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**THE LONG TERM EFFECTIVENESS OF THE PRE-OPERATIVE SMOKING  
CESSATION PROGRAM AT WESTERN HEALTH**

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# THE LONG TERM EFFECTIVENESS OF THE PRE-OPERATIVE SMOKING CESSATION PROGRAM AT WESTERN HEALTH

## **Abstract**

### Introduction

Smoking is associated with adverse effects in the peri-operative period, including elevated risk of death. The peri-operative period provides an opportunity to engage with patients who are smokers to encourage smoking cessation, often referred to as a 'teachable moment'. We developed a smoking intervention model for the Pre-Admission Clinic (PAC) at Western Health (WH), Victoria, Australia. This case series aimed to assess the impact of the smoking intervention model, which is standard of care, on the participants smoking habits over four time points.

### Methods

We enrolled 50 consecutive participants for elective surgery who were smokers and had attended PAC at WH, Footscray. All smokers were offered a standard intervention package to address their smoking. Participants underwent a brief interview to elicit their current smoking behavior on their DOS, 3 and 12 months post-operatively.

## Results

We found a reduction at each time point post intervention in the average number of cigarettes smoked per day by all participants with a 43% reduction at 12 months compared with PAC. We found that the number of participants who had quit increased at each time point, with 29% abstinent at 12 months post-operatively. At 12 months, we found 71% of participants had either quit or reduced the number of cigarettes smoked compared with the amount reported at PAC.

## Discussion

This study adds to the evidence that a simple intervention pre-operatively can contribute to long-term changes in smoking behavior.

**Keywords: smoking cessation; tobacco; peri-operative; long term; smoking intervention**

**Word Count: 230**

## Introduction

The World Health Organisation reports that smoking is the leading cause of preventable death and disease in the world<sup>1</sup>. In Australia, the most recent estimates are that smoking is responsible for 15,000 annual deaths<sup>2</sup> and 8% of the total health burden as measured by disability adjusted life years<sup>3</sup>. It is estimated that smoking costs the Australian economy \$31.5 billion per year in social, health and economic costs<sup>2</sup>.

An Australian prospective cohort study of over 205, 000 people found that two thirds of smokers will die from a smoking related disease and on average, smokers die 10 years earlier than non-smokers<sup>4</sup>. A smoker's mortality can be returned to that of a non-smoker if they quit before the age of 45 years<sup>4</sup>. There is a clear public health incentive to encourage smoking cessation at a younger age.

Smoking has been shown to be associated with adverse events in the peri-operative period, with smokers at a 40% increased risk of 30-day mortality compared with non-smokers<sup>5</sup>. Smokers are more likely to suffer from respiratory events such as pneumonia, unplanned intubation and prolonged mechanical ventilation. The risk of cardiac events in the peri-operative period are also increased in smokers, such as myocardial infarction, cerebrovascular

accidents and cardiac arrests, and they are at an increased risk of infections, including sepsis<sup>5</sup>.

The pre-operative period provides an excellent opportunity to engage with patients about their smoking and to encourage cessation, often referred to as a 'teachable moment'<sup>6,7</sup>. A Cochrane systematic review of eight trials concluded that smoking interventions are effective for changing smoking behaviours and might reduce post-operative morbidity<sup>8</sup>.

A smoking cessation program was developed for the pre-admission clinic (PAC) at Western Health (WH), a 4-hospital Australian metropolitan health service.

This was supported by a grant from the Department of Health (Victoria, Australia) as part of the initiative "Supporting patients to be smoke free: an ABCD approach in Victorian health services". The ABCD Approach to Smoking advocates:

- A – asking all patients about smoking
- B – performing a brief intervention
  - Advise all smokers to quit
  - Offering written information about quitting
  - Offering Nicotine Replacement Therapy (NRT)
  - Offering a referral to relevant support group e.g. Quitline.

- C, D – communication at discharge of smoking status to the patient’s local doctor

The pre-admission nursing staff at WH received training in smoking cessation and counselling provided by Quit Victoria as single group sessions and workshops.

All patients who attended the PAC at WH and were identified as smokers were offered this intervention.

