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## Electronic cigarettes as a smoking cessation aid for cancer patients: beliefs and behaviours of health professionals

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**Electronic cigarettes as a smoking cessation aid for cancer patients: beliefs and behaviours of health professionals**

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**Abstract:**

Objectives: To explore clinicians' beliefs and behaviours around recommending e-cigarettes as a smoking cessation aid for cancer patients

Design: Cross-sectional online survey

Setting: England, Wales, Scotland and Northern Ireland

Participants: Health professionals involved in the care of patients with cancer

Primary and secondary outcomes: Behavioural Change Wheel COM-B, knowledge, beliefs, current practice around e-cigarettes and other smoking cessation practices

Method: Clinicians (n=506) completed an online survey to assess beliefs and behaviours around e-cigarettes and other smoking cessation practices for cancer patients. Behavioural factors associated with recommending e-cigarettes in practice were assessed.

Results: 29% of clinicians would not recommend e cigarettes to cancer patients who continue to smoke. Factors associated with recommendation include smoking cessation knowledge (OR =0.64, CI 0.42-0.99) and e-cigarette knowledge (OR =1.64, CI 1.06-2.55), engagement with patients regarding smoking cessation (OR =2.12, CI 1.12-4.03), belief in the effectiveness of e-cigarettes (OR =2.36 CI 1.61-3.47), and belief in sufficient evidence on e-cigarettes (OR = 0.48, CI 0.25-0.91) and how comfortable they felt discussing e-cigarettes with patients (OR = 1.57 CI 1.04-2.36).

Conclusion: Many clinicians providing cancer care to patients who smoke do not recommend e-cigarettes as a smoking cessation aid and were unaware of national guidance supporting recommendation of e-cigarettes as a smoking cessation aid.

**Strengths and limitations of this study**

- This study reports an online survey with 506 clinicians to assess their beliefs and current practices around e-cigarettes as a smoking cessation aid for cancer patients.

- The study highlights that despite the popularity of e-cigarettes as a smoking cessation aid and support from Public Health England, clinicians have reservations about supporting their use in cancer patients
- Improved knowledge through training and change of policies at local and regional NHS sites are needed to encourage endorsement of the use of e-cigarettes in cancer patients
- Limitations include the sampling method and the potential for response bias

Key words: E cigarettes, cancer, smoking cessation, behavioural change, current practice

## Background

Smoking is a well-established risk factor for many common cancers.<sup>1-3</sup> The adverse effects of smoking continue after a cancer diagnosis, increasing the risk of treatment-related complications, recurrence, the development of a second primary cancer, and mortality from both cancer-related and non-cancer-related causes.<sup>4-11</sup> Despite the increased risk of complications of cancer treatment, recurrence, and death, many patients with smoking-related cancers continue smoking following diagnosis<sup>12-15</sup> having tried and failed to stop smoking. Effective aids for cessation are available, but support to quit is not routinely offered as part of cancer care.<sup>16,17</sup> One study found that 39% (N=1129) of lung cancer patients, 37% (N=281) upper aero-digestive tract cancer patients, and 49% (N=850) of bladder cancer patients continued to smoke one year after diagnosis, figures that were likely to be higher as a third of the potential participants' smoking status was unknown.<sup>18</sup> To enhance the length and health-related quality of their lives, efforts are needed to support cancer patients to stop smoking cigarettes.

In recent years e-cigarettes have grown in popularity as a cessation aid among smokers worldwide. In the UK, e-cigarettes have swiftly become the most popular smoking cessation product for smokers.<sup>19,20</sup> There are 3.6 million EC users in the UK, of which only 0.8% have never smoked.<sup>[ASH 2019]</sup> E-cigarettes are used in 30% of quit attempts with currently around 20% of smokers and 30% of recent ex-smokers using them.<sup>21</sup> Evidence shows that e-cigarettes help smokers to stop smoking long-term<sup>22-24</sup> and recent evidence suggests that e-cigarettes are more effective for smoking cessation than nicotine-replacement therapy, when both products are accompanied by behavioural support.<sup>25</sup> Consequently, Public Health England, medical organisations and leading cancer charities in the UK recommend that clinicians support the use of e-cigarettes in patients who smoke.<sup>26-29</sup> Qualitative

1  
2  
3 evidence implies that clinicians may be more uncertain than guidance suggests is  
4  
5 appropriate, with some expressing hostility and reporting practices that contradict the  
6  
7 evidence.<sup>30</sup>  
8  
9

10 The aims of this study were to understand clinicians' beliefs and behaviours related to e-  
11  
12 cigarettes for patients with cancer who continue to smoke, and to understand the  
13  
14 behavioural factors that may promote or inhibit recommending e-cigarettes.  
15  
16

## 17 **Methods**

### 18 **Design**

19  
20 The study was a cross-sectional online survey of health professional's knowledge, beliefs  
21  
22 and current practice of smoking cessation and e-cigarettes. The survey was sent to  
23  
24 clinicians involved in the cancer care pathway, working in primary and secondary care.  
25  
26  
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29

### 30 **Survey development**

31  
32 The survey was developed using methods suggested by Bowling (1997).<sup>31</sup> The questions  
33  
34 drew on 1) a literature review to identify evidence of clinicians' knowledge, attitudes,  
35  
36 behaviours and current practice with respect to smoking cessation interventions, including  
37  
38 e-cigarettes, in cancer patients; 2) expert opinion; 3) drawing on Behaviour Change Wheel  
39  
40 (BCW).<sup>32</sup> Development also drew on previous survey questions exploring attitudes to e-  
41  
42 cigarettes.<sup>22,33</sup> The questionnaire was piloted with five GPs and five cancer specialists,  
43  
44 resulting in minor modification of wording of some questions.  
45  
46  
47  
48

49 The final questionnaire was structured according to the COM-B behaviour model based on  
50  
51 Mitchie's Behaviour Change Wheel for development of interventions.<sup>32</sup> This model proposes  
52  
53 that people need capability (C), opportunity (O) and motivation (M) to perform a behaviour  
54  
55 (B) and was developed to guide understanding of behaviour in context and develop  
56  
57 behavioural targets. The model proposes that for someone to engage in a particular  
58  
59  
60



1  
2  
3 behaviour (B) at a given moment they must be physically able and psychological ability (C)  
4  
5 and have the social and physical opportunity (O) to enact the behaviour and, in addition,  
6  
7 want or need to enact the behaviour more than any other competing behaviours at that  
8  
9 moment (M). This inclusive definition of motivation (M) covers basic drives and automatic  
10  
11 processes such as habit and impulses as well as reflective processes including intention and  
12  
13 choice. If a desired behaviour is not occurring (or an undesirable behaviour occurring) then  
14  
15 an analysis of the determinants of the behaviour will help to define what needs to shift in  
16  
17 order for the desired behaviour to occur (or the unwanted behaviour to cease).  
18  
19  
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21  
22

23 The questionnaire included items relating to psychological capability (knowledge of smoking  
24  
25 status of patients, knowledge and skills about smoking cessation in general, knowledge and  
26  
27 skills about of e-cigarettes,); physical opportunity (time constraints talking to patients about  
28  
29 e-cigarettes, physical constraints due to policy); social opportunity (relationship with patient  
30  
31 and how this impacts on smoking cessation advice given, social norms e.g. most my  
32  
33 colleagues support use of e-cigarettes, most my colleagues feel uncomfortable  
34  
35 recommending e-cigarettes, clinicians should discourage smoking); reflective motivation  
36  
37 (motivation to engage in smoking cessation with cancer patients, beliefs about how  
38  
39 effective e-cigarettes are for cancer patients, beliefs about the HP's role, beliefs about the  
40  
41 evidence base around e-cigarettes, attitudes towards e-cigarettes, beliefs about the harms  
42  
43 of e-cigarettes particularly in comparison to tobacco cigarettes, and automatic motivation  
44  
45 (how comfortable they feel giving smoking cessation advice in general and in giving specific  
46  
47 advice on e-cigarettes to patients). A full copy of the questionnaire is available  
48  
49 electronically (insert link here)  
50  
51  
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56  
57 **Sample:**  
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1  
2  
3 MedeConnect, the survey arm of Doctors.net.uk asked clinicians who care for cancer  
4 patients in the UK (surgeons, oncologists, cancer nurse specialists, GPs and practice nurses)  
5  
6 to complete the survey if they were on their existing databases and had consented to  
7  
8 participate in research. The survey was completed between Nov 2018 and February 2019.  
9  
10  
11 A small financial reward was offered. Quota sampling was used to stratify the sample by  
12  
13 type of clinician and by the seven National Health Service (NHS) UK regions. Participants  
14  
15 confirmed they had read the participant information and consented to take part via email  
16  
17 before the survey link was sent.  
18  
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22

### 23 **Analyses**

24  
25 Anonymised electronic responses were imported into SPSS (version 25) for analysis.

