lungcancer (2 patients, male, 61-90 years old), heart failure (2 patients, male, 61-90 years old), respiratory insufficiency caused by lung metastases (1 patient, female, 61-90 years old), acute exacerbation of COPD (1 patient, male, 61-90 years old).

Predictors of referral, hospitalization or death in patients with acute dyspnea

Based on multiple logistic regression analysis, male gender is a significant independent predictor of immediate hospitalization and death (table 2). A visit at home is a significant predictor of immediate hospitalization compared to a visit at the surgery, as is the occurrence of an exacerbation of known dyspnea compared to an episode of new dyspnea.

Table 2: relation between predictors and the occurrence of referral, hospitalization or death of a patient with acute dyspnea (ORs are based on multiple logistic regression, only significant predictors are displayed).

Predictor	Immediate referral* (n = 45)	Immediate hospitalization* (n = 14)	Death ** (n = 6)
Age (per 10 years)	1.23 (1.07–1.41)		
Gender: male vs. female		3.82 (1.08-13.45)	12.89 (1.29-128.76)
Surgery vs. visit at home		0.06 (0.01-0.06)	
New vs. known dyspnea		0.24 (0.06-0.96)	
Hosmer & Lemeshow (p)	*0.89*	*0.59*	*1.00*

*During the initial contact

** Within one month after initial contact

Predictors of diagnostic outcome categories in patients with acute dyspnea

Gender was not a significant predictor of any of the diagnostic categories (appendix 2). Age 0-30 years is a predictor of the presence of asthma, other age categories were no significant predictors. Visit at the surgery was a significant predictor of the presence of acute bronchi(oli)tis or asthma. The occurrence of an episode of new dyspnea was predictive of the presence of acute bronchi(oli)tis or a diagnosis other than one of the 7 diagnostic categories.

Technical investigations in patients with acute dyspnea

In 291 out of 317 (91.8%; 95% CI = 88.2-94.6) patients with dyspnea, diagnoses were based on signs and symptoms. In 55 patients (17.4%) laboratory results were used for diagnosis, in 23 patients (7.3%) an ECG was performed and in 54 patients (17.0%) an X-ray was performed. Echocardiography was performed in 11 patients (3.5%), as well as spirometry. CT, NMR, SPECT or other imaging techniques were performed in 7 patients (2.2%).

Discussion

In this study, we gathered information about both the general characteristics (age and gender) of all patients contacting the GP and the occurrence and characteristics of acute dyspnea in primary care. Since the number of studies in this area is scarce, little is known about it. This study shows that acute dyspnea is a reason for contacting the GP in 2.2% of patient-doctor contacts, which is comparable to what Frese et al. described in their study (6).

We learned that more women than men consulted the GP with acute dyspnea, even when corrected for the higher number of women consulting the GP in general. The reason for this is unknown. Most of the contacts occurred at the surgery, except for patients above age 90. This seems logical, since these patients are usually less mobile or more frequently present with conditions that make them unable to go to the surgery.

Most of the immediate referrals to a specialist consultant, as well as immediate hospitalization, occurred in patients 61-90 years old and according to the multiple logistic regression, age was a significant predictor of referral. The explanation for this could be that younger patients (0-60 years) usually present with less severe conditions, which less frequently need referral. Patients above age 90 on the contrary more often present with (an exacerbation of) conditions they're already diagnosed with and treated for. Another reason could be that in this age category the GP tries to minimize referral (and possible resulting investigations) because of age and lack of impact on further management. However, since this age category is very small, these results may be biased.

All 6 patients who died within one month after initial contact were 61-90 years old and 5 were male, which results in a strong association of the male gender and risk of death within one month after initial presentation. A possible explanation for this could be that conditions associated with smoking (COPD, lung cancer, higher risk on cardiovascular diseases) still are more frequent in men, although frequency in women is increasing (7).

The strength of this study is that it was performed in daily practice, which results in representative results about the occurrence of dyspnea in primary care setting. By recording throughout the year, we avoided seasonal discrepancies as much as possible.

The statistical power of this study was rather small as far as analyses restricted to patients with dyspnea were concerned. In addition, for this study we were not able to include a random sample of Flemish GPs, but we approached GPs we knew personally. This may cause the study population and the quality of the recorded data to be influenced (positively or negatively), since most of the recording GPs are working for university or guiding a trainee. Unfortunately, not all GPs performed their recordings completely, 3 of them only recorded during 3 periods. This may also result in biased data, since during these periods dyspnea may have been more or less frequent.

In daily practice the risk of immediate referral, hospitalization and death is higher in men and in older patients, especially if the contact is at the patient's home. When a patient 0-30 years consults for dyspnea, the cause of dyspnea is most likely to be asthma. In a patient with dyspnea consulting at the surgery, the cause is more likely to be asthma or bronchi(oli)tis compared to other diagnostic

categories. At last, a patient consulting with a new episode of dyspnea is more likely to present with acute bronchi(oli)tis compared to other diagnostic categories.

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Conflict of interest statement

None.

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Appendix 1: distribution of patients with dyspnea for age and sex classes and according to contact, referral, hospitalization and death characteristics.

