NOVA

University of Newcastle Research Online

nova.newcastle.edu.au

Regan, T., Carey, M., Bryant, J., Waller, A., Mansfield, E., Sitas, F., & Tracey, E "Prevalence and correlates of current smoking among medical oncology outpatients". Published in Psycho-Oncology, Vol. 24 Issue 10, P. 1258-1264 (2015)

Available from: **http://dx.doi.org/10.1002/pon.3893**

"This is the peer reviewed version of the following article: Regan, T., Carey, M., Bryant, J., Waller, A., Mansfield, E., Sitas, F., & Tracey, E "Prevalence and correlates of current smoking among medical oncology outpatients". Published in Psycho-Oncology, Vol. 24 Issue 10, P. 1258-1264 (2015), which has been published in final form at http://dx.doi.org/10.1002/pon.3893. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving."

Accessed from: http://hdl.handle.net/1959.13/1331619

Prevalence and correlates of current smoking among medical oncology outpatients

Authors and affiliations: Dr Tim Regan[1], Dr Mariko Carey[1], Dr Jamie Bryant[1], Dr Amy Waller[1], Dr Elise Mansfield[1], Associate Professor Freddy Sitas[2], Elizabeth Tracey[1]

[1] Health Behaviour Research Group, Priority Research Centre for Health Behaviour, University of Newcastle & Hunter Medical Research Institute. HMRI Building, University of Newcastle, Callaghan, New South Wales, Australia.

[2] Cancer Research Division, Cancer Council New South Wales. Kings Cross, New South Wales, Australia.

Corresponding author (details):
Dr Tim Regan
Health Behaviour Research Group
The University of Newcastle
Callaghan, NSW, Australia, 2300
Telephone: +61 2 4985 4558,
Fax: +61 2 4042 0040

Word count: 3725

Acknowledgements:

This research was supported by a National Health & Medical Research Council Project Grant (ID 1010536), a Strategic Research Partnership Grant from Cancer Council NSW to the Newcastle Cancer Control Collaborative (New-3C), and infrastructure funding from the Hunter Medical Research Institute (HMRI). Our thanks to the participating cancer treatment centres; Rochelle Smits, Alison Zucca, Heidi Turon and Hannah Small for research support; Sandra Dowley for data management; and Alessandra Bisquerra for statistical assistance. Dr Jamie Bryant is supported by an Australian Research Council Post-Doctoral Industry Fellowship.

ABSTRACT

Background. Continued smoking following a cancer diagnosis has adverse impacts on cancer treatment and puts individuals at risk of secondary cancers. Data on the prevalence and correlates of smoking amongst cancer patients is critical for successfully targeting smoking cessation interventions.

Aims. To explore among a sample of medical oncology outpatients: (a) the prevalence of self-reported current smoking; and (b) the demographic and psychosocial factors associated with self-reported smoking.

Methods. A heterogeneous sample of cancer patients aged 18 years or over were recruited from one of 11 medical oncology treatment centres across Australia. Patients completed a survey assessing: smoking status; socio-demographic, disease and treatment characteristics; time since diagnosis; anxiety; and depression. Factors associated with self-reported smoking were examined using a univariate and multivariate mixed-effects logistic regression.

Results. A total of 1379 patients returned surveys and 1338 were included in the analysis. The prevalence of current smoking was 10.9% (n=146). After adjusting for treatment centre, patients aged 65 years and older and those without health concession cards were significantly less likely to smoke. Patients diagnosed with lung cancer and those without private health insurance were more likely to smoke.

Discussion. A minority of cancer patients reported continued smoking at an average time of 13 months post-diagnosis. Patients who are younger, have been diagnosed with lung cancer, and have lower socioeconomic status are at-risk groups and represent important targets for smoking cessation advice and intervention.

Key words: cancer, smoking, prevalence, treatment, cessation.

