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Increasing preventive care by primary care nursing and allied health clinicians: A non-randomized, controlled trial.

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ABSTRACT

Background

Although primary care nurse and allied health clinician consultations represent key opportunities for the provision of preventive care, such care is provided sub-optimally.

Purpose

To assess the effectiveness of a practice change intervention in increasing primary care nursing and allied health clinician provision of preventive care for four health risks.

Design

A two group (intervention versus control), non-randomized controlled study assessed the effectiveness of the intervention in increasing clinician provision of preventive care.

Setting/Participants

Randomly selected clients from 17 primary health care facilities participated in telephone surveys that assessed their receipt of preventive care prior to (September 2009-2010: n = 876) and following intervention (October 2011-2012: n= 1113).

Intervention

The intervention involved: local leadership and consensus processes; modification of an electronic medical record system; educational meetings and outreach; provision of practice change resources and support; and performance monitoring and feedback.

Main outcome measures

The primary outcome was differential change in client reported receipt of three elements of preventive care (assessment, brief advice, referral/follow up) for each of four behavioral risks individually (smoking, inadequate fruit and vegetable consumption, alcohol overconsumption, physical inactivity), and combined. Logistic regression was used to determine intervention effectiveness.

Results

Analyses conducted in 2013 indicated significant improvements in preventive care delivery in the intervention compared to the control group from baseline to follow-up for: assessment of fruit and vegetable consumption (+23.8% vs -1.5%), physical activity (+11.1% vs -0.3%), and of all four risks combined (+16.9% vs -1.0%); and brief advice for inadequate fruit and vegetable consumption (+19.3% vs -2.0%), alcohol overconsumption (+14.5% vs -8.9%) and of all four risks combined (+14.3% vs +2.2%). The intervention was ineffective in increasing the provision of the remaining forms of preventive care.

Conclusions

The intervention impact on the provision of preventive care varied by both care element and type of risk. Further intervention is required to increase the consistent provision of preventive care, particularly referral/follow-up.

INTRODUCTION

The primary behavioural risks for the most common causes of mortality and morbidity in developed countries include smoking, poor nutrition, alcohol overconsumption and physical inactivity.¹⁻³ To reduce such risks, clinical guidelines support the routine, opportunistic delivery of preventive care by all primary health care clinicians to all clients; care that is recommended to involve at least three elements⁴⁻⁷(ask, advise and refer/follow-up)⁶ and to address multiple behavioural risks.⁴⁻⁶

Primary care nurses and allied health clinicians have a key role in reducing the burden of chronic disease as they have the capacity to provide preventive care to a large proportion of the population on multiple occasions and across a variety of settings.⁸⁻¹⁰ Despite this, variable and generally sub-optimal levels of care provision have been reported, particularly regarding referral/follow-up.¹¹⁻²⁰

Practice change theories,^{21;22} reviews of practice change interventions and clinical guidelines²³ suggest multi-strategic interventions are more likely than single strategy approaches to be effective in increasing clinician delivery of preventive care.²³⁻²⁹ Such a multi-strategic approach is suggested to be effective as it addresses the multiple barriers to clinician delivery of preventive care.^{30;31} The authors could locate only five controlled trials that have examined the effectiveness of multi-strategic interventions in increasing primary care nurses' or allied health professionals' provision of preventive care for any of the primary behavioural risks.³²⁻³⁶ The interventions included: educational meetings,^{32;33;35;36} provision of patient resources,^{32;35;36} audit and feedback,^{34;36} patient mediated intervention;^{33;34} educational outreach visits and academic detailing,^{33;34} ongoing support,^{33;34} distribution of educational materials,³² local consensus

processes;³⁴ and reminders.³⁶ All trials focused on single rather than multiple risks,³²⁻³⁶ most frequently smoking,^{32;34-36} and the majority did not focus across the spectrum of care (assessment, brief advice, and referral/follow-up).³³⁻³⁵ Four of the studies reported a significant increase in at least one element of preventive care,³²⁻³⁵ including assessment,³²⁻³⁴ brief advice,^{32;33} and referral/follow-up.^{32;35}

Objective

To assess the effectiveness of a multi-strategic intervention in increasing the provision by primary care nurses and allied health professionals of three elements of preventive care for four behavioural health risks individually, and for all risks combined.

