

Death certificates in asthma and COPD patients (Survey of statistical data in Warsaw)

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ABSTRACT: *Death certificates in asthma and COPD patients (Survey of statistical data in Warsaw). K.L. May.*

Mortality statistics regarding asthma and COPD (in the older age groups) are probably lower due to the misplacement of underlying and additional causes of death in the death certificates. To check this possibility, all death certificates over one year were reviewed (20,881) in Warsaw. In 1,431 cases (6,85%) the medical diagnoses were missing. Asthma, COPD and Pulmonary Heart Disease (PHD) (excluding any other cause of PHD) were mentioned at some point in 315 cases (on one of the three items cards). 212 deaths occurred in hospital, 103 at home (22 were regarded as sudden deaths). After reviewing records from 16 hospitals and patients' local clinics, the existence of long-standing asthma

and/or COPD was confirmed in all cases. Considering all the three items (underlying, secondary, direct causes) in the death certificates the mortality rates (for 100,000 all-age inhabitants) were established for asthma - 4,51 for COPD - 10,54, for PHD - 3,23 (different from official statistics).

Principal conclusions. The main sources of underestimation in mortality from asthma and/or COPD (in official statistics) are:

- 1) disregarding the "additional" and "immediate" causes of death,
- 2) regarding PHD as an underlying cause of death,
- 3) the lack of medical diagnoses in great number of death certificates.

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Keywords: *Asthma, COPD, (mortality); Death Certificates; Pulmonary Heart Disease; Cause of death (underlying, additional); Poland (epidemiology).*

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Mortality statistics are invaluable tools for any historical or country to country comparisons.

However, in contrast to many other "clear cut" causes of death such as cancers, heart infarcts, road accidents, suicides and other fatal events, asthma and COPD patients, always create some dilemma for those who complete the death certificates. The problem increases with the patients age and COPD and asthma patients, often, die in their sixties or later. Since deaths at these ages often occur in conjunction with coexisting diseases, the fundamental problem is deciding with which, or from which, disease the patient died [1].

For general death statistics only the underlying (primary) cause of death counts. The primary cause is given the proper ICD (International Classification of Diseases) number. Such data is the basis for the majority of comparisons [2–8]. Much less common are the surveys on COPD where not only the underlying but also additional causes of deaths are considered [9, 10, 11, 12].

Such an approach makes the statistical data much more accurate, in addition, COPD is more often noted as a contributory (additional) rather than as an underlying (primary) cause of death [9, 10].

In Poland, the death certificates consist not only of the underlying (primary) and secondary (additional) causes of death, but they contain also the third item known as the direct (immediate) cause of death.

Such certificates, if completed accurately, provide a much closer approach to the particular case of death but on the other hand make its completion more complicated for junior medical or emergency doctors, and for general practitioners, outside the hospital.

The misunderstandings which occur during the completion of these certificates provide a good example of the reasons why the rate death by Pulmonary Heart disease (PHD) as the underlying cause of death (11-15/100.000/year 1995-1999 - ICD - I 27) is so high in various National Statistics.

It has been decided that the epidemiological principle (all unselected data) for the control of statistical material (death certificates) concerning asthma and COPD should be applied.

Material and method

During one year, the death certificates were "on-line" reviewed in all seven district offices (mayoralties) of Warsaw.

20,881 death certificates were inspected (97% of all deceased in Warsaw during this period).

Among them, 315 certificates were found to have at least one of the following "diagnoses" regardless whether it was mentioned as "underlying", "additional" or "immediate" causes of death:

– Asthma,

- Chronic bronchitis,
- Spastic bronchitis,
- Pulmonary emphysema,
- COPD,
- PHD,
- Cardio-pulmonary insufficiency (CPI).

Certificates where a diagnosis of cancer, tuberculosis or any other pulmonary disease (except pneumonia) was made were not collected.

212 deaths occurred in hospital, 103 at home, and among them 22 cases were regarded as "sudden death".

The collected cases were subsequently verified through inspection of the morbid documentation in the local primary care physicians (187 cases) and also by examining the documentation in 16 municipal or teaching hospitals where the patients died (157 cases).

Their medical histories were consistent with diagnoses of asthma and/or COPD with symptoms of cough and dyspnea, bronchodilator use or bronchial symptoms during auscultation, were traced, in some cases, up to 20 or more years.