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27 Frequencies and proportions were used to summarise questionnaire responses. Results are  
28  
29 reported using the COM-B model: physical and psychological capability; physical and social  
30  
31 opportunity; and automatic and reflective motivation  
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33

34  
35 Means and standard deviations for each measure for the whole sample were calculated and  
36  
37 then compared by health professional occupation. Chi squared tests were used to compare  
38  
39 the HPs on categorical measures. One way ANOVA was used to compare means for the  
40  
41 other measures. Multiple comparisons were taken into account using a Bonferroni  
42  
43 correction. Student-Newman-Keuls post-hoc tests were used to examine differences  
44  
45 reported.  
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47

48  
49 Binomial logistic regression models were used to predict the likelihood of recommending e-  
50  
51 cigarettes to cancer patients. The dependent variable was dichotomised by always/nearly  
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53 always /often recommend e-cigarettes (Q5\_3) vs. sometimes/ infrequently/ never.  
54  
55

56  
57 Ethics: This study was approved by the Oxford Brookes University Research Ethics  
58  
59 Committee (2017 44 Brett)  
60

**Results:****Characteristics of respondents**

The online survey was completed by 506 clinicians: 103 GPs, 102 oncologists, 100 cancer surgeons, 102 practice nurses and 99 cancer nurse specialists (CNSs). Table 1 describes the clinicians' characteristics:

**Table 1 Clinician Characteristics**

<b>Demographics</b>	All participants % (N = 506)	Primary Care % (n = 205)	Secondary Care % (n = 301)
<b>Gender</b>			
Male	41.1	35.1	45.2
Female	57.5	63.9	53.2
Prefer not to say	1.4	1.0	1.7
Mean year qualified as a health professional	1995 (1968-2009)	1994	1996
<b>Role</b>			
General practitioner (GP)	20.4	40.5	
Practice nurse	20.2		
Cancer surgeon	19.8		59.5
Oncologist	20.2		
Cancer nurse specialist	19.6		
<b>NHS region</b>			
London	15.8	12.2	18.3
South of England	21.1	21.5	20.9
Midlands & East SEA	25.5	25.4	25.6
North of England	20.6	22.9	18.9
Scotland	12.1	13.7	11.0

Wales	2.2	2.4	2.0
Northern Ireland	2.8	2.0	3.3
Main cancer group they care for			
All	37.0	76.1	10.3
Breast	24.1	12.2	32.2
Prostate	19.4	13.7	23.3
Lung / mesothelioma	18.0	11.7	22.3
Bowel	11.9	5.4	16.3
Kidney	11.9	0.5	19.6
Bladder	11.3	0.5	18.6
Other cancer groups	< 10	<5	<15
Smoking status of clinicians			
Smoke tobacco cigarettes	2.0	1.5	2.3
** Use e-cigarettes	1.2	1.5	1.0
Ex-smoker	21.3	22.9	20.3
Never smoker	72.3	72.2	72.4
Other	1.4	1.5	1.3
Prefer not to say	3.6	2.4	4.3

**Reported behaviour:** 29% (n=147) of clinicians would not recommend e-cigarettes to cancer patients who smoke. 51% (n=258) would recommend e-cigarettes as an interim measure, to help patients stop smoking completely, while 20% (n=101) would recommend e cigarettes as a partial replacement for smoking tobacco.

### Psychological capability

Most clinicians (78%, n=394) knew the smoking status of their cancer patients, and routinely recorded their smoking status (73% n=368). 67% (n=339) reported that they routinely recommended patients stop smoking, or cut down (52%, n=263). 29% (n=147) referred

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3 patients to the NHS stop smoking services, 14% (n=71) recommended NRT, 9% (n=46)  
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5 recommended digital smoking cessation tools, and 5% (n=25) prescribed medication  
6  
7  
8 (Varenicline or Bupropion).  
9

10 Many clinicians felt they had insufficient knowledge (57%, n=286) and training (73%, n=370)  
11  
12 to provide advice about e-cigarettes to patients and a further 36% (n=182) indicated that  
13  
14 they did not know the efficacy of e-cigarettes with regard to smoking cessation.  
15  
16

17 Clinicians derived information about e-cigarettes from several sources. Overall, only 9.5% of  
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19 health professionals knew whether their organisation had guidance concerning advice to  
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21 patients on e-cigarette use. Most health professionals had sought information about e-  
22  
23 cigarettes from government/health agencies (55%), but also from professional associations  
24  
25 (37%), healthcare colleagues (29%), news/media/advertising (24%), scientific literature  
26  
27 (23%), professional development/training (22%) and charities (18%). Nineteen percent of  
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29 health professionals had never sought information about e-cigarettes. One quarter of  
30  
31 respondents (25%, n=124) were uncertain whether e-cigarettes were less harmful than  
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33 smoking tobacco, while 10% (n=52) thought e-cigarettes were equally harmful or more  
34  
35 harmful than smoking tobacco. 18% (n=93) considered using e-cigarettes to be more  
36  
37 harmful than regular nicotine replacement therapies (e.g. gum, nasal spray, patches) and  
38  
39 54% (n=273) were uncertain.  
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#### 46 **Physical opportunity**

47  
48 The majority of health professionals (56%, n=285) said that e-cigarette use was prohibited in  
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50 all areas at their main place of work. Twenty three percent (n=119) reported that the use  
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52 of e-cigarettes was permitted, with 24% (n=29) reporting use in designated smoking areas  
53  
54 only. Overall 51% (n=258) agreed that time constrained their ability to talk about e-  
55  
56 cigarettes with patients.  
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### **Social opportunity**

The nature of the relationships between health professionals and patients with cancer were important in whether and how smoking cessation was discussed. 55% (n=278) of health professionals reported that having a good relationship would make them more likely to speak to their patient about stopping or cutting down, while 45% (n=228) reported that having a poor relationship would make them less likely to discuss smoking cessation. Many clinicians (42% n= 212 ) felt uncomfortable when asked by patients for an opinion on e-cigarettes. The large majority, 82%, had been asked about e-cigarettes by patients in the past year (2017/18), up from 21% in 2016/17.

Thirty eight percent (n=192) said that most of their colleagues would feel uncomfortable recommending e-cigarettes to patients with cancer, and 37% (n=187) were unsure whether health professionals should discourage patients with cancer from using e-cigarettes.

### **Automatic motivation**

Subconscious biases towards e-cigarettes were influenced by health professionals' beliefs around the effectiveness of and evidence on e-cigarettes, as reported in the psychological capability section above.

Clinicians reported that their decisions to speak with patients with cancer about smoking cessation were influenced by their perceptions of the patient. Health professionals reported that they were more likely to discuss smoking cessation if they judged the person was motivated to quit (69%, n=349), or was coping well (67%, n=339).

### **Reflective Motivation**

Reflective motivation related to the clinicians' perceived role in smoking cessation and national and organisational policy on e-cigarettes. Two thirds (65%, n=327) of clinicians agreed that they should play a greater role in helping cancer patients stop smoking. Health

professionals' were divided over whether e-cigarettes should be licensed and available on prescription for patients with cancer, with 39% (n=199) respondents disagreeing, and 32% (n=162) saying they should be available on prescription. Furthermore, 30% (n=150) of clinicians felt that public health campaigns, such as Stoptober should not endorse using e-cigarettes as a way to give up smoking tobacco, while 29% (n=149) thought e-cigarettes should be endorsed in campaigns.

### **Differences in e-cigarettes practice between health professionals**

GPs and practice nurses were significantly more likely to say that they recommended e-cigarettes to cancer patients than the other HPs included in the study (see Table 2).

GPs and practice nurses also rated themselves as having significantly greater general knowledge and skills than other professionals to help patients with cancer stop smoking, and reported that they had more time to discuss smoking with patients and having an important role in helping patients cut down.

Practice nurses engaged in significantly more behaviours (e.g. knew smoking status, engaged in advice to patients, supported e-cigarette use in patients) related to smoking cessation with patients than all the other groups. GPs engaged in significantly more behaviours than the other HPs, but fewer than practice nurses.

