Smoking cessation support in primary care and quitting after lung, bladder or aerodigestive tract cancer

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ABSTRACT

Purpose

Smoking cessation after diagnosis of lung, bladder, and upper aerodigestive tract cancer appears to improve survival and support to quit would improve cessation. The aims of this study were to assess how often general practitioners (GPs) provide active cessation support in these patients and whether this is influenced by incentive payments.

Methods

Using electronic primary care records from the UK Clinical Practice Research Datalink (CPRD), 12,393 incident cancer cases diagnosed between 1999-2013 were matched 1:1 with incident coronary heart disease (CHD) patients. We assessed differences in the proportion whose GPs updated smoking status, advised quitting, prescribed cessation medications, or stopped smoking within a year of diagnosis and whether any differences arose because GPs were incentivised to address smoking in patients with CHD and not cancer.

Results

At diagnosis, 32·0% of patients with cancer and 18·2% of patients with CHD smoked. Patients with cancer were less likely than patients with CHD to have GPs update smoking status (OR 0·18 (95%CI 0·17-0·19)), advise quitting (OR 0·38 (95%CI 0·36-0·40)), prescribe medication (OR 0·67 (95%CI 0·63-0·73)), or stop smoking (OR 0·76 (95%CI 0·69-0·84)). 61.7% of people with cancer and 55·4% with CHD who smoked at diagnosis were smoking one year later. Introducing incentives was associated with more frequent intervention but not for CHD patients specifically.

Conclusions

General practitioners are less likely to support smoking cessation in patients with cancer than CHD and patients with cancer are less likely to stop smoking, and this is not due to the difference in incentive payments.

Key words: smoking, smoking cessation, cancer, primary care

INTRODUCTION

A fifth of cancers in the UK are attributable to tobacco smoke,(1) of which lung, bladder and upper aerodigestive tract cancers are most common.(1, 2) Continued smoking after diagnosis of cancer is associated with worse prognosis.(3-5) Estimates suggest that between 35% and 62% of cancer patients continue smoking in the year after diagnosis.(6-11)

A cancer diagnosis motivates people to attempt to quit smoking. (12) Physicians can improve motivation and the likelihood of achieving abstinence by offering assistance, including giving advice and prescribing medication.(13, 14) However, many physicians do not view supporting smoking cessation as a priority.(15) In 2004, the UK introduced a pay for performance scheme, the Quality and Outcomes Framework (QOF), which includes incentivisation to support smoking cessation. Payments are made for recording smoking status and offering 'support and treatment' annually to patients with one of several smoking-related conditions, but this does not include smoking-related cancers.(16) It is not known to what extent GPs are supporting cancer patients to quit, or if introduction of incentives for other conditions has influenced this.

The first aim of this study was to examine how often GPs intervene to support smoking cessation in patients with cancer, meaning how often they updated smoking status and provided support, and to examine the proportion of patients that manage to stop in the first year after diagnosis. Hospital physicians infrequently offer active support for smoking cessation so primary care support is crucial.(17-20) For context, we compared cancer with patients with coronary heart disease (CHD), a similarly serious smoking-related condition which also motivates people to try to stop smoking and for which there is evidence that smoking cessation improves disease outcomes.(21) A second aim was to examine the effect

of incentive payments on management of smoking in patients with CHD. CHD is a condition in which doctors are incentivized to provide smoking cessation support. If the management of smoking improved in patients with CHD but not cancer after the payments were introduced, this would support extending these incentive payments to cover patients with smoking-related cancers too.

METHODS

We conducted a retrospective cohort study using routinely collected UK primary care records from the Clinical Practice Research Datalink (CPRD) (www.cprd.com). In 2013, this contained records from 4.4 million live patients, 6.9% of the UK population.(22) The protocol was peer-reviewed then approved by the Independent Scientific Advisory Committee (ISAC) for MHRA database research (ref no: 14_105) and was available during peer review.