METHOD

Study design

A two group, non-randomized controlled study was undertaken as part of a larger trial.³⁷ Cross-sectional outcome measurement occurred over 12 months prior to a 12 month intervention (baseline: September 2009-2010) and for 12 months following the intervention (follow-up: October 2011-2012).

Setting

The study was undertaken within a network of public community health facilities in one Health District in New South Wales (NSW), Australia. The study was approved by the Hunter New England Area (approval No. 09/06/17/4.03) and the University of Newcastle Human Research Ethics Committees (approval No. H-2010-1116).

Sample, recruitment and allocation to groups

Community health facilities

The study was conducted in 17 (of 56) community health facilities, selected and allocated (unblinded) on a convenience basis to either the intervention (n=5) or the control group (n=12). The intervention facilities were located in an administratively and geographically separate area from the control facilities. Clinicians and managers, but not clients, were aware of facility allocation to groups.

Clinicians

The community health facilities employed approximately 570 nurses and allied health professionals (90 within intervention, and 481 in control facilities). The services provided by the facilities included: community nursing, child and family health nursing, diabetes services, aged care, and specific services provided by psychologists, social workers, occupational therapists, physiotherapists, and dieticians.

Clients

Adult clients with at least one face to face clinical contact with a service within the prior two weeks and who had not previously been selected were eligible to participate. For both groups of facilities, a sample of approximately 20 clients was randomly selected from electronic medical records each week during the 12 month baseline and follow-up periods. Selected clients were mailed an information letter and contacted by telephone to further determine eligibility, including if they: spoke English; were mentally and physically capable of completing the interview (determined at or prior to the interview); and were not involved in another community health care focused study.

Intervention

Preventive care

A Health District policy required: the routine assessment of all clients regarding their smoking, fruit and vegetable consumption, alcohol use, and physical activity status; and for clients identified as being ‘at risk’, the provision of brief advice and referral/follow up. Referral/follow up options included: free specialist telephone-based risk reduction services³⁸⁻⁴³ NSW Quitline (www.icanquit.com.au/further-resources/quitline) and the NSW ‘Get Healthy Information and Coaching’ service (www.gethealthynsw.com.au); General Practitioners (GP; these are analogous to Family Physicians in the US); Drug and Alcohol services; and local referral options (e.g. dieticians).

Clinical practice change intervention

The following intervention strategies were implemented to all community health facilities, including all clinicians and managers. The choice of the following strategies is informed by extensive practice change research and reviews of the clinical practice change literature.^{21;29;37;44-}

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Local leadership and consensus processes

Oversight of the intervention was via a Preventive Care Taskforce involving clinicians and Health District executives. Facility managers facilitated training and provided performance feedback. A performance indicator was incorporated in the operational plans of the intervention group services.

Enabling clinical and management organisational systems

An electronic medical record used by all services was modified to: prompt, facilitate and record preventive care delivery; produce tailored client and GP /Aboriginal Medical Service provider (AMS) information letters based on the preventive care provided; and generate automated preventive care delivery performance reports for managers. A hard copy form for manually recording the delivery of preventive care was provided for use by clinicians in home visits.

Performance monitoring and feedback

Monthly performance reports regarding preventive care delivery, and including benchmark comparisons were provided to, and discussed with facility managers.

Manager and clinician educational meetings

Face to face training was provided to all intervention group managers (two, 1 hour sessions). In addition, all existing and new clinicians were provided online competency based training in preventive care delivery and recording (approximately 2 hours).

Educational outreach

Practice change support officers were allocated to each intervention facility to support clinicians and managers through monthly face to face visits and fortnightly telephone support in order to facilitate delivery of preventive care. The content of the visits/calls included both structured and reactive support tailored to need.

Clinician practice change resources

Managers and clinicians were provided with: an email helpline, a training and resource website, clinician resource pack, referral resources (e.g. contact information, list of local referral options), six newsletters, 11 tip sheets, and a workstation reminder to prompt care delivery.

Community promotion

Two promotional GP newsletter articles and three newspaper articles were published, and a poster and brochure for Aboriginal clients were provided to health facilities.

Control group

While the Preventive Care Policy, Taskforce, modification to the electronic medical record, and the website were implemented on a district-wide basis, these strategies were not promoted to control group facilities (whose clients received usual preventive care).