Hospital documentation revealed that pneumonia was also diagnosed in 37 cases (24%).

In 5 post-mortem examinations (out of only 22 performed) 3 cases of cancer, 1 aneurysm rupture and 1 digestive tract haemorrhage was found.

These were not mentioned in the official death certificates.

Among all the 20 881 reviewed death certificates, in 1,431 cases (6.85%) no diagnosis had been found. They were classified as "cause of death unknown" (N.798-ICD).

From the available in-patient documentation, it was obvious that 43% of the deceased had all symptoms of a surging abundant bronchial secretion without any possibility of removing it.

Such situations have been confirmed in all 22 post-mortem examinations.

The results

There were 179 males and 136 females in the group. The age structure of the group is presented in the table 1.

The great majority of the examined group died at the age of 60-79 - over double amount when compared with the age structure of deceased at that time in all towns in Poland (table 1). However the age of all the inhabitants of Warsaw was not known, so such findings may only indicate the trend and not absolute difference.

According to actual statistical procedures, the obtained data of "underlying causes of death" gave the following death rates for the 1,642,694 inhabitants of Warsaw at that time: 2.98 for asthma, 8.71 for Bronchitis and 6.27 for PHD in 100.000 inhabitants [13].

However, when "the secondary" (additional) and "direct" (immediate) causes of deaths were considered (table 2 and 3), a different picture appeared.

In the whole group, the diagnosis of "asthma" was mentioned 132 times.

In 15 cases it was mentioned twice (both as underlying and as additional or direct causes of death).

Therefore 117 cases could be diagnosed as "asthma" deaths.

Diagnoses of bronchitis, emphysema and COPD (any of these) were mentioned 190 times (again they were mentioned twice in 17 patients). It could therefore be assumed that among the 315 deceased were 173 cases diagnosed as COPD deaths.

Coincidence of asthma and COPD was noticed in 43 patients. Those were regarded as COPD deaths.

PHD as an underlying (primary) cause of death was found in 88 cases. In 7 cases, it was mentioned twice (as the first and third item of the deaths' certificates). Asthma or COPD were mentioned only in 28 (32%) of those 88 cases.

In the remaining 53 cases no reason was given for the existence of PHD.

PHD as the third item (direct cause of death) appeared in 10 cases of asthma (10%) and in 39 cases of COPD (23%).

CPI was diagnosed in 14 cases of asthma (14%) and in 28 cases of COPD (17%).

Coexistence of PHD and CPI occurred in 25 cases, all showing CPI as the result of PHD (additional causes of death). In 5 cases when CPI was regarded

Table 1. - The structures of age of the 315 deceased (study group) and 223.400 deceased in Poland in 1994 (data from national statistics) (inhabitants of towns only)

Age group	Examined group of the deceased			Structure of age (%) of 223.400 deceased
	Males	Females	% of total	
< 31	1	1	0,6	4,0
31-40	2	2	1,3	3,3
41-50	4	5	2,9	7,6
51-60	24	11	11,0	11,4
61-70	86	58	45,8	22,1
71-80	38	40	24,8	22,5
Over 80	24	19	13,7	29,1
TOTAL	179	136	100,1	100,0

Table 2. – “Primary” cause of death and “secondary” cause of death

Primary underlying cause of death	Secondary (2) (accompanying) cause of death								Total
	Asthma	Bronchitis	Emphysema	COPD	PHD	Card.-pulm. Ins.	Others	Not given	
Asthma	14	0	1	1	0	5	20	8	49
Bronchitis	32	1	0	9	1	19	25	29	116
Emphysema	4	0	1	0	0	0	2	1	8
COPD	2	0	0	0	0	1	2	1	6
PHD	13	0	7	3	0	3	46	16	88
Card.-pulm. ins.	1	0	1	1	0	2	3	1	9
Other	5	1	7	0	0	1	10	15	39
TOTAL	71	2	17	14	1	31	108	71	315

Table 3. – “Primary” cause of death and “direct” cause of death

Primary (underlying) cause of death	Direct (3) (immediate) cause of death							Total
	Asthma	Bronchitis	Emphysema	COPD	PHD	Card.-pulm. Ins.	Others	
Asthma	1	0	0	0	10	9	29	49
Bronchitis	5	4	1	0	35	18	53	116
Emphysema	0	1	0	0	2	0	5	8
COPD	0	0	0	0	2	0	4	6
PHD	0	3	2	0	7	21	55	88
Card.-pulm. ins.	1	2	1	0	1	1	3	9
Other	5	13	0	0	2	3	16	39
TOTAL	12	23	4	0	59	53	165	315

as underlying cause of death neither asthma, COPD nor PHD were mentioned as additional causes of deaths.