Practice nurses were significantly more likely to believe in the effectiveness of e-cigarettes in helping cancer patients stop smoking compared to other HPs.

**Table 2: COM-B measures by HP– Mean and SD**

	Total	General Practitioner	Practice Nurse	Cancer Surgeon	Oncologist	Cancer Nurse Specialist	Test statistic, p
N of participants	506	103	102	100	102	99	

Recommend e-cigarettes always/often, N (%)	97 (19.2)	24 (23.3%)	36 (35.3)	9 (9)	16 (15.7)	12 (12.1)	$\chi^2=28.90$ , p<.001
<b>Capability</b>							
Know status	4.72 (.59)	4.75 (.48)	4.78 (.46)	4.81 (.46)	4.75 (.60)	4.52 (.81)	F = 4.17, p=.002*
General smoking knowledge	3.40 (1.03)	3.80 (.86)	3.75 (1.08)	3.10 (1.00)	3.17 (1.03)	3.19 (.95)	F = 12.09, p<.001*
E-cig knowledge	2.34 (.99)	2.40 (.89)	2.45 (1.07)	2.21 (.94)	2.54 (1.05)	2.11 (.95)	F = 3.32, p=.011
<b>Opportunity</b>							
Time	2.60 (1.03)	2.46 (.95)	2.87 (.94)	2.39 (1.00)	2.29 (1.06)	3.02 (1.00)	F= 10.47, p<.001*
Patient relationships	2.51 (.68)	2.45 (.72)	2.52 (.66)	2.59 (.64)	2.49 (.67)	2.52 (.72)	F = .59, p=.668
Social norms	3.00 (.72)	2.98 (.86)	3.18 (.75)	2.85 (.66)	3.08 (.65)	2.91 (.64)	F =3.36, p=.010
<b>Motivation</b>							
Engagement with patients who smoke	2.77 (.61)	2.90 (.55)	3.21 (.55)	2.60 (.54)	2.55 (.58)	2.59 (.55)	F= 26.13, p<.001*
Effectiveness in helping cancer pts	2.83 (1.50)	2.86 (1.48)	3.39 (1.43)	2.49 (1.54)	2.81 (1.45)	2.57 (1.44)	F = 5.89, p<.001*
Importance of HP role	4.35 (.76)	4.48 (0.62)	4.60 (.60)	4.33 (.83)	4.20 (.81)	4.15 (.84)	F =6.40, p<.001*
Lack of evidence N (%)	242 (47.8)	57 (55.3)	51 (50)	44 (44)	41 (40.2)	50 (50.5)	$\chi^2=5.60$ p=.231
Attitudes	3.22 (.61)	3.23 (.64)	3.39 (.62)	3.08 (.61)	3.26 (.53)	3.13 (.59)	F = 4.04, p=.003
Harm	3.16 (.68)	3.25 (.63)	3.15 (.67)	3.18 (.66)	3.22 (.71)	3.01 (.71)	F =1.32, p=.263
Better than smoking	3.86 (.96)	4.00 (1.00)	3.84 (1.00)	3.82 (.81)	4.07 (.86)	3.56 (1.05)	F = 4.39, p=.002*
Comfortable discussing	4.40 (.76)	4.45 (.75)	4.44 (.71)	4.49 (.72)	4.39 (.81)	4.24 (.80)	F =1.59, p=.175



smoking in general							
Comfortable discussing e-cigs	2.91 (1.16)	3.09 (1.13)	3.04 (1.23)	2.65 (1.17)	3.00 (1.11)	2.76 (1.12)	F =2.79, p=.026

Note \* = significant for F tests when multiple comparisons taken into consideration, accepted p value corrected to 0.003

### Logistic regression model

Table 3 presents a logistic regression model including all COM-B factors and controlling for health professional type. In this model, capability factors of smoking knowledge (OR =0.64 CI 0.42-0.99) and e-cigarette knowledge (OR =1.64 CI 1.06-2.55) significantly predicted recommending e-cigarettes to cancer patients. Specifically, those with lower levels of knowledge and skills about smoking cessation in general were less likely to recommend e-cigarettes, and those with higher levels of knowledge and skills about e-cigarettes were more likely to recommend them. Motivation factors were also important - engagement with patients regarding smoking (OR =2.12 CI 1.12-4.03), belief in the effectiveness of e-cigarettes (OR =2.36 CI 1.61-3.47), belief in sufficient evidence on e-cigarettes (OR = 0.48 CI 0.25-0.91) and the social opportunity factor of how comfortable they felt discussing e-cigarettes with patients (OR = 1.57 CI 1.04-2.36) all significantly predicted recommending e-cigarettes to cancer patients. Specifically, those who reported higher levels of engagement around smoking cessation, and those who were comfortable discussing e-cigarettes were more likely to recommend them. However, those who felt the evidence base was lacking were less likely to recommend them.

**Table 3: Results of full binary logistic regression model exploring all factors relating to capability, opportunity and motivation to recommend e-cigarettes to cancer patients**

	B	Wald(df =1)	p	95% CI for Odds Ratio		
				Lower	Odds Ratio	Upper
<b>Capability</b>						
Know status	0.758	3.32	0.068	0.944	2.134	4.821

General smoking knowledge	-0.44	3.866	0.049	0.416	0.644	0.999
E-cig knowledge	0.495	4.878	0.027	1.057	1.641	2.546
<b>Opportunity</b>						
Time	0.083	0.237	0.626	0.778	1.087	1.517
Patient relationships	-0.092	0.128	0.72	0.551	0.912	1.51
Social norms	-0.047	0.028	0.867	0.549	0.954	1.658
<b>Motivation</b>						
Engagement with patients who smoke	0.752	5.308	0.021	1.119	2.122	4.025
Effectiveness in helping cancer pts	0.858	19.09	0.000	1.605	2.359	3.466
Importance of HP role	0.259	0.834	0.361	0.743	1.295	2.257
Sufficient evidence	-0.745	4.963	0.026	0.247	0.475	0.914
Attitudes	0.37	1.038	0.308	0.711	1.447	2.947
Harm	0.023	0.006	0.941	0.556	1.023	1.885
Better than smoking	-0.009	0.001	0.972	0.593	0.991	1.655
Comfortable discussing smoking in general	-0.402	2.18	0.14	0.392	0.669	1.141
Comfortable discussing e-cigs	0.448	4.594	0.032	1.039	1.565	2.356
<b>Health professional type</b>						
		5.385	0.25			
GP	0.276	0.256	0.613	0.453	1.318	3.839
Practice Nurse	0.281	0.294	0.588	0.479	1.324	3.659
Cancer Surgeon	-0.805	1.791	0.181	0.138	0.447	1.453
Oncologist	-0.391	0.514	0.473	0.232	0.676	1.971
<b>Constant</b>	-					
	11.416	20.331	0		0	

Note: reference categories - for HP type = Cancer Nurse Specialist, for sufficient evidence = yes

## Discussion

The findings from this study suggest relatively low levels of clinician support around recommending e-cigarettes to cancer patients. Despite a growing evidence base to support use and popularity of e-cigarettes as a smoking cessation aid in the UK nearly a third of clinicians do not recommend e-cigarettes to cancer patients who smoke. Not recommending e-cigarettes is associated with a lack of knowledge regarding smoking cessation and e-cigarettes, lack of engagement in smoking cessation practices with patients that smoke, low belief in effectiveness of e-cigarettes, low belief in evidence around e-cigarettes, and not feeling comfortable discussing e-cigarettes with their patients.