BACKGROUND

Impact of smoking amongst individuals diagnosed with cancer

Continued smoking following a diagnosis of cancer has significant detrimental impacts [1], including increased surgical recovery time [2], risk of surgical complications [3, 4], poorer quality of wound healing [5], increased risk of wound infection [2], and higher ratings of pain [6]. Smoking is also associated with poorer long-term outcomes following radiotherapy [7], decreased chemotherapy effectiveness [8, 9], and exacerbation of treatment side effects including skin and oral mucositis [10] weight-loss [11, 12] and depression [11]. There is some evidence that continued smoking after a cancer diagnosis and post-treatment is associated with decreased survival among patients diagnosed with lung [13], head and neck [13], colorectal [14], and breast cancers [15]. Clinical practice guidelines recommend healthcare providers provide smoking cessation advice and support to all individuals who smoke, not just those with a diagnosis of cancer [16]. However, a cancer diagnosis provides a clear 'teachable moment' for smoking cessation [17], and the identification of patients who are most likely to continue to smoke after a cancer diagnosis therefore remains a priority for effective cancer control.

Prevalence and correlates of smoking among people with cancer

Prevalence of continued smoking among individuals diagnosed with cancer varies by cancer type and time since diagnosis. In some cases, prevalence is surprisingly high. A cross-sectional national study of US cancer survivors between 2 and 10 years post-diagnosis identified rates of continued smoking ranging from 8.4% for men with prostate cancer to 17.4% for individuals with bladder cancer [18]. A population based Australian study identified a smoking prevalence of 21.3% for a sample of disease-free cancer survivors with heterogeneous types of cancers [19]. Among a cohort of breast cancer survivors, 12.1% self-

reported being a smoker at diagnosis, falling to 8.9% at the first follow-up (~9 months) [20]. Previous studies have shown that a range of factors are associated with continued smoking following a diagnosis, including: younger age [21, 22], female sex [22], earlier stage of cancer [23, 24]; higher nicotine dependency [25]; increased emotional distress [24] and lower perceived social support [26]. However, the majority of these studies have focused on patients with lung or head and neck cancer. There is a need for data on the correlates of smoking in a diverse sample that includes a wide range of cancers, as well as individuals at all stages of the illness trajectory.

Aims

To explore in a sample of medical oncology outpatients:

a) the prevalence of self-reported current smoking and;

b) the demographic and psychosocial factors associated with self-reported smoking.

METHOD

Setting

Data were collected from 11 medical oncology treatment centres across Australia as part of a larger study exploring the patient, social, and treatment centre characteristics associated with psychosocial outcomes among patients attending medical oncology clinics.

Sample

Eligibility and recruitment of medical oncology clinics. Eligible clinics were those that provided services to more than 400 patients each year. A leading medical oncologist from each Australian state helped to identify eligible centres, and sent invitation letters on behalf of the research team.

Eligibility of patients. Eligible patients had a confirmed diagnosis of any cancer, were aged 18 years or over, were attending one of the participating medical oncology treatment centres for at least their second outpatient appointment, were proficient enough in English to read, comprehend and respond to study materials, and were physically and mentally capable of providing informed consent and completing the survey.

*Procedures***.** Clinics selected their preference to have a research assistant (RA) or staff member undertake patient recruitment. Eligible patients were approached while waiting for an appointment and invited to participate in the study. Patients were provided with written and verbal information about the study and informed consent was obtained. Patients were then invited to complete a survey as they waited in the clinic or at home in their own time. Patients who completed the survey at home were asked to return it using a reply-paid envelope within one week, with a reminder letter and another survey sent out if the original survey was not returned within 2-3 weeks. A second reminder letter was sent 2-3 weeks after the first reminder. Ethics approval was obtained from the University of Newcastle Human Research Ethics Committee and the ethics committee of the participating health services.

Measures

The survey contained measures for the following variables that are of interest to the present study:

Smoking. Smoking was assessed with one item from the New South Wales Health Survey [27]. Participants were asked "*Which of the following best describes your smoking status? This includes cigarettes, cigars and pipes"*. The response options were: 'I smoke daily'; 'I smoke occasionally'; 'I don't smoke now but I used to'; 'I've tried it a few times but never smoked regularly'; or 'I've never smoked'.

Demographic characteristics. Participants self-reported their: age; gender; Aboriginal and Torres Strait Islander status; and whether they held private health insurance or a health care concession card (health care concession cards provide holders with more affordable access to medical services and medications).

