Does smoking kill? A study of death certification and smoking

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ABSTRACT

Aim To assess how frequently smoking is cited as a cause of death (COD) on death certificates.

Methods A retrospective study of 2128 death certificates and 236 postmortem reports issued at a large teaching hospital between 2003 and 2009.

Results Smoking was identified as the underlying COD on only 2 (0.1%) death certificates and included in part II of the death certificate on 10 (0.5%). The two death certificates citing smoking as the underlying COD were in cases of lung cancer and chronic obstructive pulmonary disease. The study included 279 deaths in which these diagnoses were cited on the death certificate and in the majority of these cases the deceased was a smoker or ex-smoker. A review of postmortem reports from the same period failed to identify a single case in which the pathologist cited smoking as causing or contributing to death. In marked contrast to smoking, 57.4% (vs 0.5%) of death certificates, which included diagnoses linked to alcohol use, cited alcohol in part I of the death certificate.

Conclusion This study demonstrates that smoking is rarely cited on death certificates, even in cases where the causal link with smoking is very strong. There are many reasons why smoking is not cited on death certificates. One frequently cited reason is the reluctance of doctors to stigmatise the deceased. Interestingly, such reluctance did not extend to citing alcohol as a COD. By not recording smoking on death certificates doctors are failing to gather important epidemiological and pathological data.

INTRODUCTION

Tobacco use is the most common cause of preventable death in developed countries. In the UK, it is estimated to kill over 81 000 people each year, accounting for one-fifth of all deaths.[1] The causal links between smoking and lung cancer and respiratory conditions such as chronic obstructive pulmonary disease (COPD) are no longer disputed. Furthermore, the role of smoking as a contributory factor in common conditions such as ischaemic heart disease and a wide range of other cancers is also widely recognised (table 1).[1–3]

Disease specific mortality rates are derived from a number of sources. In the case of deaths attributable to smoking, current estimates are derived from two main sources: (a) smoking prevalence from the General Lifestyle Survey (GLF)[4] and (b) published RR rates for deaths in smokers and non-smokers.[5 6] There are a number of potential drawbacks with this approach. First, the GLF is a relatively small annual survey comprising ~16 000 interviews, and is widely believed to significantly underestimate the prevalence of smoking.[7] Second, the cohort studies used to determine RR rates are inevitably subject to bias and confounding factors. These studies are also becoming dated and may not reflect changes in smoking behaviour, dose and exposure resulting from recent changes to smoking legislation.

Death certification is an important source of mortality data and directly captures 99.79% of all deaths in the UK.[8] Importantly, the Medical Certificate of Cause of Death (MCCD) is completed by a doctor who knew the deceased and can make an accurate assessment of the underlying cause of death (COD). In 1992, doctors were permitted to cite smoking and alcohol use as a COD without having to refer the case to the coroner. Furthermore, the Office of National Statistics (ONS) publishes guidance notes that accompany MCCD which provide a clear illustration of how certificates should be completed when smoking is identified as the COD.[9]

Given the potential shortcomings of statistical estimates of smoking related deaths, we sought to assess how well the current system of death certification records deaths attributable to smoking. In this study, we determined the frequency with which smoking and/or tobacco use was cited as an underlying COD, or as a contributory factor, on MCCDs completed in a large teaching hospital. The frequency with which smoking was cited on MCCDs was compared with that for alcohol use and a comparison was also made with MCCDs completed by pathologists following postmortem examination at the same hospital.

METHODS

The University College London Hospital (UCLH) is a large teaching hospital with >450 junior medical staff and 700 consultants. It provides a broad range of acute specialities and is a regional cancer centre. Each year, 600–850 patients die in the hospital. Death certificates are issued in the majority of these cases. In approximately 8–12% of cases, a postmortem is performed in order to ascertain the COD.

We retrospectively examined the retained records of 2128 death certificates issued at the ULCH between January 2003 to June 2004 and January 2008 to May 2009. Of these, 142 (6.7%) were rejected from the study as they were not completed in accordance with ONS guidelines. Autopsy reports from the same period were examined to identify the causes of death determined by pathologists following postmortem examination.