Data collection procedures

Outcome data and client characteristics were obtained via client computer-assisted telephone interviews (CATI) conducted by trained interviewers blind to client group allocation (approximately 25 minutes). If a client had poor English they were informed that they could have someone else translate their answers. Other client and service characteristics were obtained from the clients' electronic medical record.

Measures

Client and service characteristics:

Information collected by the CATI included: employment status; Aboriginal or Torres Strait Islander status; marital status; highest level of education; and number of conditions for which

client needed to take medication/receive medical attention. Information obtained from the client's electronic medical record included: age, gender, postcode, service attended and number of visits to the service in the prior 12 months.

Risk status:

Clients were asked to describe their health risk behaviours via validated or recommended risk identification survey items.⁵⁴⁻⁵⁷ Clients were asked to indicate, in the month before seeing the service: their frequency of smoking tobacco products;⁵⁴ the number of serves of fruit, and of vegetables typically eaten per day;⁵⁵ how often they had a drink containing alcohol, the number of standard drinks they had on a typical drinking day, and how often they had four or more standard drinks on any one occasion;⁵⁶ and how many days a week they usually undertook 30 minutes or more of physical activity.⁵⁷ Based on national guidelines,⁵⁸⁻⁶¹ clients were considered 'at risk' if they reported they: smoked any tobacco products;⁵⁸ ate less than two serves of fruit or five serves of vegetables per day;⁶¹ drank more than two standard alcoholic drinks on a typical drinking day or four or more standard drinks on any one occasion;⁵⁹ or engaged in less than 30 minutes of physical activity on at least five days of the week.⁶⁰

Preventive care delivery

Items used to assess the delivery of three preventive care elements were based on recommended assessment tools,^{62:63} guidelines,^{62:64} or items used in previous surveys.⁶⁵⁻⁶⁷ During the CATI clients were asked if the particular community health service they saw provided each element of preventive care. For example, 'when you saw the foot care clinic, did the clinician ask if you smoked any tobacco products?'

Assessment

Clients were asked if during any appointment with the service, the clinician asked: if they smoked any tobacco products; how much fruit and how many vegetables they ate; how much alcohol they drank; and how much physical activity they participated in (yes, no, don't know).

Brief advice

For each of their risks, clients were asked whether the clinician advised them: to quit smoking or consider using nicotine replacement therapy; to eat more fruit and/or more vegetables; to reduce the amount of alcohol they consume; or to do more physical activity (yes, no, don't know).

Referral/follow-up care

For each of their risks, clients were asked whether they had received the following forms of referral/follow-up (yes, no, don't know):

- Offered a referral to telephone-based risk reduction services for smoking, inadequate fruit and/or vegetable consumption and physical inactivity.
- Received advice to use support from their GP/AMS.
- Received advice to use support from another professional/support group (including: pharmacist, dietician, drug and alcohol counsellor, physiotherapist, community exercise group etc.).

Clients with at least one risk were asked whether the service offered to send a summary of their health risks to their GP/AMS (yes, no, don't know).

Process measures

The implementation of the clinical practice change strategies was monitored using project management logs.

Statistical analysis

Analysis was undertaken using SAS (version 9.2) in 2013. Postcodes were used to calculate disadvantage⁶⁸ and remoteness.⁶⁹ Comparison of the characteristics of participants and non-participants was undertaken using chi-square analyses ($p < .01$). All participant descriptors were examined for differential change in prevalence between the intervention and control groups across time, using chi-square analyses (Table 1).

Calculation of care provision variables for ‘all risks combined’ for assessment, brief advice and referral/follow-up options was undertaken by combining responses for each outcome for each individual risk. Care provision for ‘all risks combined’ was defined as assessment for all four risks, and the provision of brief advice for all a client’s risks. Regarding referral/follow-up, care provision for all of a client’s risks was defined as: an offer to send a health risk summary to the clients GP/AMS; or for each individual risk, either an offer of referral to the telephone helplines, advice to use support from their GP/AMS, or advice to use support from another professional/support group.