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3 In line with the results of this study, a survey of members of The British Thoracic Oncology  
4 Group in April 2015 showed that the vast majority of clinicians agreed that they needed  
5 more information and guidance regarding e-cigarettes to advise patients (n = 124, 92.6 %).  
6  
7  
8 Clinicians lacked confidence in providing advice to patients with lung cancer over the use of  
9  
10 e-cigarettes.<sup>33</sup> Our findings indicate that three years on clinicians continue to lack  
11  
12 knowledge and confidence in recommending e-cigarettes to cancer patients despite a public  
13  
14 health policy to support e-cigarettes. Clinicians across disease groups have reported a clear  
15  
16 need for training and local guidance around e-cigarettes in line with the national public  
17  
18 health policy.<sup>35-37</sup> Interventions are needed to target the reported behavioural factors  
19  
20 associated with clinicians' recommendation of e-cigarettes.  
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30 This study highlights that the COM-B components of psychological capability, social  
31  
32 opportunity and motivation were all associated with clinicians' beliefs and behaviours  
33  
34 around recommending e-cigarettes. Improving knowledge through accessible training on e-  
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36 cigarettes alongside local adoption of public health policies around e-cigarettes throughout  
37  
38 the NHS may support clinicians to feel more confident and comfortable in recommending  
39  
40 them to patients. NICE advise that health professionals have an informed discussion with  
41  
42 patients on use of e-cigarettes to stop smoking.<sup>29</sup>  
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47 Opportunity to recommend e-cigarettes could be improved by providing a more positive  
48  
49 strategy around e-cigarettes. An ongoing ban of e-cigarettes in many NHS organisations, or  
50  
51 permitted use only in dedicated smoking areas not only limits clinicians from demonstrating  
52  
53 e-cigarettes, but puts vapers at risk of relapsing. Allowing vaping in appropriate parts of the  
54  
55 NHS may improve compliance with public health policy around e-cigarettes.  
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3 A recent study reports that practitioners suggested the development of decision aids around  
4  
5 e-cigarettes, such as a leaflet, booklet or online resource to use during consultations with  
6  
7 patients.<sup>38</sup> This would aid a more 'neutral' decision around use of e-cigarettes and  
8  
9 potentially improve confidence around discussions on e-cigarettes.<sup>30</sup> Furthermore,  
10  
11 engagement from local Clinical Commissioning Groups (CCGs) and clinical leads alongside  
12  
13 accessible training is needed to encourage clinicians to support use of e-cigarettes in cancer  
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15 patients.  
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19 To date there is still no medicinally licenced EC in the UK, or anywhere else in the world,  
20  
21 which is possibly presenting challenges for health professionals wishing to demonstrate e-  
22  
23 cigarettes or recommend for inpatient use. In this study, clinicians were divided over this  
24  
25 decision, with two fifths of clinicians disagreeing, and nearly a third agreeing to licensing of  
26  
27 e-cigarettes for medicinal uses. Health professionals may be more comfortable  
28  
29 recommending e-cigarettes if they were available on prescription.  
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32  
33 Debate is also needed on how e-cigarettes could be integrated into smoking cessation  
34  
35 practices of cancer clinicians for patients with cancer. Smoking cessation practices are  
36  
37 already well developed in other disease groups such as coronary heart disease (CHD).<sup>39</sup> It is  
38  
39 therefore timely to set out the role of a smoking cessation service within the cancer  
40  
41 pathway, including the role of e-cigarettes can play in helping cancer patients to quit  
42  
43 smoking long term after a diagnosis.<sup>22</sup> While attendance at a cancer clinic provides a prime  
44  
45 opportunity for clinicians to provide smoking cessation advice to those who smoke, this is  
46  
47 not currently routinely offered. Patients have highlighted the need for more specific stop  
48  
49 smoking cessation advice for those diagnosed with cancer, and have reported difficulty in  
50  
51 attending external smoking cessations services in addition to all their other clinic  
52  
53 appointments.<sup>12</sup> Smoking cessation advice has historically been the role of primary care or  
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3 community smoking cessation services, and this is reflected in the greater knowledge,  
4  
5 confidence and more positive attitude towards e-cigarettes among practice nurses and GPs  
6  
7 reported in this study. However, lack of funding has seen a decline in these services, and  
8  
9 alternatives are needed. Maintaining a trusting and caring relationship with their patient  
10  
11 may discourage clinicians from sensitive discussions around quitting smoking<sup>40</sup>, although  
12  
13 clinicians misconceptions of patients abilities to stop smoking have also been reported,<sup>41</sup>  
14  
15 and patients may stop smoking in the short term during treatment, but return to smoking  
16  
17 post treatment.  
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### 23 **Strengths and limitations**

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25 To our knowledge, this study is the first to examine a broad range of clinicians' behaviours  
26  
27 and beliefs around the use of e-cigarettes in patients across different cancer groups. The  
28  
29 COM-B model has previously been successfully used in the development of smoking  
30  
31 cessation interventions.<sup>42-44</sup> In this study, it has enabled the identification of factors, which  
32  
33 could be used to improve clinicians' recommendation of e-cigarettes.  
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37 The recruitment procedure for this survey utilised an existing network of electronically  
38  
39 active clinicians from the research arm of doctors.net.com. This method has the advantage  
40  
41 of speed and guaranteed response which is beneficial considering that surveys with busy  
42  
43 clinicians have commonly suffered from poor response rates. However, this sample may  
44  
45 not be representative of the population of clinicians in the United Kingdom. Quota sampling  
46  
47 ensured diversity in terms of geographical spread, gender and years of clinical experience,  
48  
49 although our sample included clinicians who worked with patients who had a wide range of  
50  
51 cancer diagnoses, and not just those with cancers directly associated with smoking  
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57 The potential for response bias should be considered; for example, those with a greater  
58  
59 interest in smoking cessation for cancer patients may have been more likely to respond,  
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3 whereas clinicians who are smokers may have been under-represented. In addition, findings  
4  
5 rely on self-report.  
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### 8 **Conclusions**

9  
10 Despite the evidence that e-cigarettes help smokers quit smoking, and the positive public  
11  
12 health stance towards e-cigarettes in the UK, clinicians remain cautious about  
13  
14 recommending e-cigarettes to cancer survivors who continue to smoke. Improved  
15  
16 knowledge through training and change of policies at local and regional NHS sites are  
17  
18 needed to encourage endorsement of the use of e-cigarettes in cancer patients.  
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E-cigarettes as a Smoking Cessation aid in Cancer Patients: Health Professionals knowledge, attitude and current practice. NCRI 2018 abstract 2171

E-cigarettes as a Smoking Cessation aid in Cancer Patients: Health Professionals knowledge, attitude and current practice. IPOS 2019 abstract 751. Journal of Psychosocial Oncology – Research and Practice Sept 2019, vol 1: suppl 1 1S

## Author Contributions

JB and EW designed the study. All authors were involved in the development of the protocol. ED and FM conducted the statistical analysis. All authors were involved in the interpretation of the data and edited the manuscript.

**Competing interests:** The authors have no conflict of interest or disclosures. All authors declare no financial or other relationships or activities that could appear to have influenced the submitted work.

## Ethical approval:

This study complies with ethical standards. Informed consent was gained. The study obtained ethics approval to conduct the study from Oxford Brookes University Ethics

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2  
3 Committee (2017 44 Brett) and was performed in accordance with the Declaration of  
4  
5 Helsinki.  
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10 **Patient and Public Involvement statement:** Cancer service users and vapor representatives  
11  
12 were involved in the proposal development, questionnaire development and dissemination  
13  
14 of the results of this study. One vaper representative was involved in the write up and is an  
15  
16 author on the paper.  
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20  
21 **Funder:**  
22

23  
24 Cancer Research UK Ref: A24355 Dr Jo Brett  
25  
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29

30 **Data sharing/Data availability:**  
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32  
33 Data will be deposited in the university repository, where request for access can be  
34  
35 submitted. Data access can be requested from the corresponding author. The data will be  
36  
37 kept for a minimum of ten years following publication.  
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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	5
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6,7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6,7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5,6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	5,6
Study size	10	Explain how the study size was arrived at	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7
		(b) Describe any methods used to examine subgroups and interactions	7
		(c) Explain how missing data were addressed	N/A
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	N/A
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8 Table1
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	8,9,10,11
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make	8,9,10,11

		clear which confounders were adjusted for and why they were included N/A	
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10,11
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14,15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	14
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## Electronic cigarettes as a smoking cessation aid for cancer patients: beliefs and behaviours of clinicians in the UK

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3 **Electronic cigarettes as a smoking cessation aid for cancer patients: beliefs and behaviours**  
4 **of clinicians in the UK**  
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56 **Word Count: 3536**  
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**Abstract:**

Objectives: To explore UK clinicians' beliefs and behaviours around recommending e-cigarettes as a smoking cessation aid for cancer patients

Design: Cross-sectional online survey

Setting: England, Wales, Scotland and Northern Ireland

Participants: Clinicians involved in the care of patients with cancer

Primary and secondary outcomes: Behavioural Change Wheel COM-B, knowledge, beliefs, current practice around e-cigarettes and other smoking cessation practices

Method: Clinicians (n=506) completed an online survey to assess beliefs and behaviours around e-cigarettes and other smoking cessation practices for cancer patients. Behavioural factors associated with recommending e-cigarettes in practice were assessed.