The aim of this case series was to assess the impact of the smoking intervention model, which is standard of care, on the participants smoking habits over four time points.

## **Methods**

This single-centre case series was conducted at WH, Footscray Hospital in Melbourne, Victoria, Australia. The trial received approval from the WH Low Risk Human Research Ethics Panel (QA2014.81). Verbal consent was obtained from all participants on their day of surgery (DOS).

All patients older than 18 years presenting for elective surgery at the hospital between August and September 2014 had their electronic medical record (EMR)

reviewed. Smokers were identified via their completed Pre-Admission Health Questionnaire Form and we ensured that all participants had attended a face-to-face appointment at the PAC. All patients scheduled for major surgery or with identified significant co-morbidities attend a face-to-face PAC appointment at WH. A convenience sample of 50 consecutive smokers presenting for elective surgery that had attended PAC were selected for this study. Participants were excluded from the study if they had not attended a PAC appointment prior to surgery or they were deemed to have significant cognitive impairment.

The PAC nurses were blinded to the running of this study so as not to influence their usual practice. The interventions and advice according to the ABCD approach that was offered to each participant by the PAC nurses was also recorded. All participants received an intervention as per the ABCD approach. This would typically involve the nurses providing the smokers with brief (i.e., less than 15 minutes) advice about the advantages of quitting smoking in the peri-operative period, a copy of the "Smoking and Surgery" brochure designed by WH, up to two weeks supply of NRT and the offer of a free referral to Quitline. All participants were offered the same intervention package.

On the participant's DOS, a brief interview was conducted to ascertain information about their current smoking habits compared with the data

recorded at the time of PAC review. At 3 months and at 12 months post-operatively, a single researcher following a script to ascertain current smoking behaviours and reasons attributed to the change conducted a telephone interview. We defined current smokers as those who had smoked any cigarettes in the past 7 days. Where a participant gave a range of cigarettes smoked per day, the maximum number was selected as the number of cigarettes smoked per day. At 3 and 12 months post-operatively participants were asked if their current smoking behavior was attributable to the advice and supports they received at the PAC.

### **Statistical analysis**

Each participant was assessed at a maximum of four time points: PAC, DOS, 3 months after surgery and 12 months after surgery. First, we fitted univariable and multivariable logistic regression models to evaluate the association between age (per year), sex (male/female), and cancer surgery (no/yes) and whether or not the participant smoked (i.e. smokers vs. non-smokers) at 12 months after surgery.

Next, we were interested in the average change in the amount smoked after the PAC. This was done in a two-step process: first, we calculated the slope of each

individual's amount smoked from date of surgery to 12 months after surgery (i.e. 3 time points) versus time trajectory using simple linear regression to describe the change in the amount smoked over time for the individual (Figure 1); next, to determine whether there is a change in the amount smoked over time, we fitted a linear regression model and adjusted for amount smoked at the PAC.

All analyses were done using Stata version 13.1<sup>9</sup>.

## Results

From August to September 2014, we approached 51 potential participants and enrolled 50 participants into the study. We found a smoking prevalence of 15% of patients presenting for elective surgery. Table 1 shows the baseline characteristics of the participants; 32 (64%) were male, 35 (71%) did not have cancer surgery and the mean age at baseline was 56 (standard deviation = 16) years. One participant died between their DOS and 3 months post-operatively, and another participant refused to participate in the 12 month follow up interview, see Figure S1.

At 12 months post-surgery, complete data was available for 48 participants; 14 participants were non-smokers. From the multivariable model, age was not associated with whether or not the participant was a non-smoker (odds ratio

(OR) = 1.02; 95% confidence interval (CI) = 0.98, 1.06; p-value = 0.397). Females had a 1.5-fold higher odds of being a smoker at 12 months post surgery (OR = 1.51; 95% CI = 0.34, 6.65; p-value = 0.588), whereas participants undergoing cancer surgery had a 0.6-fold lower odds of being a smoker at 12 months post surgery (OR = 0.63; 95% CI = 0.13, 3.00; p-value = 0.567) (Table 2). Of those participants who were no longer smoking at 12 months post-operatively, there was no relationship between ongoing use of counselling services or NRT compared with those who were still smoking.