	Dyspnea	Visit at surgery		Visit at home		New dyspnea		Known dyspnea		Referral*		Hospitalization*		Death**	
Male	135	118	87.4%	17	12.6%	77	57.0%	58	43%	24	23.7%	9	7.4%	5	3.7%
Female	182	145	79.7%	37	20.3%	117	64.3%	65	35.7%	21	13.2%	5	2.7%	1	0.5%
0-30 yr	94	92	97.9%	2	2.1%	59	62.7%	35	37.3%	8	11.7%	1	2.1%	0	0%
31-60 yr	98	96	98.0%	2	2%	70	71.4%	28	28.6%	9	10.2%	2	2.0%	0	0%
61-90 yr	120	75	62.5%	45	37.5%	63	52.5%	57	47.5%	28	25.8%	11	9.2%	6	5%
> 90 yr	5	0	0%	5	100%	2	40.0%	3	60.0%	0	0%	0	0%	0	0%
Male 0-30 yr	50	49	98%	1	2%	32	64%	18	36%	6	18.0%	1	4%	0	0%
Male 31-60 yr	32	32	100%	0	0%	20	62.5%	12	37.5%	4	12.5%	1	3.1%	0	0%
Male 61-90 yr	52	37	71.2%	15	28.8%	25	48.1%	27	51.9%	14	28,8%	7	13.5%	5	9.6%
Male > 90 yr	1	0	0%	1	100%	0	0%	1	100%	0	0%	0	0%	0	0%
Female 0-30 yr	44	43	97.7%	1	2.3%	27	61.4%	17	38.6%	2	4.5%	0	0%	0	0%
Female 31-60 yr	66	64	97.0%	2	3.0%	50	75.8%	16	24.2%	5	9.1%	1	1.5%	0	0%
Female 61-90 yr	68	38	55.9%	30	44.1%	38	55.9%	30	44.1%	14	23.5%	4	5.9%	1	1.5%
Female > 90 yr	4	0	0%	4	100%	2	50.0%	2	50.0%	0	0%	0	0%	0	0%

* During the initial contact

** Within one month after initial contact

Appendix 2: predictors of dyspnea. Distribution of diagnostic categories (by the International Classification of Primary Care (ICPC)-2) for age and sex classes, and according to contact and dyspnea characteristics.

	Heart failure		Acute infection of the upper airways		Acute bronchitis/ bronchiolitis		Pneumonia		COPD		Asthma		Hyperventilation		Other	
Gender																
- Male	9	6,7% (3.1-12.3)	10	7,4% (3.6-13.2)	37	27,4% (19.9-34.9)	13	9,6% (5.2-15.9)	18	13,3% (7.6-19.9)	22	16,3% (10.1-22.5)	8	5,9% (2.6-11.3)	28	20,7% (13.9-27.6)
- Female	11	6,0% (3.1-10.6)	16	8,8% (5.1-13.9)	31	17,0% (11.6-22.5)	25	13,7% (8.7-18.7)	19	10,4% (6.0-14.9)	33	18,1% (12.5-23.7)	16	8,8% (5.1-13.9)	52	28,6% (22.0-35.1)
Age																
0 - 30 yr	0	0% (0-3.9)	11	11,7% (6.0-20.0)	32	34,0% (24.6-44.5)	4	4,3% (1.2-10.5)	0	0% (0-3.9)	33	35,1% (25.5-45.6)	5	5,3% (1.8-12.0)	15	16% (9.2-24.9)
31 - 60 yr	0	0% (0-3.7)	7	7,1% (2.9-14.2)	22	22,4% (14.6-32.0)	10	10,2% (5.0-18.0)	9	9,2% (4.3-16.7)	14	14,3% (8.0-22.8)	14	14,3% (8.0-22.8)	25	25,5% (17.2-35.3)
61 - 90 yr	16	13,3% (7.3-19.4)	8	6,7% (2.9-12.7)	14	11,7% (5.9-17.4)	22	18,3% (11.4-25.3)	27	22,5% (15.0-30.0)	7	5,8% (2.4-11.7)	5	4,2% (1.4-9.5)	40	33,3% (24.9-41.8)
> 90 yr	4	80% (28.4-99.5)	0	0% (0-3.0)	0	0% (0-3.0)	2	40% (5.3-85.3)	1	20% (0.5-71.6)	1	20% (0.5-71.6)	0	0% (0-3.0)	0	0% (0-3.0)
Contact																
Surgery	7	2,7% (1.1-5.4)	23	8,7% (5.6-12.8)	64	24,2% (19.1-29.4)	25	9,5% (6.2-13.7)	26	9,8% (6.5-14.1)	50	18,9% (14.2-23.7)	22	8,3% (5.3-12.3)	67	25,3% (20.1-30.6)
Home	13	24,5% (13.8-38.3)	3	5,7% (1.2-15.7)	4	7,5% (2.1-18.2)	13	24,5% (13.8-38.3)	11	20,8% (10.8-34.1)	5	9,4% (3.1-20.7)	2	3,8% (0.5-13.0)	13	24,5% (13.8-38.3)
Dyspnea																
New dyspnea	5	2,6% (0.8-5.9)	19	9,8% (6.0-14.9)	54	28,0% (21.6-34.3)	24	12,4% (7.8-17.1)	7	3,6% (1.5-7.3)	23	11,9% (7.4-16.5)	16	8,3% (4.8-13.1)	63	32,6% (26.0-39.3)
Known dyspnea	15	12,1% (6.4-17.8)	7	5,6% (2.3-11.3)	14	11,3% (5.7-16.9)	14	11,3% (5.7-16.9)	30	24,2% (16.7-31.7)	32	25,8 (18.1-33.5)	8	6,5% (2.8-12.3)	17	13,7% (7.7-19.8)