Results: 29% of clinicians would not recommend e-cigarettes to cancer patients who continue to smoke. Factors associated with recommendation include smoking cessation knowledge (OR =1.56, CI 1.01 - 2.44) and e-cigarette knowledge (OR =1.64, CI 1.06-2.55), engagement with patients regarding smoking cessation (OR =2.12, CI 1.12-4.03), belief in the effectiveness of e-cigarettes (OR =2.36 CI 1.61-3.47), and belief in sufficient evidence on e-cigarettes (OR = 2.08 CI 1.10-4.00) and how comfortable they felt discussing e-cigarettes with patients (OR = 1.57 CI 1.04-2.36).

Conclusion: Many clinicians providing cancer care to patients who smoke do not recommend e-cigarettes as a smoking cessation aid and were unaware of national guidance supporting recommendation of e-cigarettes as a smoking cessation aid.

### Strengths and limitations of this study

- This study reports an online survey with a wide-range of clinicians to assess their beliefs and current practices around e-cigarettes as a smoking cessation aid for cancer patients.
- The survey used the COM-B behavioural model to understand the factors that influence clinicians to recommend or not recommend e-cigarettes.
- Quota sampling enabled representation across relevant clinical roles in primary and secondary care and across geographical areas in the UK
- The sample is limited to UK clinicians where public health policy supports use of e-cigarettes as a smoking cessation aid for risk reduction compared to tobacco cigarette smoking
- The sampling was not random and so participation could have been affected by whether clinicians were interested in the topic, although paying clinicians to complete the study aimed to mitigate this.

Key words: E cigarettes, cancer, smoking cessation, behavioural change, current practice

Peer review only

## Background

Smoking is a well-established risk factor for many common cancers.<sup>1-3</sup> The adverse effects of smoking continue after a cancer diagnosis, increasing the risk of treatment-related complications, recurrence, the development of a second primary cancer, and mortality from both cancer-related and non-cancer-related causes.<sup>4-11</sup> Despite the increased risk of complications of cancer treatment, recurrence, and death, many patients with smoking-related cancers continue smoking following diagnosis<sup>12-15</sup> having tried and failed to stop smoking. Effective aids for cessation are available, but support to quit is not routinely offered as part of cancer care.<sup>16,17</sup> One study found that 39% (N=1129) of lung cancer patients, 37% (N=281) upper aero-digestive tract cancer patients, and 49% (N=850) of bladder cancer patients continued to smoke one year after diagnosis, figures that were likely to be higher as a third of the potential participants' smoking status was unknown.<sup>18</sup> To enhance the length and health-related quality of their lives, efforts are needed to support cancer patients to stop smoking cigarettes.

In recent years e-cigarettes have grown in popularity as a cessation aid among smokers worldwide, but the e-cigarette regulatory environment in each country varies considerably due to policy makers' reactions to a rapidly developing evidence base.<sup>19,20</sup> Often this is influenced by strategic positions on tobacco control e.g. harm prevention vs. harm reduction,<sup>21</sup> and whether e-cigarettes are classified as a tobacco, medicinal or consumer product.<sup>19</sup> The main debates focus on trying to achieve a balance between the risks and potential of e-cigarettes.<sup>21</sup>

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3 Support for the use of e-cigarettes for smoking cessation is endorsed by several health-  
4 related organisations in the UK including Public Health England,<sup>22</sup> Cancer Research UK,<sup>23</sup> the  
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6 National Health Service<sup>24</sup> and the National Centre for Smoking Cessation and Training.<sup>25</sup>  
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9 Public Health Scotland,<sup>26</sup> Public Health Wales,<sup>27</sup> the British Medical Association,<sup>28</sup> the Royal  
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Support for the use of e-cigarettes for smoking cessation is endorsed by several health-related organisations in the UK including Public Health England,<sup>22</sup> Cancer Research UK,<sup>23</sup> the National Health Service<sup>24</sup> and the National Centre for Smoking Cessation and Training.<sup>25</sup> Public Health Scotland,<sup>26</sup> Public Health Wales,<sup>27</sup> the British Medical Association,<sup>28</sup> the Royal College of General Practitioners<sup>29</sup> and the Royal College of Physicians<sup>30</sup> also acknowledge that e-cigarettes are considered less harmful than smoking tobacco cigarettes or that some people may find using e-cigarettes useful for stopping or reducing smoking.

In the UK and other European countries, the manufacture, presentation and sales of e-cigarettes are regulated by the Tobacco Products Directive (2014/40/EU).<sup>31, 32</sup> The regulation prohibits sales of e-cigarettes to people under 18 years, most forms of advertising and places restrictions on the type and quality of ingredients. In France there are further restrictions on the use of e-cigarettes in public places.<sup>33</sup> The regulatory environment differs substantially in other parts of the world.

In the United States, for instance, the Centres for Disease Control and Prevention (CDC) advice is not unlike many UK public health bodies in stating that “if (adults) choose to use e-cigarettes as an alternative to cigarettes, they should completely switch from cigarettes to e-cigarettes and not partake in an extended period of dual use of both products that delays quitting smoking completely”.<sup>34</sup> The World Health Organisation position is that there is insufficient evidence concerning comparisons with combustible cigarettes or efficacy for smoking cessation, and that the use of e-cigarettes is harmful.<sup>35</sup>, although In October, 2018, 72 experts with no connections to the tobacco industry wrote to the WHO Director-General

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3 to argue that WHO should embrace innovation and more actively include tobacco harm  
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5 reduction in its strategy to tackle the burden of smoking-related disease.  
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10 Whilst the need for further evidence around impacts of e-cigarettes on cessation and long-  
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12 term harms is widely acknowledged, many health-related organisations also recognise that  
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14 e-cigarettes may have a potential role in smoking cessation and could help people that may  
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16 otherwise continue to smoke. A risk reduction policy to encourage smoking cessation is  
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18 particularly important in people who have been diagnosed with cancer who continue  
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20 smoking and therefore increase their risk of recurrence, other co-morbidities and premature  
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22 death as a result.<sup>4-11</sup>  
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30 In the UK, e-cigarettes have swiftly become the most popular smoking cessation product for  
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32 smokers.<sup>36,37</sup> There are 3.6 million EC users in the UK, of which only 0.8% have never  
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34 smoked.<sup>37</sup> E-cigarettes are used in 30% of quit attempts with currently around 20% of  
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36 smokers and 30% of recent ex-smokers using them.<sup>38</sup> Evidence shows that e-cigarettes  
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38 help smokers to stop smoking long-term<sup>39-41</sup> and a recent study suggests that e-cigarettes  
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40 are more effective for smoking cessation than nicotine-replacement therapy, when both  
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42 products are accompanied by behavioural support.<sup>42</sup> However, qualitative evidence implies  
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44 that clinicians may be uncertain about the use of e-cigarettes as a cessation aid, with some  
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46 expressing hostility and reporting practices that are not consonant with the evidence.<sup>43</sup>  
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51 The aims of this study were to understand clinicians' beliefs and behaviours related to e-  
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53 cigarettes for patients with cancer who continue to smoke, and to understand the  
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55 behavioural factors that may promote or inhibit recommending e-cigarettes.  
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## Methods

### Design

The study was a cross-sectional online survey of clinician's knowledge, beliefs and current practice of smoking cessation and e-cigarettes. The survey was sent to clinicians involved in the adult cancer care pathway, working in primary and secondary care.

### Survey development

The survey was developed using methods suggested by Bowling (1997).<sup>44</sup> The questions drew on 1) a literature review to identify evidence of clinicians' knowledge, attitudes, behaviours and current practice with respect to smoking cessation interventions, including e-cigarettes, in cancer patients; 2) expert opinion; 3) drawing on Behaviour Change Wheel (BCW).<sup>45,46</sup> Development also drew on previous survey questions exploring attitudes to e-cigarettes.<sup>47-49</sup> The face validity of the survey was evaluated with five general practitioners (GPs) and five cancer clinicians to evaluate whether the survey was appropriate and the questions were understood. This resulted in minor modification of wording of some questions.

The final questionnaire was structured according to the COM-B behaviour model based on Michie's Behaviour Change Wheel for development of interventions.<sup>45,46</sup> This model proposes that people need capability (C), opportunity (O) and motivation (M) to perform a behaviour (B) and was developed to guide understanding of behaviour in context and develop behavioural targets. The model proposes that for someone to engage in a particular behaviour at a given moment they must be physically able and have the psychological ability and have the social and physical opportunity to enact the behaviour



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3 and, in addition, want or need to enact the behaviour more than any other competing  
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5 behaviours at that moment. This inclusive definition of motivation covers basic drives and  
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7 automatic processes such as habit and impulses as well as reflective processes including  
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9 intention and choice. If a desired behaviour is not occurring (or an undesirable behaviour  
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11 occurring) then an analysis of the determinants of the behaviour will help to define what  
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13 needs to shift in order for the desired behaviour to occur (or the unwanted behaviour to  
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18 cease).