Figure 1 shows the number of cigarettes smoked for a random sub-sample of the participants at each of the time points. After adjusting for the amount smoked at the PAC, age, sex and whether or not the participant had cancer surgery, the mean change in the amount smoked for an individual was -0.43 (95% CI: -0.55, -0.31), p-value < 0.001.

Figure 2 demonstrates the reduction in the average number of cigarettes smoked per day by each participant at the 3 interview points. There was a 43% reduction in the average number of cigarettes smoked per person per day between their PAC appointment and 12 months post-operatively. Figure 3 shows the change in smoking behaviour in participants between their PAC appointment and up to 12 months post-operatively. At 12 months post-operatively, 29% (14) of

participants were abstinent and 42% (20) had reduced the number of cigarettes smoked per day compared with when they were first interviewed at PAC.

Figure 4 demonstrates the proportion of participants who attributed their cessation or reduction of cigarettes smoked to the interventions offered to them pre-operatively by WH.

### **Discussion:**

The results of this study demonstrate that a limited preoperative smoking cessation intervention leads to a reduction in smoking up to 12 months post-operatively. At 12 months post-operatively approximately a third of participants who had either reduced the number of cigarettes smoked or quit attributed their change in behavior to the interventions offered to them at the PAC at WH. This proportion was down from over half who attributed their reduction or cessation of smoking to the interventions offered by WH when asked at the 3 month interview.

This study further adds to the impression that the peri-operative period provides a teachable moment for smoking intervention with potential for long lasting impact. Clinicians who have interactions with patients in this period

should seize the opportunity to counsel and provide support to patients to encourage cessation of smoking as patients are more likely to quit if they are encouraged by a clinician<sup>10</sup>.

Previous concerns about a short period of cessation prior to surgery leading to increased post-operative complications have been discredited<sup>11-13</sup> and based on the current evidence, clinicians should encourage patients to quit at any time prior to surgery<sup>13</sup>. This advice is supported by the Australian and New Zealand College of Anaesthetists<sup>14</sup>.

The results seen in this study are similar to a single centre randomized controlled study by Lee et al<sup>15</sup> in Canada which demonstrated that 25% of participants in the intervention group were abstinent at 12 months, compared with 8% in the control group. This compared with the abstinence rate of 29% in our case series at 12 months. The *de novo* smoking cessation rate in the community is estimated to be 2% per annum<sup>16</sup>.

There has been a general trend towards reduction in smoking in Australia. In 2007, 17.5% of adult Australians reported smoking, compared with 13.3% in 2013<sup>17</sup>. There are many potential reasons for this including increasing costs from taxation levies, social pressures, health benefits, plain packaging, reduced advertising and introduction of laws banning smoking in public places.

There are several strengths to this study. We were able to obtain near complete data from consecutive smokers who attended the PAC over the study period. As well, we captured data not just from participants that quit smoking but also participants that reduced the number of cigarettes that they smoked, which is a reflection of real world outcomes. The relative ease of implementation of the interventions offered by non-specialists at the pre-admission clinic make the results broadly applicable to other hospitals and their patient populations.

The limitations to this study include the small sample size and the absence of a control group. Given WH was a pilot site for the Victorian Government's smoking intervention we were unable to withhold the intervention from some patients and can therefore not draw conclusions about causality of our intervention. The authors could have collected comparator data from another hospital network that had not implemented a preoperative smoking cessation intervention (i.e. a control group). However, WH has a unique patient population, characterised by relative social disadvantage<sup>18</sup> and it is unlikely that another hospital will reflect the patient demographics of WH and thus may not represent an accurate comparator.

There is the possibility that post-operative patients have an enforced cessation or reduction in smoking relating to their hospital stay, pain or reduced mobility.

This effect is unlikely to remain at 3 or 12 months post-operatively. At the 3 and 12 month interviews, no participant attributed their change in smoking behavior to either still being an inpatient or to ongoing post-surgical pain. Further, at the 12 month post operative interview, 30% of participants that had reduced or quit smoking reported that their reduction or cessation of smoking was due to the intervention offered by WH. Although this may be an over estimate due to the possibility of recall bias, this still represents a significant proportion.