To examine change in care delivery from baseline to follow-up in intervention compared to control groups, a logistic regression model utilizing a group by time interaction term and adjusted by age, gender and number of visits to the service in the prior 12 months⁷⁰ was developed for each of the three preventive care elements for each individual risk and all risks combined (26

models; Table 2). Change in care delivery was determined to be significantly different between groups if the p-value for the group by time interaction term was < 0.01 in the regression model. A significance level of $\alpha=0.01$ was used to adjust for multiple testing.⁷¹

RESULTS

Sample

The sample size for intervention and control groups for baseline and follow-up ranged from $n=427$ to $n=610$, and consent rates ranged from 70% to 77% (Table 1). Compared to participants, eligible non-participants ($N= 704$) were less likely to be from major cities ($p=0.02$), and more likely to be under 40 years old ($p<0.001$), and disadvantaged ($p=0.03$). Only number of visits to the service differentially changed between intervention and control groups across time (Table 1).

Add Table 1 about here

Intervention implementation

Due to logistic difficulties, the audit and feedback strategies were not available until the fourth month of intervention. The mean number of support officer visits per facility was 7 (range: 3-11), and the mean number of calls per facility was approximately 12 (range: 4-20).

Preventive care delivery

Assessment

From baseline to follow-up in the intervention group, there was a greater increase in clients reporting clinician assessment of fruit and vegetable consumption (+23.8%), physical activity

(+11.1%), and of all four risks (+16.9%), compared to the control group (-1.5%, -0.3% and -1.0% respectively) (Table 2).

Brief advice

There were significant increases from baseline to follow-up in the intervention compared to the control group for provision of brief advice for inadequate fruit and vegetable consumption (+19.3%), alcohol overconsumption (+14.5%) and of all four risks (+14.3%), compared to the control group (-2.0%, -8.9% and +2.2% respectively) (Table 2).

Referral/follow-up

There was no significantly differential change for any of the referral measures (Table 2).

Add Table 2 about here

DISCUSSION

This is the first controlled intervention trial designed to increase the provision of multi-risk factor preventive care among primary care nursing and allied health clinicians. The intervention impact on the provision of preventive care varied by both care element and type of risk. The intervention was ineffective in increasing the provision of referral or smoking cessation care. Such findings suggest further research is required regarding effective practice change intervention strategies to address the provision of preventive care, and for referral in particular.

Intervention effect on assessment and brief advice for single risks

The current study found an effect size of 11-25% for provision of assessment and/or brief advice for inadequate fruit and vegetable consumption, physical inactivity and alcohol overconsumption. The observed increase was larger than that found in previous trials of interventions to increase primary care nurses' or allied health professionals' provision of preventive care for any of the four behavioural risks.³²⁻³⁶ It is also larger than that reported in Cochrane reviews of practice change interventions in primary care settings generally, which included a component study addressing any of the four behavioural risks.⁴⁸⁻⁵³ The greater effect sizes found in the current study compared to previous trials is likely attributable to the greater number of intervention strategies utilized, with such an approach potentially targeting a range of different barriers in the system.⁷² Additionally, specific intervention strategies such as clinician educational meetings, community promotion, and leadership support were designed to address some of the barriers to preventive care delivery previously documented by similar clinicians (e.g. negative clinician attitudes and beliefs regarding: self-efficacy, access to support mechanisms, perceived intervention effectiveness, congruence with their role and service delivery, and perceived client receptiveness/acceptability).^{30;73}

Intervention effect on assessment and brief advice for all risks

A novel finding that has not been examined in past trials, is the effectiveness of the intervention in increasing the preventive care provision by nurses and allied health professionals for multiple risks. The results suggest that multi-risk preventive care is feasible, in part. Such a finding is important as evidence suggests multiple-behavior interventions have a greater impact on public health than single-behaviour interventions^{1;74} (with equivocal evidence surrounding the

comparative efficacy of the simultaneous versus sequential delivery of multiple behavior interventions).^{75;76}