Disease characteristics. Participants self-reported cancer type (haematological/blood; breast; colorectal; prostate; lung; melanoma; other).

Treatment characteristics. Participants self-reported time since diagnosis in months (0-6, 6-12, 13-24, more than 24) and their reason for visiting the treatment centre (discuss treatment options; receive treatment; check-up during treatment; check-up post-treatment; other).

Anxiety and Depression: Participants completed the Hospital Anxiety and Depression Scale (HADS) [28]. The HADS includes an *anxiety* subscale (7 items), and a *depression* subscale (7 items). Each item is scored from 0 to 3, giving a maximum score of 21 for each subscale. The scale has been widely used with a variety of populations, including cancer patients and has adequate internal consistency, construct validity and discriminant validity [29].

Statistical Analysis

Participants were classified as 'current smokers' if they reported smoking daily or smoking occasionally, and were classified as 'non-smokers' if they reported any other smoking status. Age was split in to three categories: 18-49, 50-64, 65 years and over. All cancer types except lung cancer were collapsed into a category called 'other' to allow comparisons between lung and all other cancer types. Two levels of the time since diagnosis variable were collapsed together: the '13-24 months' category and the 'more than 24 months' category were combined and renamed '13 months or more' since diagnosis. Reasons for treatment visit were used to approximate what stage of the treatment cycle patients were currently in: those patients we reported being present to receive treatment or undergo a check-up during

treatment were classified as ‘during treatment’, and those that responded attending for a post-treatment check-up were classified ‘post-treatment’.

Participant characteristics and outcomes are presented as counts and percentages. A univariable and multivariable mixed-effects logistic regression was undertaken, with the likelihood of being current smoker assessed against patient, disease and treatment factors. All analyses were conducted in STATA 12.1 [30]. All predictors were included on an a priori basis and consistent with the modelling and variable selection criteria outlined by Greenland [31]. Multilevel mixed-effects logistic regression was also undertaken using the xtmelogit command. The random effects portion of the model was grouped on the 11 treatment centres.

RESULTS

Consent Rates

The average number of patients recruited from each of the 11 treatment centres was 130 (SD = 11, minimum = 86, maximum = 195). A total of 2237 patients were approached to participate and 1840 provided informed consent (82%). A total of 1379 patients returned completed surveys (75%). Forty one patients did not report cancer site an d were excluded from analyses, leaving 1338 complete sets of patient data.

Demographic characteristics of the sample

Patient demographics are reported in Table 1. The majority of participants were female (58.3%), aged 65 years or older (46.7%), and were diagnosed with breast (32.6%), haematological malignancies (30.9%) colorectal (17.5%), upper gastrointestinal or lung cancer (9.2%). Most were currently undergoing treatment (67%) and had received their diagnosis at least 13 months prior to completing the survey (50.4%). The majority of

participants did not have private health insurance (52.2%), were concession card holders (58.0%), and were not depressed (82.7%) or anxious (80.3%).

Prevalence of self-reported current smoking

One hundred and forty-six (10.9%, 95%CI 9.3%-12.7%) patients self-reported that they were current smokers.

Patient characteristics associated with smoking status

The results of the mixed effects logistic regression analysis exploring relationships between patient characteristics and smoking status are shown in Table 2. After adjusting for treatment centre, patients aged 65 years and older were significantly less likely to smoke than younger patients (OR=0.27, 95% CI=0.16-0.48, $p<.001$). Lung cancer patients were nearly three times more likely to smoke than patients diagnosed with other types of cancer (OR=2.83, 95% CI=1.72-4.71, $p<.001$). Patients without private health insurance were nearly three times more likely to smoke than those who had private health insurance (OR=3.34, 95% CI=2.11-5.28, $p<.001$), and those without concession cards were 64% less likely to smoke than those with concession cards (OR=0.36, 95% CI=0.23-0.58, $p<.001$). No significant relationships were found for gender, Aboriginal and Torres Strait Islander status, stage of treatment, time since diagnosis, depression, or anxiety. A likelihood ratio test comparing a logistic regression model with the mixed effect logistic regression model indicated that the two models were not significantly different from each other (p= 0. 1959), suggesting that the level of clustering within treatment centres was not statistically significant. Collinearity between patient characteristics was examined using the Variance Inflation factor (VIF). None of the patient characteristics exceeded VIFs of two, indicating a low risk of collinearity between included

variables [32]. The Receiver Operating Curve (ROC) statistic suggested that the area under the curve was 0.76, indicating acceptable model discrimination [33].