In all cases, the underlying COD was defined as the initiating condition recorded on the lowest line of part I of the MCCD. Information provided in

Table 1 The estimated number and percentage of deaths among adults aged >35 years that are attributable to smoking in 2009

Diagnosis	Observed deaths	Attributable number	Attributable %
All deaths	448 230	81 400	18
All cancers	130 316	37 500	29
All respiratory diseases	62 802	22 000	35
All circulatory diseases	148 332	20 600	14
All diseases of the digestive system	23 150	1300	6
Cancers			
Trachea, lung, bronchus	28 043	23 000	82
Upper respiratory site	1783	1200	66
Larynx	611	500	81
Oesophagus	6214	4200	68
Bladder	4207	1700	41
Kidney	3098	800	25
Pancreas	6686	1700	25
Stomach	4027	900	21
Unspecified site	8410	3100	37
Myeloid leukaemia	2230	400	17
Cervical	729	100	12
Respiratory diseases			
Chronic obstructive pulmonary disease	21 776	17 300	79
Pneumonia and influenza	24 975	4700	19
Circulatory diseases			
Aortic aneurysm	6549	4000	61
Ischaemic heart disease	66 974	9500	14
Cerebrovascular disease	40 541	3300	8
Other arterial disease	2593	500	18
Digestive diseases			
Stomach/duodenal ulcer	2540	1300	50

Table adapted from Statistics on Smoking: England, 2010.[1]

part II of the certificate was also assessed. ONS guidelines state that this should include all other conditions, injuries or events that contributed to death, but were not part of the direct sequence leading to death. The smoking history of each of the deceased was obtained either from the medical notes or from general practitioners' records.

RESULTS

Table 2 shows the most common conditions identified as the COD for patients dying at the UCLH. Of the 1986 records studied, only 2 (0.1%) cited smoking as the underlying COD (1 case of lung cancer and 1 of COPD) and smoking was only included in part II on 10 (0.5%) certificates. A total of 407 cases were identified that were due to conditions in which the attributable percentage of deaths caused by smoking is considered strong (ie, >50%). In this selected group of conditions, only 2/407 (0.5%) and 6/407 (1.5%) certificates cited smoking in part I or part II, respectively.

Lung cancer and COPD have the strongest causal link with smoking. In this study, we identified 279 MCCDs citing these conditions as the COD (145 and 134 cases respectively). In two cases smoking was identified as the underlying COD, and in six cases smoking was included in part II. In 127/279 cases, medical records were available for assessment. Examination of these records demonstrated that 45.4% of the deceased were recorded as 'smokers', 23.3% 'ex-smokers' and 12.1% 'non-smokers'. In 19.2% of cases the smoking history was not recorded.

Fifty-four cases were recorded for which prior studies have demonstrated a causal link to alcohol use (table 3). In contrast to deaths attributable to smoking, certifying doctors were significantly more likely to record alcohol use as an underlying COD (table 3). Thirty-one (57.4%) cases were recorded as being due to alcohol use or used terminology that included 'alcohol'.

A study of 236 death certificates issued following postmortem examination performed during the same study period failed to identify a single case in which smoking was either cited as the COD (part I) or included as a contributory factor (part II). While the frequency of causes of death attributable to smoking was fewer in this group (data not shown), it is surprising that smoking or tobacco use fails to appear at all. The COD recorded in the majority of cases subject to postmortem examination was coronary artery disease/thrombosis, accounting for 97 (41.1%) cases. Interestingly, in contrast to smoking, recognised medical conditions such as hypertension (four cases), diabetes (four cases) and hypercholesterolaemia (three cases) were mentioned in part II.

DISCUSSION

In a study of almost 2000 MCCDs issued at a large teaching hospital, we found that the use of smoking was rarely cited as the underlying COD. The almost complete absence of smoking on death certificates was most surprising in cases of lung cancer and COPD where the causal association with smoking is strongest and the prevalence of smoking among the deceased was high. While smoking was more frequently cited in part II, rates were still very low. Furthermore, the inclusion of smoking in part II indicates that the certifying doctor did not consider it to be directly linked to the COD.