Incident cases of lung, bladder and upper aerodigestive tract cancers diagnosed between 1999 and 2013 that had a recording of smoking at diagnosis or within three years of diagnosis, were matched 1:1 to incident CHD controls based on year of diagnosis, general practice and smoking status. We included patients who smoked at diagnosis or who had stopped within three years of diagnosis as people who have recently stopped are vulnerable to relapse during this time,(23) and doctors are incentivized by QOF to ask patients about smoking for up to three years after quitting. We defined smoking at diagnosis as smoking on the last occasion smoking status was recorded in the three years prior to diagnosis. A recent ex-smoker was defined someone recorded as smoking within three years of diagnosis and subsequently recorded as not smoking on the last occasion prior to diagnosis. Patients were followed until the end of 2013. We adapted the protocol to exclude thyroid cancers, because they are not

smoking-related, and to exclude people who had been stopped for over three years or never smokers because they are not relevant to the study questions.

For the first aim, we compared the proportion of patients in whom GPs updated smoking status, advised patients to stop or provided advice on how to do so, prescribed cessation medication, and quit smoking during the year after diagnosis. This is presented as a proportion of current smokers and recent ex-smokers. With logistic regression we examined differences in outcomes between cancer cases and CHD controls. All models were adjusted for age, gender, and the presence of co-morbidity for which intervention on smoking is incentivized by the QOF- asthma, chronic kidney disease, chronic obstructive pulmonary disease, peripheral artery disease, diabetes, hypertension, stroke and serious mental illness. In sensitivity analyses we excluded patients who were not smoking at diagnosis. Because GPs may not intervene on smoking in patients who are known to be terminally ill, we also conducted sensitivity analyses restricted to patients who survived at least one year after diagnosis. We calculated the adjusted incidence rate ratio (RR) for cancer patients relative to CHD patients for number of smoking cessation prescriptions given using negative binomial regression (to account for over-dispersion). We assessed whether incentives increased the frequency of GP intervention by adding a binary term reflecting whether or not the year of diagnosis was prior to or after 2004, the year incentives were introduced. We added a multiplicative interaction term to examine whether the apparent effect of incentives differed between cases with cancer and controls with CHD; the latter attracted incentive payments.

RESULTS

There were 42,112 people who were diagnosed with lung, bladder or upper aerodigestive tract cancer between the start of 1999 and end of 2013. Of these, 13,449 (32·0%) were

smoking at diagnosis and 3,092 (7·3%) had stopped smoking within three years of diagnosis There were 159,182 people diagnosed with CHD during this period, of whom 28,987 (18·2%) smoked at diagnosis and 6,301 (4·0%) had stopped smoking within three years of diagnosis. Of these groups, 12,393 cancer cases were successfully matched to the same number of CHD controls and were included in the main analyses. There were 9,347 people with lung cancer (86% current smokers), 2,050 with bladder cancer (90% current smokers), with upper aerodigestive tract cancers (91% current smokers). Sensitivity analyses of people who had survived for at least one year, included 5,094 incident cancer cases (2,781 lung, 1,512 bladder, 801 upper aerodigestive) and 5,094 matched CHD controls.

Cancer patients were older at diagnosis (67·5yrs. (SD 10·5) v 61·3yrs. (SD 11·9)), less likely to be male (57·9% v 65·6%) and had higher prevalence of asthma, chronic obstructive pulmonary disease (COPD), chronic kidney disease, stroke, and peripheral artery disease and a lower prevalence of hypertension and diabetes (Table 1).

Updating of smoking status

Cancer patients were significantly less likely to have their smoking status updated during the first year after diagnosis than controls (37% v 78%, OR 0·18 (95%CI 0·17-0·19)). After removing patients who died within a year of diagnosis, this difference was smaller but still apparent (62% v 86%, OR 0·26 (95%CI 0·23-0·29)) (Table 2, Figure 1a).

There was an almost three-fold increase in the odds of updating of smoking status after incentives were introduced (OR 2·71 (95%CI 2·44-2·99)). There was no evidence that the increase was larger in CHD compared with cancer (p interaction=0·86) (Appendix Table 1).