Table 1 Demographic characteristics of medical oncology treatment centre patients for non-smokers and current smokers

Characteristics	Total n=1338#	%	Non-smoker n=1,192	%	Current smoker n=146	%	p value
Sex							
Male	558	41.7	493	88.4%	65	11.6	
Female	780	58.3	699	89.6%	81	10.4	p = 0.488
Age at time of survey							
18-49 years	220	16.4	187	85.0%	33	15.0	
50-64 years	474	35.4	414	87.3%	60	12.7	
65 years and older	625	46.7	573	91.7%	52	8.3%	p = < .01
ATSI status							
Non-Aboriginal	1,312	98.1	1,170	89.2%	142	10.8	
Aboriginal or Torres Strait	26	1.9	22	84.6%	4	15.4	p = 0.456
Type of cancer							
Lung cancer	132	9.9	103	78.0%	29	22.0	
Breast	436	32.6	400	91.7%	36	8.3%	
Colorectal	234	17.5	215	91.9%	19	8.1%	
Upper GI	123	9.2	104	84.6%	19	15.4	
Haematopoetic	413	30.9	370	89.6%	43	10.4	p < .001
Stage of treatment cycle							
During treatment	896	67.0	798	89.1%	98	10.9	
Post treatment	442	33.0	394	89.1%	48	10.9	p > 0.5
Time from diagnosis to							
0-6 months	418	31.2	377	90.2%	41	9.8%	
7-12 months	245	18.3	221	90.2%	24	9.8%	
13 or more months	675	50.4	594	88.0%	81	12.0	p = 0.15
Private Health Insurance							
Yes	639	47.8	610	95.5%	29	4.5%	
No	699	52.2	582	83.3%	117	16.7	p < .001
Concession card holder							
Yes	776	58.0	666	85.8%	110	14.2	
No	562	42.0	526	93.6%	36	6.4%	p < .001
Depression							
a score of 8 or lower	1,107	82.7	1,001	90.4%	106	9.6%	
A score of 9 or higher	231	17.3	191	82.7%	40	17.3	p < .001
Anxiety							
a score of 8 or lower	1,074	80.3	974	90.7%	100	9.3%	
A score of 9 or higher	264	19.7	218	82.6%	46	17.4	p < .001

41 records were excluded because of missing information

Table 2 Odds ratios and 95% confidence limits for univariable and multivariable factors associated with self-reported current smoking status among medical oncology patients using mixed effects logistic regression model.

Characteristics	OR	95%C		p-value	OR	95%		p-value
	Univariable				Multivariable			
Sex								
Male	1				1			
Female	0.87	0.61,	1.24	p=0.43	0.82	0.56,	1.20	p=0.3051
Age at time of survey								
18-49 years	1				1			
50-64 years	0.81	0.51,	1.28		0.71	0.43,	1.18	
65 years and older	0.54	0.34,	0.87	p=0.03	0.27	0.16,	0.48	p<0.0001
Aboriginal and Torres strait								
Non-Aboriginal	1				1			
Aboriginal or Torres Strait Islander	1.34	0.45,	4.01	P<0.61	1.04	0.32,	3.39	p=0.94
Type of cancer								
Other cancer	1				1			
Lung cancer	2.33	1.46,	3.72	p= 0.0004	2.84	1.72,	4.71	p<0.0001
Stage of treatment cycle								
Post treatment					1			
During treatment	1.35	0.91,	1.99	p=0.14	1.26	0.83,	1.93	p=0.28
Time from diagnosis to clinic								
0-6 months	1				1			
7-12 months	0.85	0.49,	1.46		0.81	0.46,	1.44	
13 or more months	1.08	0.72,	1.63	p=0.62	1.38	0.88,	2.16	p=0.48
Private Health Insurance status								
Yes	1				1			
No	4.08	2.61,	6.38	p<0.0001	3.34	2.11,	5.28	P<0.0001
Concession card holder								
Yes	1				1			
No	0.40	0.27,	0.60	p<0.0001	0.36	0.23,	0.58	p=0.0001
Depression								
a score of 8 or lower	1				1			
A score of 9 or higher	1.98	1.33,	2.96	p=0.0008	1.27	0.78,	2.06	p=0.34
Anxiety								
a score of 8 or lower	1				1			
A score of 9 or higher	1.94	1.32,	2.84	p=0.0008	1.44	0.91,	2.28	p=0.12