We did not collect data on nicotine dependence from our participants and can not comment on whether this had an impact on those who quit or reduced their smoking. Nicotine dependence is now routinely collected via a Fagerstrom score for all patients at WH who are current smokers.

Similar to other studies looking at long term follow up of smoking cessation interventions, we relied on self-reported smoking behaviors. Self-report has been shown to have varying levels of accuracy depending on type of test and population being studied<sup>19</sup>, although work by Wong et al<sup>20</sup> found good correlation between urine cotinine levels and self-report. Where participants gave a range of cigarettes smoked per day we used the maximum number reported, which might make the data more accurate.

Our work adds to the growing body of literature that simple interventions pre-operatively can contribute to long-term changes in smoking behaviors.

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## References:

1. World Health Organization. *WHO Report on the Global Tobacco Epidemic*, 2013. World Health Organization; 2013.
2. Collins DJ, Lapsley HM. *The costs of tobacco, alcohol and illicit drug abuse to Australian society in 2004/05*. Commonwealth of Australia; 2008.
3. Begg S, Vos T, Barker B, Stevenson C, Stanley L, Lopez A. *The burden of disease and injury in Australia 2003*. 2007. Australian Institute of Health and Welfare; 2004.
4. Banks E, Joshy G, Weber MF, Liu B, Grenfell R, Egger S, et al. Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Med*. BioMed Central; 2015 Feb 24;13(1):38.
5. Turan A, Mascha EJ, Roberman D, Turner PL, You J, Kurz A, et al. Smoking and perioperative outcomes. *Anesthesiology*. The American Society of Anesthesiologists; 2011 Apr;114(4):837-46.
6. Shi Y, Warner DO. Surgery as a teachable moment for smoking cessation. *Anesthesiology*. The American Society of Anesthesiologists; 2010 Jan;112(1):102-7.

7. McBride CM, Emmons KM, Lipkus IM. Understanding the potential of teachable moments: the case of smoking cessation. *Health Educ Res.* 2003 Apr;18(2):156–70.
8. Thomsen T, Villebro N, Møller AM. Interventions for preoperative smoking cessation. *Cochrane Database Syst Rev.* 2014 Jan 1;1–35.
9. Stata Corporation. Stata statistical software. Release 13. College Station, Texas: Stata Corp LP; 2013.
10. Webb AR, Robertson N, Sparrow M. Smokers know little of their increased surgical risks and may quit on surgical advice. *ANZ Journal of Surgery.* 2013 Oct;83(10):753–7.
11. Shi Y, Warner DO. Brief Preoperative Smoking Abstinence. *Anesthesia & Analgesia.* 2011 Dec;113(6):1348–51.
12. Myers K, Hajek P, Hinds C, McRobbie H. Stopping Smoking Shortly Before Surgery and Postoperative Complications. *Arch Intern Med.* 2011 Jun 13;171(11).
13. Webb A. Smoking and surgery : time to clear the air. *Australian and New Zealand College of Anaesthetists;* 2012.
14. Australian and New Zealand College of Anaesthetists. Guidelines on Smoking as Related to the Perioperative Period.

<http://www.anzca.edu.au/documents/ps12-2013-guidelines-on-smoking-as-related-to-the.pdf>. 2014. Accessed October, 2016

15. Lee SM, Landry J, Jones PM, Buhrmann O, Morley-Forster P. Long-Term Quit Rates After a Perioperative Smoking Cessation Randomized Controlled Trial. *Anesthesia & Analgesia*. 2015 Mar;120(3):582–7.
16. Stead LF, Buitrago D, Preciado N, Sanchez G, Hartmann-Boyce J, Lancaster T. Physician advice for smoking cessation. *Cochrane Database Syst Rev*. 2013 May 31;(5):CD000165.
17. Australian Institute of Health and Welfare. *National Drug Strategy Household Survey detailed report 2013*. 28 ed. AIHW; 2014.
18. Report Population Health Data. HealthWest Catchment Brimbank, Hobsons Bay, Maribyrnong, Melton and Wyndham. [PDF on the Internet]. HealthWest Partnership, [updated 9 February 2015, cited 19 May 2017]. Available from: [http://healthwest.org.au/wp-content/uploads/2014/10/HealthWest\\_PopulationData\\_2015.pdf](http://healthwest.org.au/wp-content/uploads/2014/10/HealthWest_PopulationData_2015.pdf)
19. Gorber SC, Schofield-Hurwitz S, Hardt J, Levasseur G, Tremblay M. The accuracy of self-reported smoking: A systematic review of the relationship between self-reported and cotinine-assessed smoking status. *Nicotine & Tobacco Research*. 2009 Jan 27;11(1):12–24.