Advice to quit

Cancer patients were significantly less likely to have a recording of advice to quit (all patients 23% v 45%, OR 0·38 (95%CI 0·36-0·40). When including patients who were smoking at diagnosis only, the proportions were similar (24% v 48%, OR 0·36 (95%CI 0·34-0·38). In the cohort that survived at least a year the proportions were 39% v 51%, OR 0·60 (95%CI 0·55-0·66) (Table 2, Figure 1b).

There was a threefold increase in the odds of recording advice to quit after the introduction of incentives (OR 3·04 (95%CI 2·73-3·38). There was evidence that the increase in odds was greater for cancer patients than for CHD controls (p interaction=0·02), and subgroup analyses showed that this was confined to lung cancer patients (Appendix Table 2).

Prescription of smoking cessation medications

Cancer patients were significantly less likely to be prescribed smoking cessation medications (all patients 12% v 21%, OR 0·67 (95%CI 0·63-0·73); current smokers at diagnosis only 13% v 22%, OR 0·67 (95%CI 0.62-0.72)). However, this difference was smaller and not significant confined to people who survived at least a year (21% v 23%, OR 1·05 (95%CI 0·94-1·17)) (Table 2, Figure 1c). The number of prescriptions given to cancer patients was similar to the number given to CHD controls, RR 0·95 (95%CI 0·87-1·04). Restricted to those surviving a year it was 1·15 (95%CI 1·01-1·32) indicating that cancer patients were given more prescriptions than CHD controls.

There was a significant increase in proportion of patients receiving smoking cessation medications after introduction of the QOF (OR 1·79 (95%CI 1·56-2·05). There was no evidence that this change in the odds of prescribing at least one medication differed for

cancer or CHD patients (p interaction=0·89). Findings were similar in cancer subgroups matched to CHD controls (Appendix Table 3).

Smoking cessation

Of the 3,706 cancer/CHD patients who smoked at diagnosis and had at least one smoking status update in the year following diagnosis, 1,359 (36·7%) of patients with cancer and 1,645 (44·4%) of patients with CHD stopped smoking, OR 0·76 (95%CI 0·69-0·84). Among 2253 pairs both of whom had smoking status updated and survived at least a year, 863 (38·3%) of people with cancer and 1004 (44·6%) of people with CHD stopped smoking, OR 0·82 (95%CI 0·72-0·93) (Table 3).

There was no significant increase in quitting after introduction of incentives (OR 1·18 (95%CI 0·94-1·49) (Appendix Table 4).

DISCUSSION

A third of people with lung, bladder, and upper aerodigestive tract cancer smoked at diagnosis. People with cancer were less likely to have smoking status recorded by their GP, be given advice, be prescribed cessation pharmacotherapy, or quit smoking in the year following diagnosis. Confining the analysis to patients who smoked at the time of diagnosis and to those with a better prognosis did not change these findings except that the difference in prescription of pharmacotherapy was no longer apparent. The frequency of recording of smoking status, advice and pharmacotherapy increased after introduction of incentive payments for GPs to manage smoking but there were no differences in the rates of quitting. As these payments were confined to the management of smoking in patients with CHD and

not cancer, we expected to see the improvement to be larger in the CHD group. However, there was no evidence of this and some evidence of the reverse.

Strengths and weaknesses

This is the first study to investigate how GPs manage smoking in patients with smoking-related cancer. An important strength is that the population of patients and GPs who provide data to CPRD is broadly representative of the general UK population. (22) The sample was large enough to give precise estimates of association. Like all observational studies, we are unable to conclude that the lower rates of GP intervention on smoking in cancer patients were due to the GP not prioritising smoking in this group specifically. One plausible explanation could be that patients with cancer were less likely to consult GPs than were patients with CHD. However, there was no evidence of this. Ninety-one percent of all patients with a new diagnosis of cancer were seen by their GP in the year after diagnosis and 95% of all cancer patients who survived at least a year, compared with 75% and 79% of patients with CHD. Another explanation could lie in differences in expected survival between patients with lung cancer in particular and patients with CHD. Arguably, it is inappropriate for GPs to intervene on smoking in patients with only months to live and many patients diagnosed with lung cancer survive for less than a year.(24) To see if difference in management was driven by expectations of poor prognosis, we did sensitivity analyses using only patients that survived a year. We had originally planned to assess the effect of expected prognosis by adjusting for treatment intent and cancer staging at diagnosis but the data were not available in the level of Hospital Episode Statistics (HES) we had. Limiting analysis to patients who survived at least a year narrowed but generally did not abolish the difference between cancer and CHD. An additional reason for lower GPs intervention may be that cancer patients are more likely to

report receiving help from secondary care. However, support for smoking cessation in secondary care is low and this is unlikely to be the main source of cessation support.(17-20)