DISCUSSION

This is the largest Australian study of self-reported prevalence of current smoking among medical oncology patients with a range of cancer types. Results indicated that 10.9% of patients were current smokers, which is similar to the proportion of daily smokers reported in the most recent Australian general population data (12. 8%) [34]. While on face value these results seem as expected, a few factors should be considered. First, almost half of our sample was aged 65 and older. Population statistics indicate that smoking prevalence is significantly lower among those aged 60 years and older [35]. Second, previous research has shown that a diagnosis of cancer is a powerful motivator to quit. Given these factors, it might have been expected that smoking prevalence would be lower among our sample than for the general population. However, these factors were most likely balanced by the probability that after adjusting for age, smokers would be over-represented in a cancer population due to the link between smoking and some types of cancer. The regression analysis confirmed that these factors most likely influenced the overall prevalence with people aged 65 and older less likely to smoke than patients aged 18-49.

Further, our data show that people diagnosed with lung cancer were much more likely to be smokers than people diagnosed with other types of cancers. This reflects that smoking is a significant contributor to the incidence of lung cancer in men (90%) and to a lesser extent women (65%) [37]. This suggests that some people with a tobacco related lung cancer may have quit either prior to diagnosis or subsequent to their diagnosis. Indicators of lower socioeconomic status such as not having private health insurance were also associated with increased odds of being a smoker. Again this aligns with population data which shows much

higher smoking rates among people of lower socioeconomic status compared to the general population [38].

Previous research has identified a link between smoking and depression and anxiety in cancer populations. For example, a recent population based longitudinal Australian study of cancer survivors found that survivors who were current or former smokers at baseline had at least twice the odds of having comorbid anxiety-depression one year later [39]. Similarly, a cross-sectional found that patients with head and neck cancer who smoked reported poorer mental health than those that did not smoke [40]. In contrast, no significant association was found between probable anxiety or depression and self-reported smoking status in the current study. This may reflect the differences in the trajectory of distress among patients with cancer, and/or differences in the sampling between studies.

Implications for oncology services

It is important to note that the prevalence of current smoking in our sample was the same for patients who were still undergoing treatment and those who had finished treatment. This suggests a lack of smoking cessation effectiveness this point in the trajectory. Given the potential impact of continued smoking on cancer treatments and subsequent morbidity and mortality, it suggests a need to intervene on smoking as early as possible in the cancer trajectory. Our data suggest that this may be particularly important for younger patients (<65 years), those diagnosed with lung cancer, and those from a lower socioeconomic background. Recent surveys suggest that 90% of oncology providers believe smoking impacts on patient outcomes, and that smoking cessation is thus essential to cancer care [41, 42]. Although 70-80% of providers reported always asking patients about their tobacco use at their initial visit, less than 20% of providers reported always actively providing smoking cessation support or

referral. Providers were then less likely report always asking about tobacco use at follow-up visits (~40%) [41, 42].