Clinicians at the UCLH are not alone in their reluctance to cite smoking as an underlying COD. A study of 236 postmortem reports completed by consultant pathologists at the same institution failed to identify a single report in which smoking was mentioned. Similarly, Robinson *et al* demonstrated that after a modest increase following the 1992 change in guidance on referring smoking-related deaths to the coroner, general practitioners in Newcastle also rarely included smoking as a COD on MCCDs.[10] However, perhaps most striking are records from the ONS, which showed that in the last 10 years smoking appeared on 7619 records but was only cited as the COD in 95 cases (personal communication). Despite these data being heavily reliant upon interpretation by non-medically trained coders, it supports the findings of this and previous studies.

There are many potential reasons why smoking is not cited as a COD by doctors in the UK. The first and frequently debated reason relates to doctors' desire not to cause relatives distress by stigmatising the deceased and their smoking habit. While the results of this study would support this assumption, it is interesting that the same clinicians frequently cited alcohol use as an underlying COD. The stigma associated with smoking is a well-documented phenomenon, which may be worsening since the introduction of recent legislation.[11–13] However, the stigmatisation of alcohol use is restricted to specific situations such as drink driving, binge drinking and alcohol dependence.[14 15] Outside of these situations, there is a high level of acceptance of alcohol use. It is tempting to speculate that the universal nature of the smoking stigma explains, at least in part, why doctors would feel

Table 2 The medical diagnoses and frequency with which smoking is identified in parts I and II of the MCCD completed at the UCLH during the study

Diagnosis	No. of deaths (% of total)	Smoking cited as underlying COD (part I)	Smoking cited as a contributory factor (part II)
Pneumonia	240 (12.1%)	0	1
Carcinoma of lung or bronchus	**145 (7.3%)**	**1**	**3**
Cerebrovascular disease	143 (7.2%)	0	1
COPD & Emphysema	**134 (6.7%)**	**1**	**3**
Ischaemic heart disease	106 (5.3%)	0	2
Sepsis (inc. UTI)	74 (3.7%)	0	0
Carcinoma of the oesophagus	**47 (2.4%)**	**0**	**0**
Carcinoma of the upper aerodigestive system	**40 (2.0%)**	**0**	**0**
Neurodegenerative conditions	32 (1.6%)	0	0
Carcinoma of the bladder	23 (1.2%)	0	0
Bowel perforation	23 (1.2%)	0	0
Bowel ischaemia	22 (1.1%)	0	0
Peptic and duodenal ulcer disease	**21 (1.1%)**	**0**	**0**
Pulmonary embolus	21 (1.1%)	0	0
Aortic aneurysm	**20 (1.0%)**	**0**	**0**
All other cancers	630 (31.7%)	0	0
Miscellaneous	265 (13.3%)	0	0
TOTAL (all deaths)	1,986	2	10
TOTAL (>50% attributable to smoking)	407 (20.5%)	2	6

The highlighted diagnoses are those in which the percentage of deaths attributable to smoking has been calculated to be ≥50%.
MCCD, Medical Certificate of Cause of Death; UCLH, University College London Hospital.

that it would be distressing to relatives to record smoking as the COD. By contrast, the situation-specific nature of the alcohol-related stigma may remove any such reluctance to record alcohol as the COD.

Second, it is possible that doctors completing the death certificate are unaware or unsure of the deceased smoking habits. In the current era of shift-working and reduced length of stay it is becoming increasingly difficult for doctors to obtain a detailed knowledge of their patients. In addition, pathologists frequently have very limited clinical and social information relating to postmortem cases, especially for patients who die in the Accident & Emergency department, which may explain why none of the MCCDs they completed cited smoking. However, the same low rate of recording smoking on death certificates was also observed in a study of general practitioners, a group who it could be argued should know the smoking habits of their patients.[10]

Third, anecdotal evidence also suggests that many doctors are unaware that smoking can be cited as the underlying COD. While this is undoubtedly a factor, death certification is now widely taught at medical schools and the ONS have produced guidance for the formulation of CODs in smoking related deaths.[9]

Finally, many doctors fully understand the link between smoking and the terminal condition from which their patient died. However, the application of epidemiological observations to an individual patient can be difficult and if there are any doubts it may be their personal judgement to omit smoking from the death certificate.