As with all studies based on healthcare records, it is possible that GPs provided advice to quit or on how to quit and did not record this. While this would underestimate the true rate of intervention, it is likely to underestimate the frequency of intervention in patients with cancer and CHD equally and is thus an implausible explanation for the findings. Given the way records work, all prescriptions given by GPs would have been recorded and thus these data can be regarded as true estimates of the frequency of intervention. It is also likely that some people stopped smoking and, because GPs did not ask, this was not recorded or patients may claim to have stopped smoking when this is not the case. While our estimate of cessation may therefore be inaccurate to some degree, any error should affect patients with cancer and CHD to a similar extent. Thus it appears that GPs are less assiduously supporting patients with cancer to stop smoking than they do for people with CHD to the detriment of people with cancer.

Interpretation of findings and comparison with existing studies

Many GPs express negative attitudes towards supporting smoking cessation in general.(15) This includes concerns about lack of time, ineffectiveness of interventions and lack of training. However, these concerns would deter intervening in patients with lung cancer and CHD equally. Two recent international surveys of cancer specialists found that less than half routinely offered patients smoking cessation treatment; common concerns were that intervention would be ineffective and cancer patients would resist treatment.(18, 19) However, we have previously reported that patients treated surgically for lung cancer express a wish for much greater involvement of clinicians in helping them manage smoking, and so this concern may be unfounded.(25) Whether or not GPs view smoking cessation support as

an equal priority is perhaps a secondary concern, however, because data indicate considerable scope for increasing active management both in cancer and CHD. Only a minority of patients receive advice to quit and just over a fifth are prescribed pharmacotherapy, while about six in 10 report smoking one year after the diagnosis of cancer or CHD.

The second aim was to examine the impact of payment to GPs on management of smoking. We found that recording of status and advice was higher on average in the post-QOF period than before incentives were introduced in 2004. Given the size of effect and the sharp rise that occurred around the time of introducing the incentive payments, it is likely that this was a change brought about by the new payment system, as has been noted in previous studies.(26, 27) However, counterintuitively, we found that the increase applied equally to both patients with cancer, who did not attract payments, as to patients with CHD who did. Furthermore, the absolute rates of prescription of smoking cessation medications were small, and again although this increased after introduction of the QOF, the size of the increase for cancer and CHD patients was similar. Although GP intervention for smoking has been shown to be effective at increasing smoking cessation rates,(14) and clearly incentive payments will have the desired benefit to health if activity leads patients to quit smoking(28) this finding casts doubt on the specific benefits of extending the coverage of incentives for patients with smoking-related cancers.

CONCLUSIONS

Our data show that cancer patients receive less support to quit smoking in primary care than patients with CHD. Although absolute rates have improved over time they remain lower than they could be. The higher rate of intervention seen in patients with CHD than with cancer is not due to the effect of incentive payments. Cancer patients would benefit if GPs became

more actively involved in supporting smoking cessation and it is important to find ways to improve the management of smoking cessation by GPs for patients with cancer.

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Disclosure of potential conflicts of interest:

Paul Aveyard reports grants from MRC, NIHR, CRUK, ESRC, and UK Centre for Tobacco and Alcohol Studies during the conduct of this study; Amanda Farley reports grants from the NIHR, MRC and CRUK during the conduct of this study; Ronan Ryan reports that he was part-funded by the National Health Service (Heart of England NHS Foundation Trust) during the conduct of this study; All other authors have no potential conflicts of interest to declare.

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Table 1. Distribution of baseline characteristics in all cancer cases and matched CHD controls diagnosed between 1999 and 2013.