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23 The questionnaire included items relating to psychological capability (knowledge of smoking  
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25 status of patients, knowledge and skills about smoking cessation in general, knowledge and  
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27 skills about e-cigarettes,); physical opportunity (time constraints talking to patients about  
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29 e-cigarettes, physical constraints due to policy); social opportunity (relationship with patient  
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31 and how this impacts on smoking cessation advice given, social norms e.g. most my  
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33 colleagues support use of e-cigarettes, most my colleagues feel uncomfortable  
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35 recommending e-cigarettes, clinicians should discourage smoking); reflective motivation  
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37 (motivation to engage in smoking cessation with cancer patients, beliefs about how  
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39 effective e-cigarettes are for cancer patients, beliefs about the clinician's role, beliefs about  
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41 the evidence base around e-cigarettes, attitudes towards e-cigarettes, beliefs about the  
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43 harms of e-cigarettes particularly in comparison to tobacco cigarettes, and automatic  
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45 motivation (how comfortable they feel giving smoking cessation advice in general and in  
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47 giving specific advice on e-cigarettes to patients). A full copy of the questionnaire is  
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60 available electronically (insert link here)

### Sample:

The survey was distributed electronically by M3, the research arm of Doctors.net.uk, a leading market research consultancy specialising in high-quality online research using pre-recruited panels of medical professionals. All clinicians who are registered with doctors.net.uk have to provide their clinical registration number during the registration process. M3 have 7781 GPs, 436 oncologists, 708 surgeons, 221 cancer nurse specialists, and 315 practice nurses on their research panels. Sampling was restricted to currently practising clinicians, was stratified by NHS region, and was conducted on a 'first come, first served' basis; the target number of responses was 100 for each of the clinician types. When the quota of responses from each type of clinician or from each UK NHS region was reached, the survey was closed for that clinician group or region.

The survey was completed between Nov 2018 and February 2019. A small financial incentive was offered. Participants confirmed they had read the participant information and consented to take part via email before the survey link was sent.

### Analyses

Anonymised electronic responses were imported into SPSS (version 25) for analysis. Frequencies and proportions were used to summarise questionnaire responses. Results are reported using the COM-B model: physical and psychological capability; physical and social opportunity; and automatic and reflective motivation

Means and standard deviations for each measure for the whole sample were calculated and then compared by clinician occupation. One-way ANOVA was used to compare means for

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3 the other measures. Multiple comparisons were taken into account using a Bonferroni  
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5 correction. Student-Newman-Keuls post-hoc tests were used to examine differences  
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7 reported.  
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12 Chi squared tests were used to compare the clinicians on categorical measures. Binomial  
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14 logistic regression models were used to predict the likelihood of recommending e-cigarettes  
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16 to cancer patients. The dependent variable was dichotomised by always/nearly always  
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18 /often recommend e-cigarettes (Q5\_3) vs. sometimes/ infrequently/ never.  
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#### 24 25 **Ethics:**

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27 This study was approved by the Oxford Brookes University Research Ethics Committee (2017  
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29 44 Brett)  
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#### 35 **Patient and Public Involvement:**

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37 Cancer service users and vapor representatives were involved in the proposal development,  
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39 questionnaire development and dissemination of the results of this study. One vapor  
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41 representative was involved in the write up and is an author on the paper.  
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#### 47 **Results:**

##### 48 49 **Characteristics of respondents**

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51 The online survey was completed by 506 clinicians: 103 GPs, 102 oncologists, 100 cancer  
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53 surgeons, 102 practice nurses and 99 cancer nurse specialists (CNSs). One CNS was  
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55 excluded because they were a CNS for children. Table 1 describes the clinicians'  
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57 characteristics:  
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**Table 1 Clinician Characteristics**

<b>Demographics</b>	All participants % (N = 506)	Primary Care % (n = 205)	Secondary Care % (n = 301)
<b>Gender</b>			
Male	41.1	35.1	45.2
Female	57.5	63.9	53.2
Prefer not to say	1.4	1.0	1.7
Years of professional experience	1995 (1968-2009)	1994	1996
<b>Role</b>			
General practitioner (GP)	20.4	40.5	
Practice nurse	20.2		
Cancer surgeon	19.8		59.5
Oncologist	20.2		
Cancer nurse specialist	19.6		
<b>NHS region</b>			
London	15.8	12.2	18.3
South of England	21.1	21.5	20.9
Midlands & East SEA	25.5	25.4	25.6
North of England	20.6	22.9	18.9
Scotland	12.1	13.7	11.0
Wales	2.2	2.4	2.0
Northern Ireland	2.8	2.0	3.3
<b>Main cancer group they care for</b>			
All	37.0	76.1	10.3
Breast	24.1	12.2	32.2
Prostate	19.4	13.7	23.3
Lung / mesothelioma	18.0	11.7	22.3

Bowel	11.9	5.4	16.3
Kidney	11.9	0.5	19.6
Bladder	11.3	0.5	18.6
Other cancer groups	< 10	<5	<15
Smoking status of clinicians			
Smoke tobacco cigarettes	2.0	1.5	2.3
** Use e-cigarettes	1.2	1.5	1.0
Ex-smoker	21.3	22.9	20.3
Never smoker	72.3	72.2	72.4
Other	1.4	1.5	1.3
Prefer not to say	3.6	2.4	4.3

### Reported behaviour:

Less than a third (29% n=147) of clinicians would not recommend e-cigarettes to cancer patients who smoke. Just over half (51%, n=258) would recommend e-cigarettes as an interim measure, to help patients stop smoking completely, while 20% (n=101) would recommend e cigarettes as a partial replacement for smoking tobacco.

### Psychological capability

Most clinicians (78%, n=394) knew the smoking status of their cancer patients, and routinely recorded their smoking status (73% n=368). Sixty seven percent (n=339) reported that they routinely recommended patients stop smoking, or cut down (52%, n=263). Twenty-nine percent (n=147) referred patients to the NHS stop smoking services, 14% (n=71) recommended NRT, 9% (n=46) recommended digital smoking cessation tools, and 5% (n=25) prescribed medication (Varenicline or Bupropion).

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3 Many clinicians felt they had insufficient knowledge (57%, n=286) and training (73%, n=370)  
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5 to provide advice about e-cigarettes to patients and a further 36% (n=182) indicated that  
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7 they did not know the efficacy of e-cigarettes with regard to smoking cessation.  
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10 Clinicians derived information about e-cigarettes from several sources. Overall, only 9.5%  
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12 (n=48) of clinicians knew whether their organisation had guidance concerning advice to  
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14 patients on e-cigarette use. Most clinicians had sought information about e-cigarettes from  
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16 government/health agencies (55%), but also from professional associations (37%),  
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18 healthcare colleagues (29%), news/media/advertising (24%), scientific literature (23%),  
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20 professional development/training (22%) and charities (18%). Nineteen percent of clinicians  
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22 had never sought information about e-cigarettes. One quarter of respondents (25%, n=124)  
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24 were uncertain whether e-cigarettes were less harmful than smoking tobacco, while 10%  
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26 (n=52) thought e-cigarettes were equally harmful or more harmful than smoking tobacco.  
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28 Eighteen percent (n=93) considered using e-cigarettes to be more harmful than regular  
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30 nicotine replacement therapies (e.g. gum, nasal spray, patches) and 54% (n=273) were  
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32 uncertain.  
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### 42 **Physical opportunity**

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44 The majority of clinicians (56%, n=285) said that e-cigarette use was prohibited in all areas  
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46 at their main place of work. Twenty three percent (n=119) reported that the use of e-  
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48 cigarettes was permitted, with 24% (n=29) reporting use in designated smoking areas only.  
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50 Overall, 51% (n=258) agreed that time constrained their ability to talk about e-cigarettes  
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52 with patients.  
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### **Social opportunity**

The nature of the relationships between clinicians and patients with cancer were important in whether and how smoking cessation was discussed. Fifty five percent (n=278) of clinicians reported that having a good relationship would make them more likely to speak to their patient about stopping or cutting down, while 45% (n=228) reported that having a poor relationship would make them less likely to discuss smoking cessation. Many clinicians (42% n= 212) felt uncomfortable when asked by patients for an opinion on e-cigarettes. The large majority, 82%, had been asked about e-cigarettes by patients in the past year (2017/18), up from 21% in 2016/17.