This study has a number of limitations. First, we have only studied the completion of death certificates at one NHS Trust and therefore our findings may not be fully representative of death certification within the wider NHS. However, since the

Table 3 The medical diagnoses and frequency with which alcohol use is identified in parts I and II of the MCCD completed at the UCLH during the study period

Diagnosis	No. of deaths	'Alcohol' cited as underlying COD (part I)	Alcohol use cited as a contributory factor (part II)
Alcoholic liver disease	23	23	0
Cirrhosis	10	3	0
Liver disease	10	0	0
Pancreatitis	7	1	0
Alcohol withdrawal-related seizures	2	2	2
Cardiomyopathy	1	1	0
Acute alcohol poisoning	1	1	0
Total	54	31	2
Percentage of deaths in conditions attributable to alcohol		57.4%	3.7%

COD, cause of death; MCCD, Medical Certificate of Cause of Death; UCLH, University College London Hospital.

Take-home messages

- In the UK, the number of smoking-related deaths is an estimate derived from epidemiological studies and surveys.
- Since 1992, smoking could be used as a cause of death (COD) on death certificates without the need to inform the coroner.
- In this study of >2000 death certificates, 407 deaths were identified as strongly associated with smoking. However, only two cases (0.5%) recorded smoking as the underlying COD.
- This reluctance to cite smoking is a widespread observation—the Office of National Statistics recorded only 95 death certificates over a 10-year period that cited smoking as the underlying COD.
- This observation was in marked contrast to alcohol use. Of the 54 deaths with a strong association, >50% cited alcohol use as the COD.
- The reasons for doctors' reluctance to cite smoking as a COD are both numerous and complex and include the desire not to stigmatise the deceased.
- By including a tick box on the reverse of death certificates, smoking-related mortality data could be collected more accurately while limiting distress to relatives.

UCLH employs >1000 doctors and the study spanned 33 months, we are likely to have sampled the certifying practices of a significant number of doctors. Furthermore, reports from the ONS, which showed that tobacco use was only recorded on 95 death certificates during a 10-year period, would strongly suggest that our findings are broadly representative. Another shortcoming of this study was that we were only able to identify the smoking history in 127/279 (45.5%) cases of lung cancer and COPD. However, in those cases where smoking history was recorded the majority (68.9%) of patients were identified as 'smokers' or 'ex-smokers'.

Despite the perceived difficulties associated with death certification and the limitations of our study, the authors feel that, given the overwhelming evidence showing a causal link between smoking and certain terminal conditions, more effort should be made to record smoking on the death certificate. It is clear that the current arrangements fail to achieve this. One approach might be to establish new terminology such as 'smoking-related chronic obstructive pulmonary disease' in line with that observed in alcohol-related deaths. This would allow doctors to identify patients in whom they felt that smoking was not an important causal factor. An alternative approach would be to include a simple tick box on the death certificate where doctors can indicate whether the deceased was a smoker/ex-smoker/non-smoker. While both approaches would improve the collection of smoking related mortality data, the latter approach would be significantly easier to implement and more likely to minimise the distress experienced by relatives. The tick box approach has been successfully adopted in several US states including Texas where the incidence of recorded tobacco use increased almost 10-fold following its introduction.[16]

This study shows that despite overwhelming epidemiological evidence and changes to the Coroners rules, doctors fail to record smoking on MCCDs. This is a lost opportunity to gather important epidemiological and pathological information on smoking-related mortality. The potential role of MCCDs in the collection of smoking related mortality data could become increasingly important if planned cuts in NHS funding signal the end of the GLF.[17] Following the outcome of this and earlier studies the authors strongly recommend that the current MCCD be amended to include a tick box system that would allow smoking status to be recorded in all deaths.

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Competing interests None.

Ethics approval The study was an audit of clinical practice and did not require ethical approval.

Contributors IP, VS and AW were involved in the conception and design of the study, analysis and interpretation of the data and drafting and revising the article. MKZ was involved in data collection and analysis.

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