Characteristics	Category	All Cancer patients	CHD patients
		n= 12,393	n= 12,393
Gender, n (%)	Male	7185 (57.9)	8126 (65.6)
	Female	5208 (42.1)	4267 (34.4)
Age yrs., mean (SD)	Years	67.5 (10.5)	61.3 (11.9)
Smoking status at diagnosis	Current	10794 (87.1)	10794 (87.1)
	< 3yr Ex-smoker	1599 (12.9)	1599 (12.9)
Index of multiple deprivation, n (%)	1 (least deprived)	925 (7.5)	934 (7.5)
	2	1315 (10.6)	1372 (11.1)
	3	1423 (11.5)	1414 (11.4)
	4	1758 (14.2)	1690 (13.6)
	5 (most deprived)	1764 (14.2)	1773(14.3)
	Missing	5208 (42)	5210 (42)
Frequency of smoking, n (%)	Light	1496 (13.9)	1367 (12.7)
	Moderate	2093 (19.4)	1981 (18.4)
	Heavy	1788 (16.6)	1794 (16.6)
	Frequency unknown	5417 (50.2)	5652 (52.4)

Asthma, n (%)	No	11271 (91)	11456 (92.4)
	Yes	1122 (9)	937 (7.6)
Chronic kidney disease, n (%)	No	11481 (92.6)	11767 (94.9)
	Yes	912 (7.4)	626 (5.1)
Chronic obstructive pulmonary disease, n (%)	No	9642 (77.8)	11091 (89.5)
	Yes	2751 (22.2)	1302 (10.5)
Diabetes, n (%)	No	11339 (91.5)	11182 (90.2)
	Yes	1054 (8.5)	1211 (9.8)
Hypertension, n (%)	No	9887 (79.8)	9658 (77.9)
	Yes	2506 (20.2)	2735 (22.1)
Peripheral arterial disease, n (%)	No	11517 (92.9)	11649 (94)
	Yes	876 (7.1)	744 (6)
Stroke, n (%)	No	11582 (93.5)	11790 (95.1)
	Yes	811 (6.5)	603 (4.9)
Psychosis, n (%)	No	12289 (99.2)	12306 (99.3)
	Yes	104 (0.8)	87 (0.7)

Table 2: Number (%) of cancer and CHD patients diagnosed between 1999 and 2013 whose smoking status is updated, were advised to quit and were prescribed smoking cessation medication within the first year after diagnosis, and odds ratio (OR) for these outcomes in cancer patients relative to matched CHD patients

	Smokers and <3 yrs. ex-smokers (All cancer n= 12, 393, CHD n= 12, 393)*			Current smokers only (All cancer n= 10, 794, CHD n= 10, 794)**			1 year+ survivors only (All cancer n = 4, 228, CHD n=4, 228)***		
Outcome	Cancer case n (%)	CHD control n (%)	OR (95% CI)	Cancer case n (%)	CHD control n (%)	OR (95% CI)	Cancer case n (%)	CHD control n (%)	OR (95% CI)
Updated smoking status									
All cancers	4541 (37)	9627 (78)	0·18 (0·17-0·19)	3962 (37)	8437 (78)	0.18 (0.17-0.19)	2605 (62)	3611 (86)	0·26 (0·23-0·29)
Lung	2873 (31)	7224 (77)	0·14 (0·13-0·15)	2454 (31)	6253 (78)	0.13 (0.12-0.14)	1404 (60)	1982 (84)	0·25 (0·22-0·29)
Bladder	1172 (57)	1620 (79	0·38 (0·33-0·44)	1055 (57)	1466 (79)	0.38 (0.33-0.44)	851 (65)	1138 (87)	0·28 (0·22-0·34)
Upper aerodigestive tract	496 (50)	783 (79)	0·27 (0·22-0·33)	453 (50)	718 (79)	0.27 (0.22-0.33)	350 (61)	502 (87)	0·23 (0·17-0·30)
Advice to quit									
All cancers	2794 (23)	5601 (45)	0·38 (0·36-0·40)	2636 (24)	5245 (48)	0.36 (0.34-0.38)	1630 (39)	2156 (51)	0·60 (0·55-0·66)
Lung	1672 (18)	4196 (45)	0·28 (0·26-0·30)	1564 (19)	3907 (49)	0.26 (0.24-0.28)	810 (34)	1182 (50)	0·49 (0·43-0·56)
Bladder	809 (39)	925 (45)	0·87 (0·76-0·99)	774 (42)	880 (48)	0.86 (0.75-0.98)	594 (46)	669 (51)	0·84 (0·70-0·99)
Upper aerodigestive tract	313 (31)	480 (48)	0·50 (0·41-0·60)	298 (33)	458 (50)	0.50 (0.41-0.60)	226 (39)	305 (53)	0·58 (0·46-0·74)