There are several factors that may act as barriers to the implementation of smoking cessation interventions in cancer care. For example, the evidence regarding the benefits of smoking cessation among patients with cancer is unclear. A systematic review reported some benefit of smoking cessation after lung cancer diagnosis on prognosis [43], but the quality of included studies was limited. For example, no randomised controlled trials were identified, and the included studies were cross-sectional and therefore lacked information on long-term smoking and cessation habits. In addition, the definitions of smoking abstinence were inconsistent, and smoking status was self-reported, and may have been under-reported due to social desirability bias [43]. Similar methodological flaws have been reported in review of bladder cancer patients [44]. To circumvent the methodological constraints of assessing the long-term impact of quitting smoking, Sitas and colleagues [45] used Australian and US registry data to model the long-term effects of quitting smoking. They estimated a difference in the 8 year survival rates between oncology patients who never smoked and those who recently quit smoking of between 43% (in Australia) and 49% (USA), suggesting there are significant the benefits to survival related to smoking cessation.

The evidence regarding the efficacy of smoking cessation interventions in oncology populations is also unclear [46]. A systematic review and meta-analysis reported that smoking cessation interventions delivered post-operatively did not lead to significant short- or long-term changes in smoking behaviour [46]. However, one randomised-controlled trial reported a significant intervention effect (OR 3.27, 95%CI, 1.10-10.93) [47] at the end of the perioperative period. Clearly there is a need for replication of this finding. Further there were no significant differences between groups in wound complications post-surgery, or on smoking at 12 month follow-up. Thus, although a diagnosis of cancer is often considered a

'teachable moment' for smoking cessation, especially for tobacco-related malignancies such as lung and head and neck cancers [17], more methodologically rigorous intervention studies are needed to establish a clear evidence-base for the longer-term benefit of these interventions.

Other barriers reported by clinicians are a lack of appropriate skills and resources to intervene on smoking [41, 42, 48], and patient resistance [41] or lack of motivation to quit [36]. It could be suggested that the focus for reducing these barriers is to improve clinician skills in discussing the importance of smoking cessation with those most likely to smoke. Given the poor prognosis and high disease burden of lung cancer, there is an argument to be made that providers face a particularly difficult task convincing these patients of the benefits of quitting smoking, compared to the potential impact on their perceived quality of life. Coupled with the lack of clarity in regarding the impact of smoking cessation on outcomes across cancer types, and the efficacy of smoking cessation interventions, a detailed health economic evaluation of the costs-benefits of implementing these interventions is warranted.

Limitations

We assessed smoking status by patient self-report. It is possible that this resulted in some degree of under-reporting due to social desirability biases. Future research regarding smoking status of oncology patients could possibly include items assessing whether the patient had quit as a result of diagnosis, or whether they had received smoking cessation advice since diagnosis. As only 14 patients with head and neck cancer were recruited for this study we were unable to be group patients into a separate tumour stream and we therefore collapsed these patients into the 'other' group. Additionally, no data were collected regarding whether or not patients' had received smoking cessation advice from any health care professional

following their diagnosis or during their treatment. Thus we are unable to directly explore the relationship between smoking cessation advice and current smoking status within our sample.

Conclusions

A notable minority of patients attending medical oncology treatment centres self-report being a current smoker. Current smoking status was significantly associated with being of younger age, being diagnosed with lung cancer, and being of lower socioeconomic status. These results suggest a need to ensure patients with cancer who are at risk of continued smoking post-diagnosis are specifically targeted to receive smoking cessation advice and intervention. However, more methodologically rigorous intervention studies are needed to develop robust evidence of the long term benefits of smoking cessation interventions for patients.