Thirty eight percent (n=192) said that most of their colleagues would feel uncomfortable recommending e-cigarettes to patients with cancer, and 37% (n=187) were unsure whether clinicians should discourage patients with cancer from using e-cigarettes.

### **Automatic motivation**

Subconscious biases towards e-cigarettes were influenced by clinicians' beliefs around the effectiveness of and evidence on e-cigarettes, as reported in the psychological capability section above.

Clinicians reported that their decisions to speak with patients with cancer about smoking cessation were influenced by their perceptions of the patient. Clinicians reported that they were more likely to discuss smoking cessation if they judged the person was motivated to quit (69%, n=349), or was coping well (67%, n=339).

## Reflective Motivation

Reflective motivation related to the clinicians' perceived role in smoking cessation and national and organisational policy on e-cigarettes. Two thirds (65%, n=327) of clinicians agreed that they should play a greater role in helping cancer patients stop smoking.

Clinicians were divided over whether e-cigarettes should be licensed and available on prescription for patients with cancer, with 39% (n=199) respondents disagreeing, and 32% (n=162) saying they should be available on prescription. Furthermore, 30% (n=150) of clinicians felt that public health campaigns, such as Stoptober should not endorse using e-cigarettes as a way to give up smoking tobacco, while 29% (n=149) thought e-cigarettes should be endorsed in campaigns.

## Differences in e-cigarettes practice between clinicians

GPs and practice nurses were significantly more likely to say that they recommended e-cigarettes to cancer patients than the other clinicians included in the study (see Table 2).

GPs and practice nurses also rated their knowledge about e-cigarettes higher than did specialist cancer care clinicians, and were also more likely to report having sufficient time to discuss smoking with patients and rated their role in helping patients cut down smoking as more important.

Practice nurses engaged in significantly more behaviours (e.g. ascertaining smoking status, advising patients, supporting e-cigarette use in patients) related to smoking cessation with patients than all the other groups. GPs engaged in significantly more behaviours than the other clinicians, but fewer than practice nurses. Practice nurses were significantly more



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likely to believe in the effectiveness of e-cigarettes in helping cancer patients stop smoking compared to other clinicians.

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**Table 2: COM-B measures by HP– Mean and SD**

	Total	General Practitioner	Practice Nurse	Cancer Surgeon	Oncologist	Cancer Nurse Specialist	Test statistic, p
N of participants	506	103	102	100	102	99	
Recommend e-cigarettes always/often, N (%)	97 (19.2)	24 (23.3%)	36 (35.3)	9 (9)	16 (15.7)	12 (12.1)	$\chi^2 = 28.90, p < .001$
<b>Capability</b>							
Know status	4.72 (.59)	4.75 (.48)	4.78 (.46)	4.81 (.46)	4.75 (.60)	4.52 (.81)	F = 4.17, p = .002*
General smoking knowledge	3.40 (1.03)	3.80 (.86)	3.75 (1.08)	3.10 (1.00)	3.17 (1.03)	3.19 (.95)	F = 12.09, p < .001*
E-cig knowledge	2.34 (.99)	2.40 (.89)	2.45 (1.07)	2.21 (.94)	2.54 (1.05)	2.11 (.95)	F = 3.32, p = .011
<b>Opportunity</b>							
Time	2.60 (1.03)	2.46 (.95)	2.87 (.94)	2.39 (1.00)	2.29 (1.06)	3.02 (1.00)	F = 10.47, p < .001*
Patient relationships	2.51 (.68)	2.45 (.72)	2.52 (.66)	2.59 (.64)	2.49 (.67)	2.52 (.72)	F = .59, p = .668
Social norms	3.00 (.72)	2.98 (.86)	3.18 (.75)	2.85 (.66)	3.08 (.65)	2.91 (.64)	F = 3.36, p = .010
<b>Motivation</b>							
Engagement with patients who smoke	2.77 (.61)	2.90 (.55)	3.21 (.55)	2.60 (.54)	2.55 (.58)	2.59 (.55)	F = 26.13, p < .001*
Effectiveness in helping cancer pts	2.83 (1.50)	2.86 (1.48)	3.39 (1.43)	2.49 (1.54)	2.81 (1.45)	2.57 (1.44)	F = 5.89, p < .001*
Importance of HP role	4.35 (.76)	4.48 (0.62)	4.60 (.60)	4.33 (.83)	4.20 (.81)	4.15 (.84)	F = 6.40, p < .001*
Lack of evidence N (%)	242 (47.8)	57 (55.3)	51 (50)	44 (44)	41 (40.2)	50 (50.5)	$\chi^2 = 5.60, p = .231$
Attitudes	3.22 (.61)	3.23 (.64)	3.39 (.62)	3.08 (.61)	3.26 (.53)	3.13 (.59)	F = 4.04, p = .003
Harm	3.16 (.68)	3.25 (.63)	3.15 (.67)	3.18 (.66)	3.22 (.71)	3.01 (.71)	F = 1.32, p = .263

Better than smoking	3.86 (.96)	4.00 (1.00)	3.84 (1.00)	3.82 (.81)	4.07 (.86)	3.56 (1.05)	F = 4.39, p=.002*
Comfortable discussing smoking in general	4.40 (.76)	4.45 (.75)	4.44 (.71)	4.49 (.72)	4.39 (.81)	4.24 (.80)	F =1.59, p=.175
Comfortable discussing e-cigs	2.91 (1.16)	3.09 (1.13)	3.04 (1.23)	2.65 (1.17)	3.00 (1.11)	2.76 (1.12)	F =2.79, p=.026

Note \* = significant for F tests when multiple comparisons taken into consideration, accepted p value corrected to 0.003

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### Logistic regression model

Table 3 presents a logistic regression model including all COM-B factors and controlling for clinician type. In this model, not recommending e-cigarettes is associated with a lack of knowledge regarding smoking cessation (OR = 1.56, CI 1.01 - 2.44) and e-cigarettes (OR = 1.64 CI 1.06-2.55). Additionally, greater engagement with patients regarding smoking cessation (OR = 2.12 CI 1.12-4.03), belief in the effectiveness of e-cigarettes (OR = 2.36 CI 1.61-3.47), belief in sufficient evidence on e-cigarettes (OR = 2.08 CI 1.10-4.00) and the social opportunity factor of how comfortable they felt discussing e-cigarettes with patients (OR = 1.57 CI 1.04-2.36) all significantly predicted recommending e-cigarettes to cancer patients. Specifically, those who reported higher levels of engagement around smoking cessation, and those who were comfortable discussing e-cigarettes were more likely to recommend them. However, those who felt the evidence base was lacking were less likely to recommend them.

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**Table 3: Results of full binary logistic regression model exploring all factors relating to capability, opportunity and motivation to recommend e-cigarettes to cancer patients**

	B	Wald(df =1)	p	95% CI for Odds Ratio		
				Lower	Odds Ratio	Upper
<b>Capability</b>						
Know status	0.758	3.320	0.068	0.944	2.134	4.821
General smoking knowledge	-0.440	3.866	0.049	1.010	1.563	2.439
E-cig knowledge	0.495	4.878	0.027	1.057	1.641	2.546
<b>Opportunity</b>						
Time	0.083	0.237	0.626	0.778	1.087	1.517
Patient relationships	-0.092	0.128	0.720	0.551	0.912	1.510
Social norms	-0.047	0.028	0.867	0.549	0.954	1.658
<b>Motivation</b>						
Engagement with patients who smoke	0.752	5.308	0.021	1.119	2.122	4.025
Effectiveness in helping cancer pts	0.858	19.09	0.000	1.605	2.359	3.466
Importance of HP role	0.259	0.834	0.361	0.743	1.295	2.257
Sufficient evidence	-0.745	4.963	0.026	1.099	2.083	4.000
Attitudes	0.370	1.038	0.308	0.711	1.447	2.947
Harm	0.023	0.006	0.941	0.556	1.023	1.885
Better than smoking	-0.009	0.001	0.972	0.593	0.991	1.655
Comfortable discussing smoking in general	-0.402	2.180	0.140	0.392	0.669	1.141
Comfortable discussing e-cigs	0.448	4.594	0.032	1.039	1.565	2.356
<b>Health professional type</b>						
		5.385	0.250			
GP	0.276	0.256	0.613	0.453	1.318	3.839
Practice Nurse	0.281	0.294	0.588	0.479	1.324	3.659
Cancer Surgeon	-0.805	1.791	0.181	0.138	0.447	1.453
Oncologist	-0.391	0.514	0.473	0.232	0.676	1.971
<b>Constant</b>	-11.416	20.331	0.000		0.000	

Note: reference categories - for HP type = Cancer Nurse Specialist, for sufficient evidence = yes

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## Discussion

The findings from this study suggest relatively low levels of clinician support around recommending e-cigarettes to cancer patients. Despite a growing evidence base to support use and popularity of e-cigarettes as a smoking cessation aid in the UK, nearly a third of clinicians do not recommend e-cigarettes to cancer patients who smoke. Not recommending e-cigarettes is associated with a lack of knowledge regarding smoking cessation and e-cigarettes, lack of engagement in smoking cessation practices with patients that smoke, low belief in effectiveness of e-cigarettes, low belief in evidence around e-cigarettes, and not feeling comfortable discussing e-cigarettes with their patients.