Prescriptions									
All cancers	1504 (12)	2560 (21)	0·67 (0·63-0·73)	1439 (13)	2426 (22)	0.67 (0.62-0.72)	882 (21)	967 (23)	1·05 (0·94-1·17)
Lung	989 (11)	1950 (21)	0·58 (0·53-0·63)	940 (12)	1835 (23)	0.57 (0.52-0.63)	498 (21)	547 (23)	1·06 (0·91-1·23)
Bladder	291 (14)	386 (19)	0·96 (0·81-1·16)	279 (15)	373 (20)	0.97 (0.81-1.16)	226 (17)	280 (22)	1·02 (0·83-1·25)
Upper aerodigestive tract	224 (22)	224 (22)	1·00 (0·80-1·24)	220 (24)	218 (24)	1 .03 (0.83-1.29)	158 (27)	140 (24)	1·18 (0·89-1·55)

*Number for cancer subgroups and 1:1 matched CHD controls - lung n= 9347, bladder n= 2050, UAT n= 996

**Number for cancer subgroups and 1:1 matched CHD controls - lung n=8037, bladder n= 1848, UAT n= 909

**Number for cancer subgroups and 1:1 matched CHD controls - lung n=2350, bladder n=1302, UAT n=576

Table 3: Number (%) cancer and CHD patients diagnosed between 1999 and 2013 quitting within the first year after diagnosis, and odds ratio (OR) for quitting in cancer patients relative to matched CHD patients

	Patients with at least 1 update of smoking status (all cancer n= 3706, CHD control n=3706)			**Patients with at least 1 update of smoking status and 1 year+ survivors only (all cancer n=2253, CHD control n=2253)**		
	Cancer case n (%)	CHD control n (%)	OR (95% CI)	Cancer case n (%)	CHD control n (%)	OR (95% CI)
Quitting						
All cancers	1359 (36·7)	1645 (44·4)	0·76 (0·69-0·84)	863 (38·3)	1004 (44·6)	0·82 (0·72-0·93)
Lung cancer	885 (37·8)	1019 (43·6)	0·85 (0·75-0·97)	487 (41·3)	510 (43·3)	1·04 (0·87-1·25)
Bladder cancer	289 (30·6)	445 (47·1)	0·48 (0·39-0·59)	232 (30·7)	351 (46·5)	0·50 (0·40-0·63)
Upper aerodigestive tract cancer	185 (43·8)	181 (42·9)	1·03 (0·78-1·35)	144 (45·0)	143 (44·7)	1·00 (0·73-1·38)

*Number for cancer subgroups and matched CHD controls, lung n= 2340, bladder n= 944, UAT n= 422

**Number for cancer subgroups and matched CHD controls, lung n= 1178, bladder n= 755, UAT n=320

Figure 1: Percentage of patients with smoking status updated, advice to quit, prescription of smoking cessation medications and quitting within the first year after diagnosis pre and post QOF (all cancer patients and matched CHD patients) between 1999 and 2013

a. Smoking status (preQOF/postQOF OR 2·71 (95% CI 2·44-2·99), p interaction = 0·86)
b. Advice to quit (preQOF/postQOF OR 3·04 (95%CI 2·73-3·38), p interaction = 0·02)
c. Prescriptions (preQOF/postQOF OR 1·79 (95%CI 1·56-2·05), p interaction = 0·89)