References

1. US Department of Health and Human Services, *The health consequences of smoking—50 years of progress: A report of the surgeon general.* Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014. **17**.
2. Gajdos, C., et al., *Adverse effects of smoking on postoperative outcomes in cancer patients.* Annals of surgical oncology, 2012. **19**(5): p. 1430-1438.
3. Sharma, A., et al., *Tobacco smoking and postoperative outcomes after colorectal surgery.* Annals of surgery, 2013. **258**(2): p. 296-300.
4. Jung, K.H., et al., *Preoperative smoking cessation can reduce postoperative complications in gastric cancer surgery.* Gastric Cancer, 2014: p. 1-8.
5. Sørensen, L.T., *Wound healing and infection in surgery: the pathophysiological impact of smoking, smoking cessation, and nicotine replacement therapy: a systematic review.* Annals of surgery, 2012. **255**(6): p. 1069-1079.
6. Ditre, J.W., et al., *Associations between pain and current smoking status among cancer patients.* Pain, 2011. **152**(1): p. 60-65.
7. Pantarotto, J., et al., *Smoking is associated with worse outcomes in patients with prostate cancer treated by radical radiotherapy.* BJU international, 2007. **99**(3): p. 564-569.
8. Zhang, J., et al., *Nicotine induces resistance to chemotherapy by modulating mitochondrial signaling in lung cancer.* American Journal of Respiratory Cell and Molecular Biology, 2009. **40**(2): p. 135-146.
9. Tsao, A.S., et al., *Smoking affects treatment outcome in patients with advanced nonsmall cell lung cancer.* Cancer, 2006. **106**(11): p. 2428-2436.
10. Porock, D., S. Nikoletti, and F. Cameron, *The relationship between factors that impair wound healing and the severity of acute radiation skin and mucosal toxicities in head and neck cancer.* Cancer nursing, 2004. **27**(1): p. 71-78.
11. Peppone, L.J., et al., *The Effect of Cigarette Smoking on Cancer Treatment–Related Side Effects.* The oncologist, 2011. **16**(12): p. 1784-1792.
12. Jensen, K., A.B. Jensen, and C. Grau, *Smoking has a negative impact upon health related quality of life after treatment for head and neck cancer.* Oral oncology, 2007. **43**(2): p. 187-192.
13. Warren, G.W., et al., *Smoking at diagnosis and survival in cancer patients.* International Journal of Cancer, 2013. **132**(2): p. 401-410.
14. Walter, V., et al., *Smoking and survival of colorectal cancer patients: systematic review and meta-analysis.* Annals of Oncology, 2014. **25**(8): p. 1517-1525.
15. Braithwaite, D., et al., *Smoking and survival after breast cancer diagnosis: a prospective observational study and systematic review.* Breast Cancer Research and Treatment, 2012. **136**(2): p. 521-533.
16. Fiore, M., *Treating tobacco use and dependence: 2008 update: Clinical practice guideline*. 2008: DIANE Publishing.
17. Gritz, E.R., D.J. Vidrine, and M. Cororve Fingeret, *Smoking cessation: a critical component of medical management in chronic disease populations.* American journal of preventive medicine, 2007. **33**(6): p. S414-S422.
18. Blanchard, C.M., K.S. Courneya, and K. Stein, *Cancer survivors' adherence to lifestyle behavior recommendations and associations with health-related quality of life: results from the American Cancer Society's SCS-II.* Journal of Clinical oncology, 2008. **26**(13): p. 2198-2204.
19. Eakin, E.G., et al., *Health behaviors of cancer survivors: data from an Australian population-based survey.* Cancer Causes & Control, 2007. **18**(8): p. 881-894.