In line with the results of this study, a survey of 124 members of The British Thoracic Oncology Group in April 2015 showed that 93% of clinicians agreed that they needed more information and guidance on e-cigarettes to advise patients. Clinicians lacked confidence to advise patients with lung cancer to use e-cigarettes.<sup>47</sup> Our findings indicate that, three years after this study, clinicians continue to lack knowledge and confidence in recommending e-cigarettes to cancer patients despite a UK public health policy to support e-cigarettes. Clinicians from various specialties have reported a need for training and local guidance around e-cigarettes in line with the national public health policy.<sup>50,51</sup> Interventions are needed to target the reported behavioural factors associated with clinicians' reluctance to recommend e-cigarettes.

This study highlights that the COM-B components of psychological capability, social opportunity and automatic and reflective motivation were all associated with clinicians' beliefs and behaviours around recommending e-cigarettes. Improving knowledge through accessible training on e-cigarettes alongside local adoption of public health policies around

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3 e-cigarettes throughout the NHS may support clinicians to feel more confident and  
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5 comfortable in recommending them to patients. The National Institute for Health and Care  
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7 Excellence (NICE) in the UK advise that clinicians have an informed discussion with patients  
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9 on use of e-cigarettes to stop smoking.<sup>52</sup>  
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15 A recent study reports that practitioners suggested the development of decision aids around  
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17 e-cigarettes, such as a leaflet, booklet or online resource to use during consultations with  
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19 patients.<sup>53</sup> This would aid a more 'neutral' decision around use of e-cigarettes and  
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21 potentially improve confidence around discussions on e-cigarettes.<sup>54</sup> Furthermore,  
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23 engagement from local clinical commissioning groups and clinical leads alongside accessible  
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25 training may support clinicians in providing advice on e-cigarettes to cancer patients.  
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30 To date there is no medicinally licenced EC in the UK, or anywhere else in the world, which is  
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32 possibly presenting challenges for clinicians wishing to demonstrate e-cigarettes or  
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34 recommend for inpatient use. In this study, clinicians were divided over this decision, with  
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36 two fifths of clinicians not supportive, and nearly a third supportive of licensing e-cigarettes  
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38 for medicinal uses. Clinicians may be more comfortable recommending e-cigarettes if they  
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40 were available on prescription.  
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47 Debate is also needed on how e-cigarettes could be integrated into smoking cessation  
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49 practices delivered by clinicians to patients with cancer. Smoking cessation practices are  
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51 already well developed in other disease groups such as coronary heart disease (CHD).<sup>55</sup> It is  
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53 therefore timely to examine the role of a smoking cessation service within the cancer  
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55 pathway, including the role of e-cigarettes can play in helping cancer patients to quit  
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57 smoking long term after a diagnosis.<sup>56</sup> While attendance at a cancer clinic provides an  
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3 opportunity for clinicians to provide smoking cessation support to those who smoke, this is  
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5 not currently routinely offered. Patients with cancer have highlighted the need for smoking  
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7 cessation support, and have reported difficulty in attending external smoking cessations  
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9 services in addition to all their other clinic appointments.<sup>12</sup> Smoking cessation advice has  
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11 historically been the role of primary care or community smoking cessation services, and this  
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13 is reflected in the greater knowledge, confidence and more positive attitude towards e-  
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15 cigarettes among practice nurses and GPs than among cancer specialists reported in this  
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17 study. However, lack of funding has seen a decline in the smoking cessation services, and  
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19 alternatives are needed. Clinicians worry that discussing smoking may damage the  
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21 relationship with the patient, which is essential for the often onerous treatment needed for  
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23 cancer.<sup>57</sup> Clinicians also seem to believe that patients cannot stop smoking.<sup>58</sup>  
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### 32 **Strengths and limitations**

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35 To our knowledge, this study is the first to examine a broad range of clinicians' behaviours  
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37 and beliefs around the use of e-cigarettes in patients across different cancer groups. The  
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39 COM-B model has previously been used to develop smoking cessation interventions.<sup>59</sup> In  
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41 this study, it has enabled the identification of factors, which could be used to improve  
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43 clinicians' recommendation of e-cigarettes.  
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50 The recruitment procedure for this survey utilised an existing network of electronically  
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52 active clinicians from the research arm of doctors.net.com. This method has the advantage  
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54 of speed and guaranteed response which is beneficial considering that surveys with busy  
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56 clinicians have commonly suffered from poor response rates. However, this sample may  
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58 not be representative of the population of clinicians in the United Kingdom. Quota sampling  
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3 ensured diversity in our sample, which included clinicians who worked with patients who  
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5 had a wide range of cancer diagnoses, and not just those with cancers directly associated  
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7 with smoking. However, in quota sampling, the sample has not been chosen using random  
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9 selection  
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15 The potential for response bias should be considered; for example, those with a greater  
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17 interest in smoking cessation for cancer patients may have been more likely to respond, and  
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19 the incentive may have encouraged participation, whereas clinicians who are smokers may  
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21 have been under-represented. In addition, findings rely on self-report.  
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### 30 **Conclusions**

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32 Despite the evidence that e-cigarettes help smokers quit smoking, and the positive public  
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34 health stance towards e-cigarettes in the UK, clinicians remain cautious about  
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36 recommending e-cigarettes to cancer survivors who continue to smoke. Clinicians require  
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38 training and support on how to integrate e cigarettes in smoking cessation advice for cancer  
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40 patients and adoption of the UK evidence based guidance at regional and local level is  
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42 needed.  
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E-cigarettes as a Smoking Cessation aid in Cancer Patients: Clinicians knowledge, attitude and current practice. NCRI 2018 abstract 2171

E-cigarettes as a Smoking Cessation aid in Cancer Patients: Clinicians knowledge, attitude and current practice. IPOS 2019 abstract 751. Journal of Psychosocial Oncology – Research and Practice Sept 2019, vol 1: suppl 1 1S

## Author Contributions

JB, ED, EW, PA, FM, DF, & MW conceived and designed the study. Additionally, LS, BN, SDM, and SJ commented on the final funding application before submission. FM, JB & ED developed the initial questionnaire, with e-cigarette knowledge input from PA, SJ & LS, primary health care input from PA & BN, nursing input from MW & surgeon and oncology input from SDM. ED and FM conducted the statistical analysis, which was reviewed by DF. JB & FM wrote the initial manuscript. EW, PA, ED, DF & MW critically reviewed the initial manuscript, while LS, BN, SDM & SJ reviewed and commented on the second version of the manuscript. All authors read and approved the final manuscript.

**Competing interests:** The authors have no conflict of interest or disclosures. All authors declare no financial or other relationships or activities that could appear to have influenced the submitted work.

**Ethical approval:**

This study complies with ethical standards. Informed consent was gained. The study obtained ethics approval to conduct the study from Oxford Brookes University Ethics Committee (2017 44 Brett) and was performed in accordance with the Declaration of Helsinki.

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**Data sharing/Data availability:**

Data will be deposited in the university repository, where reasonable requests for access can be submitted. Data access can be requested from the corresponding author. The data will be kept for a minimum of ten years following publication.



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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	5
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6,7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6,7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5,6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	5,6
Study size	10	Explain how the study size was arrived at	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7
		(b) Describe any methods used to examine subgroups and interactions	7
		(c) Explain how missing data were addressed	N/A
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	N/A
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	8
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8 Table1
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	8,9,10,11
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make	8,9,10,11

		clear which confounders were adjusted for and why they were included N/A	
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10,11
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14,15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	14
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).