From the hospital records and medical histories of the patients in local outpatient clinics, it was discovered that a great majority of the deceased also suffered from other diseases. In 28% “myocardopathy” and in another 28% “coronary heart disease” were diagnosed.

Together with “pneumonia” they were mentioned among 39 cases of “other” underlying causes of death (tables 2 and 3).

Two cases of pneumonia as the underlying cause of death were without additional or immediate causes of death. They were not included in final calculation.

Chronic gastric or duodenal ulcers were the causes in 22% of cases, diabetes in 12%, systemic hypertension in 17% and various psychic disturbance in 17% were noted. Many of them appeared as additional or immediate causes of death.

No data was available concerning the smoking habits of the deceased, or regarding their social status.

Long term data from the district patients clinic (187 cases) prescriptions of salbutamol and/or formoterol and theophylline confirmed the presence of bronchial obstructions among all the patients.

Theophyllin and steroids were used in all the individuals who died in hospitals. B₂ mimetics were used in only 35% of the cases.

All available data, therefore, was consistent with the presence of asthma and/or COPD.

Choosing only one “disease” as the cause of death for statistical purposes in the examined group, there were 74 cases of probable asthma (117 minus 43 where COPD also was mentioned), 173 cases of COPD and 53 cases of PHD which could be regarded as “underlying” causes of deaths.

The death rates for asthma, COPD and PHD among the 1.642.694 inhabitants of Warsaw at in the latest statistics could therefore be:

- 4.51/100,000 for asthma
- 10.54/100,000 for COPD and
- 3.23/100,000 for PHD.

These results vary considerably from the official death statistics.

Discussion

There are three possible explanations concerning deaths of asthma and COPD sufferers.

The first is that they will die from a quite different disease, unrelated to asthma. Then on their death certificates neither asthma nor COPD will be mentioned (especially when not very severe or life threatening).

The second is that asthma or COPD will be accepted as the underlying cause of death and it will be taken into statistics.

The third, however, is that the real cause of death will indeed be asthma or COPD but not recognised as the main (underlying) but only as accompanying cause of death. Then, in spite of appearing on the death certificate neither asthma nor COPD will be taken into account in the mortality statistics.

The purpose of this study was to evaluate the third possibility and to bring the mortality rates of asthma and COPD closer to the true.

From this study it seems apparent, that the source of errors in the studies based on statistical material (death certificates) arose regarding PHD as the underlying cause of death in COPD and asthma patients. Such attitude covers many cases of COPD making them unregistrable for statistics. It also rises suspicions that the true causes of death were either "cardiac" deaths (half of the deceased COPD and asthma patients suffered from various circulatory pathology), or events like pulmonary embolism or strokes.

Even in a little younger age group (50-64) of COPD patients, the risk of dying from cardiovascular disease for those with markedly impaired respiratory function (FEV_1 , less than 65% of predicted) is increased 4-fold. Such risk is increased 7-fold for smokers [12]. In the examined group, such cardiovascular pathology, was, (or might be) expressed as PHD.

In one multi-centre study, PHD with oedema was regarded as the cause of death in 13% of severe COPD patients on the long-term oxygen therapy [14]. In the same study 10% of such patients died from pulmonary embolism.

Among all the cases of sudden death in the community, as many as 17.7% may be regarded as "respiratory death". A British study has demonstrated, that one third of them may concern bronchitis patients, one-tenth chronic asthmatics and one fifth may be due to pulmonary embolism [15].

This provides additional proof that 22 sudden deaths in this area were indeed "respiratory deaths".

Accurate completion of death certificates for older COPD patients requires a high level of competence from attending doctors. It has been proven that such competence in general hospitals, concerning patients dying from asthma, is rather low [16].

It is difficult to explain the fact, that in a city where medical service is easily accessible, as many as 6.85% of death certificates were without any medical diagnosis. How many asthma or COPD deaths were among these?