20. Bell, R.J., et al., *Changes in patterns of use of cigarettes and alcohol in women after a first diagnosis of invasive breast cancer: a cohort study of women from Victoria, Australia.* Supportive Care in Cancer, 2012. **20**(4): p. 783-789.
21. Mayer, D.K. and J. Carlson, *Smoking patterns in cancer survivors.* Nicotine & Tobacco Research, 2010: p. ntq199.
22. Schnoll, R.A., et al., *Predictors of smoking cessation among cancer patients enrolled in a smoking cessation program.* Acta Oncologica, 2011. **50**(5): p. 678-684.
23. Ark, W.V., L.J. DiNardo, and D.S. Oliver, *Factors affecting smoking cessation in patients with head and neck cancer.* The Laryngoscope, 1997. **107**(7): p. 888-892.
24. Schnoll, R.A., et al., *Correlates of tobacco use among smokers and recent quitters diagnosed with cancer.* Patient education and counseling, 2002. **46**(2): p. 137-145.
25. Cooley, M.E., et al., *Smoking cessation is challenging even for patients recovering from lung cancer surgery with curative intent.* Lung Cancer, 2009. **66**(2): p. 218-225.
26. Yang, H.-K., et al., *The association between perceived social support and continued smoking in cancer survivors.* Japanese journal of clinical oncology, 2013. **43**(1): p. 45-54.
27. NSW Government. *Population Health Survey 2012 Questionnaire*. 2012; Available from: http://www.health.nsw.gov.au/surveys/adult/Documents/Questionnaire_2012_WEB.pdf.
28. Zigmond, A.S. and R.P. Snaith, *The hospital anxiety and depression scale.* Acta psychiatrica scandinavica, 1983. **67**(6): p. 361-370.
29. Bjelland, I., et al., *The validity of the Hospital Anxiety and Depression Scale: an updated literature review.* Journal of psychosomatic research, 2002. **52**(2): p. 69-77.
30. StataCorp, *Stata Statistical Software: Release 12.1*. 2011, StataCorp LP: College Station, TX.
31. Greenland, S., *Modeling and variable selection in epidemiologic analysis.* Am J Public Health, 1989. **79**(3): p. 340-9.
32. Berry, W.D. and S. Feldman, *Multiple Regression in Practice*, in *Sage University Paper Series on Quantitative Applications in the Social Sciences*. 1985, Sage: Beverly Hills, CA.
33. Hanley, J.A. and B.J. McNeil, *The meaning and use of the area under a receiver operating characteristic (ROC) curve.* Radiology, 1982. **143**(1): p. 29-36.
34. Australian Institute of Health and Welfare 2013. *National Drug Strategy Household Survey Report - unreleased*. 2014; Available from: http://www.aihw.gov.au/alcohol-and-other-drugs/ndshs/.
35. Australian Institute of Health Welfare, *2010 National Drug Strategy Household Survey Report*. 2011, AIHW Canberra.
36. Schnoll, R.A., et al., *Characteristics of cancer patients entering a smoking cessation program and correlates of quit motivation: implications for the development of tobacco control programs for cancer patients.* Psycho-Oncology, 2004. **13**(5): p. 346-358.
37. Ridolfo, B. and C. Stevenson, *The quantification of drug-caused mortality and morbidity in Australia, 1998*. 2001: Australian Institute of Health and Welfare.
38. Scollo, M.M. and M.H. Winstanley. *Tobacco in Australia: Facts and issues*. 2012; 4th edition:[Available from: www.TobaccoInAustralia.org.au
39. Boyes, A.W., et al., *Prevalence and predictors of the short-term trajectory of anxiety and depression in the first year after a cancer diagnosis: a population-based longitudinal study.* Journal of Clinical oncology, 2013: p. JCO. 2012.44. 7540.
40. Duffy, S.A., et al., *Depressive symptoms, smoking, drinking, and quality of life among head and neck cancer patients.* Psychosomatics, 2007. **48**(2): p. 142-148.
41. Warren, G.W., et al., *Addressing tobacco use in patients with cancer: a survey of American Society of Clinical Oncology members.* J Oncol Pract, 2013. **9**(5): p. 258-262.
42. Warren, G.W., et al., *Practice patterns and perceptions of thoracic oncology providers on tobacco use and cessation in cancer patients.* J Thorac Oncol, 2013. **8**(5): p. 543-548.
43. Parsons, A., et al., *Influence of smoking cessation after diagnosis of early stage lung cancer on prognosis: systematic review of observational studies with meta-analysis.* Bmj, 2010. **340**.

44. Aveyard, P., et al., *Does smoking status influence the prognosis of bladder cancer? A systematic review.* BJU international, 2002. **90**(3): p. 228-239.
45. Sitas, F., et al., *Smoking cessation after cancer.* Journal of Clinical oncology, 2014.
46. Nayan, S., et al., *Smoking Cessation Interventions and Cessation Rates in the Oncology Population An Updated Systematic Review and Meta-Analysis.* Otolaryngology--Head and Neck Surgery, 2013. **149**(2): p. 200-211.
47. Thomsen, T., et al., *Brief smoking cessation intervention in relation to breast cancer surgery: a randomized controlled trial.* Nicotine & Tobacco Research, 2010. **12**(11): p. 1118-1124.
48. Murray, R.L., et al., *The potential to improve ascertainment and intervention to reduce smoking in primary care: a cross sectional survey.* BMC health services research, 2008. **8**(1): p. 6.