20. Wong J, Abrishami A, Yang Y, Zaki A, Friedman Z, Selby P, et al. A perioperative smoking cessation intervention with varenicline: a double-blind, randomized, placebo-controlled trial. *Anesthesiology*. 2012 Oct;117(4):755–64.

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## Figure Legends

Figure 1 Change in the number of cigarettes smoked over time by each participant for a subsample of participants

Abbreviations: PAC = pre-admission clinic, DOS = date of surgery,  
3mo = 3 month visit, 12mo = 12 month visit

Figure 2 The average number of cigarettes smoked per day by all participants at four intervention points

Figure 3 Smoking behaviours as compared with the Pre-Admission Clinic

Absolute numbers in brackets

Figure 4 Reasons for reduction or cessation of smoking

## List of Supporting Information

Figure S1 – CONSORT flow diagram

Table 1: Demographic data for the 50 participants enrolled in the study: August to September 2014

	<b>Number (%)</b>
Age (years)	56.4 [16.0]
Sex	
Male	32 (64.0)
Female	18 (36.0)
Cancer surgery	
No	36 (72.0)
Yes	14 (28.0)
Surgical unit	
Breast/Endocrine	4 (8.0)
Colorectal	7 (14.0)
ENT	7 (14.0)
Gastro	1 (2.0)
Neurosurgery	1 (2.0)
Orthopaedics	7 (14.0)
Thoracics	2 (4.0)
Upper GI	7 (14.0)
Urology	10 (20.0)
Vascular	4 (8.0)

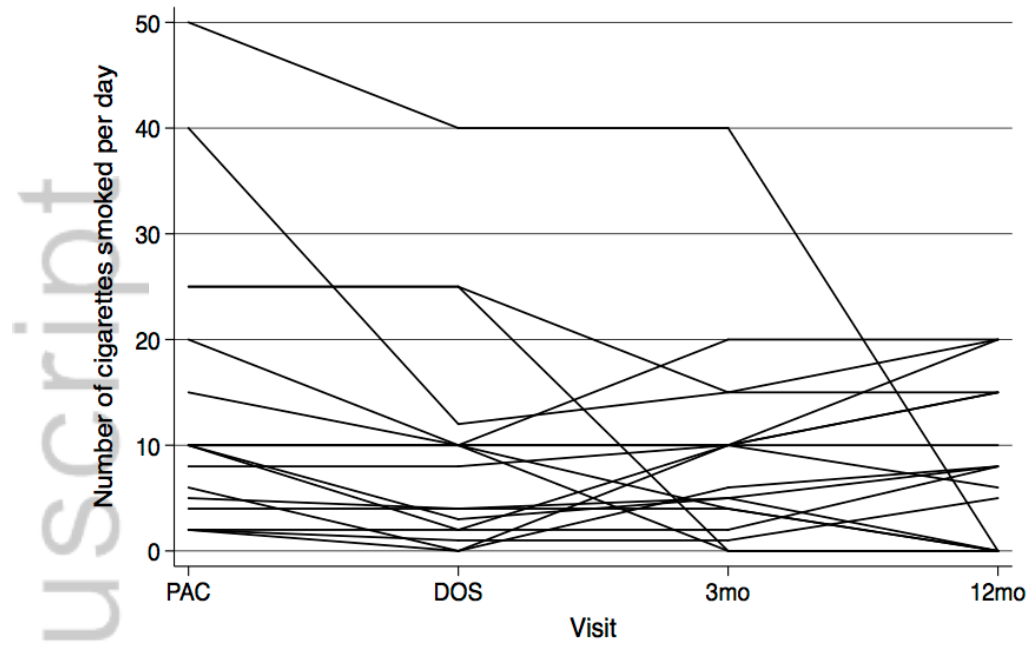
ENT= Ear, nose and throat ; GI = Gastrointestinal