Mitchell's study shows that the low degree of accuracy in death certificates has been known for

many years. In subjects over the age of 40, the chronic airway obstruction confirmed by autopsy as the main cause of death, was underestimated by 20% [17].

In addition, recent data and recent opinions have supported this claim [9, 10]. In official statistics COPD is severely underestimated, being recorded only as underlying cause of death in less than half (43%) of true COPD deaths [18]. The balance between asthma and COPD deaths in older age groups is practically impossible to establish in official statistics. Often among the elderly, asthma is not diagnosed at all [19]. In such a group (age 56-75) one fourth of COPD deaths are in fact asthma deaths [11].

The clinical fact is, that long standing severe asthma always leads to chronic persistent airflow obstruction and thereby mimics or becomes COPD [20].

In the older age group, these two diagnoses form common epidemiological facts [11].

Asthma is also under-diagnosed in the younger age group [16-64] and attributed to COPD in 18% [21].

The Tecumseh study provided quite striking data concerning the relationship between clinical diagnosis of COPD and the death certificates. Among men with COPD diagnosed during life, COPD was mentioned in their death certificates in only 21%. In women it was recorded in only 6% [10].

Such findings confirm the obvious fact of this study. Among 20,881 deceased there is a high possibility that hundreds were from chronic asthma or COPD sufferers who died from quite different reasons e.g. cancer, stroke, heart infarct a.s.o.

Their asthma, or COPD were not severe enough to warrant mentioning in the death certificates (even in three items ones). Saskatchewan Kohort's study indicates that among asthmatics (age group 5-55) 3/4 of all deaths during 8 years were not due to asthma [22].

When accepting that the prevalence of COPD among men is ca 14% and among women ca 8% [10] or that 14%-16% of general population demonstrates abnormal (low) values of FEV_1 [23] especially over age of 40 [24]. It is quite obvious that only in small part of them the cause of death will be ascribed to COPD (or asthma).

The three item death certificates improve the exactness of estimation of the cause of death among COPD and chronic asthma patients. Many other essential coexisting pathological situations however, still are omitted.

Systemic hypertension (observed in 17% in this study) may exist even in 28% of COPD patients [22]. Diabetes may be present in 14% (this study - 12%) and myocardopathy in 10% (this study - 28%) [25].

PHD reported in the present material in 45% of the deceased confirms the previous opinions, that elevated pulmonary pressure plays a major prognostic role among these patients [14, 22].

The common source of errors in death statistics is the fact, that death certificates enter the offices and are coded (according to ICD) before the results

of autopsies (if done at all) are known. Such a situation occurred in 22 cases of the present study. Some other essential diseases were discovered in 5 cases (2% of the material). In only 2 cases, however, (massive internal haemorrhage) the causes of deaths were evident.

The unexpected discovery of cancer in 3 cases makes it possible, that it was not the cancer (clinically "silent", symptomless with small progressiveness common among elderly) but actually COPD that was the cause of death.

Smoking habits promote both COPD and lung cancer so the coexistence of both diseases is common indeed. It appears in no less than 7% of severely compromised COPD patients [14].

Only experienced attending physician may decide **with which** or **from which** of those diseases the particular patient died [1]. Such experienced physicians do not create the statistics.

Conclusions

Concerning COPD and asthma patients, three items death certificates provide more exact data about causes of death than official statistics based on the one item (underlying disease) questionnaire. Such data could be even more accurate, if it were provided by experienced physicians or other medical staff who comply with the meaning of: underlying, secondary, additional and immediate descriptions.

Diagnosis of PHD as the underlying cause of death seriously diminishes the quality of statistical data concerning death rates from COPD and asthma, especially among older people.

After correction from one item to three item death certificates the following data for Warsaw was obtained.

Death rates (all ages) from asthma: 4,51/100.000 (not 2,98), from COPD - 10,54 (not 8,71) and from PHD 3,23/100.000 (not 6,27).

Coincidence of asthma and COPD in death certificates occurs in 14% of the deceased from any of these diseases.

46% of COPD and asthma patients die in the age between 61 and 70, two times more than in general population.

Among the patients who died from asthma or COPD co-morbidity from myocardopathy and/or coronary heart disease appears in half of them, from hypertension in 17%, from diabetes in 12%, from gastric or duodenal ulcers in 22% and from psychic disturbances in 17%.

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