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**Table 2: Results of logistic regression analysis comparing smokers to non-smokers at 12 months (n = 48)**

<b>Risk factor</b>	<b># of non-smokers</b>	<b># of smokers</b>	<b>Univariable model</b>		<b>Multivariable model<sup>b</sup></b>	
			<b>OR (95% CI)</b>	<b>p-value</b>	<b>OR (95% CI)</b>	<b>p-value</b>
<b>Age (years)</b>	14	34	1.01 (0.97, 1.05)	0.494	1.02 (0.98, 1.06)	0.397
<b>Sex</b>						
Male	10	20	Ref	-	Ref	-
Female	4	14	1.75 (0.46, 6.72)	0.415	1.51 (0.34, 6.65)	0.588
<b>Cancer surgery</b>						
No	9	25	Ref	-	Ref	-
Yes	5	9	0.65 (0.17, 2.46)	0.523	0.63 (0.13, 3.00)	0.567

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Figure 1 converted.tiff

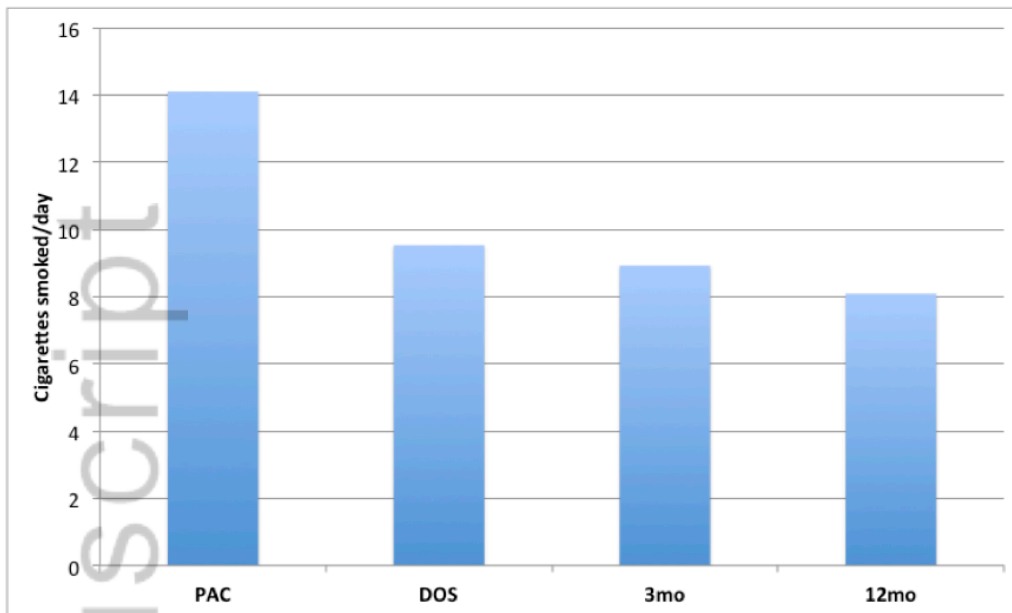


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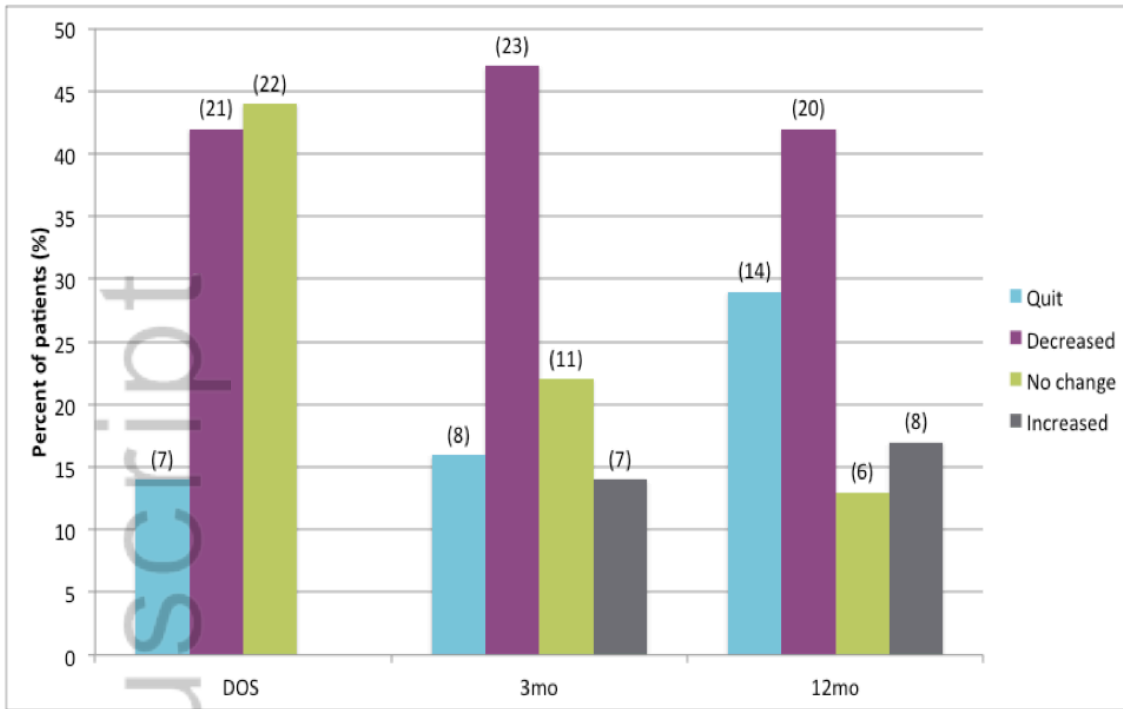
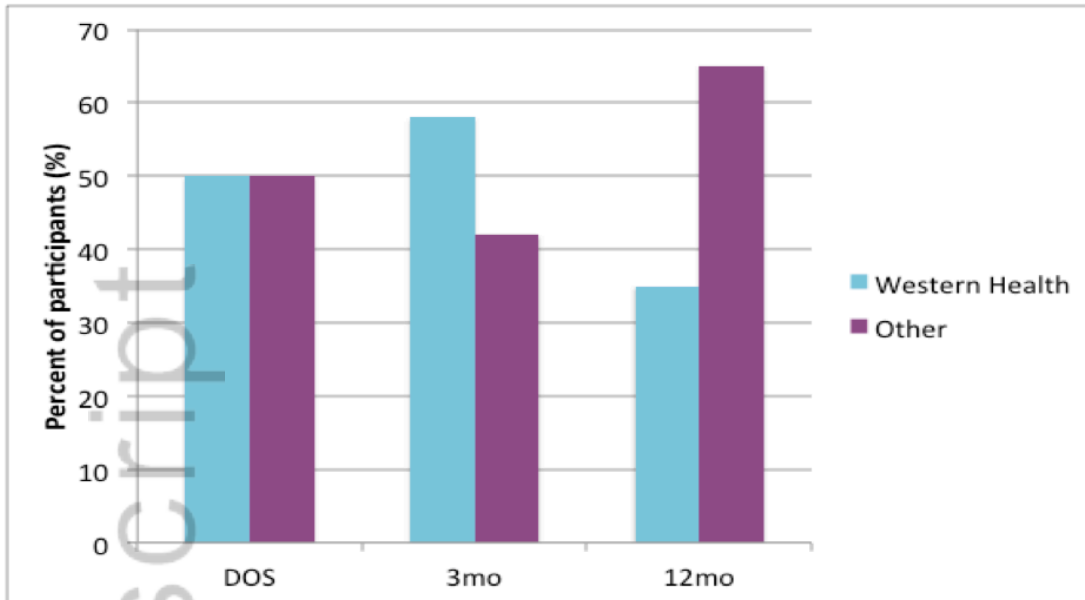


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