Lack of intervention effect on referral/follow-up

Despite the positive outcomes for assessment and brief advice, the intervention was not effective in increasing referral/follow-up for any of the four risks. Referral however, is a crucial element of preventive care as it is suggested to be the most critical for long term behavior change.⁶ Although no previous studies have examined the effect of an intervention increasing referral for alcohol, fruit and vegetable consumption or physical activity, a number of studies have demonstrated a significant increase in primary care clinician referral to telephone-based assistance for smoking.⁷⁷⁻⁷⁹ Typically such studies utilized a multi-strategic approach and incorporated strategies similar to those used in the current study. However unlike the current study, such strategies were specifically focused on enhancing referral for one risk, rather than on the provision of all three elements of preventive care across multiple risks. Therefore, although a systems change strategy was incorporated in the current study, it may not have provided sufficient systems support, such as electronic or other referral mechanisms to increase referrals.⁷⁸ Potential solutions to improve referral in future interventions could include the implementation of such mechanisms;⁸⁰ as well as improved links and pathways for referral generally;⁸⁰ and increasing clinician knowledge and training regarding the effectiveness of providing referral,⁶ and of the telephone helplines.³⁸⁻⁴¹

Lack of intervention effect for smoking cessation care

Despite the positive assessment and/or brief advice outcomes for inadequate fruit and vegetable consumption, physical inactivity and alcohol overconsumption, the intervention did not

significantly increase any element of smoking cessation care. Higher baseline levels of smoking assessment and brief advice were found compared to the other risks, potentially as a consequence of the more well-established smoking cessation care guidelines,⁸¹ which may have resulted in a ceiling effect. However, the prevalence of smoking cessation care found at follow-up remained less than optimal, particularly for referral/follow-up (70% were not provided any form of referral to ongoing care). Despite high acceptability of smoking cessation care,⁸² the low levels of referral and lack of intervention effect suggest enhancement to the current systems approach is required.²³

Limitations

The study findings should be considered in light of a number of its characteristics. First, the allocation of intervention and control groups was not randomized, hence the ability to estimate probabilities of differences due to potential confounding factors may be compromised.⁸³ However the concept of randomization for community intervention studies is frequently unacceptable for pragmatic trials within health services.⁸³ To reduce the influence of potential confounding factors on the results, the logistic regression analyses were adjusted by the variable that significantly differed between groups across time (number of visits to the service). The generalizability of the findings may be limited due to the study being conducted in a single health district. However, this limitation is mitigated by the study involving a diverse range and number of geographically and administratively separate facilities, clinicians and clients. Thirdly, not all intervention components were implemented as intended, a finding that may have contributed to both the variable intervention effect and the lack of effect for referral/follow up. When working in 'real world' clinical settings, achieving improved implementation fidelity will require a greater commitment from the administrators, manager and staff involved in the research. Such a commitment will need to be negotiated during the planning phase of the research. Finally, while

the use of client self-report has been reported to overestimate care provision,⁸⁴⁻⁸⁶ this may re-enforce the low levels of preventive care delivery reported.

Conclusions

The intervention impact on the provision of preventive care varied by both care element and type of risk. Further intervention is required to increase the consistent provision of preventive care, particularly referral/follow-up.

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Table 1. Client and Community Health Service Descriptors by Time and Group N (%)

Descriptor	Intervention group (N=930)		Control group (N=1059)		p-value
	Baseline N=427 (71% consent)	Follow-up N=503 (70% consent)	Baseline N=449 (77% consent)	Follow-up N=610 (77% consent)	
Service Type					0.02
Aged Care	4 (0.9)	8 (1.6)	21 (4.73)	30 (4.9)	
Allied health	82 (19.2)	85 (16.9)	131 (29.2)	154 (25.3)	
Community Child and Family Health ^a	62 (14.5)	97 (19.3)	74 (16.5)	183 (30.0)	
Community Nursing and other nursing services	158 (37.0)	142 (28.2)	131 (29.2)	161 (26.4)	
Diabetes	50 (11.7)	65 (12.9)	38 (8.5)	34 (5.6)	
Other ^b	71 (16.6)	106 (21.1)	54 (12.0)	48 (7.9)	
Gender					0.87
Female	280 (65.6)	351 (69.8)	294 (65.5)	421 (69.0)	
Age					0.34
<40	103 (24.1)	166 (33.0)	120 (26.7)	219 (35.9)	
40-49	36 (8.4)	44 (8.8)	27 (6.0)	43 (7.1)	
50-59	65 (15.2)	48 (9.5)	49 (10.9)	63 (10.3)	
60+	223 (52.2)	245 (48.7)	253 (56.4)	285 (46.7)	
SEIFA index ^c of disadvantage					0.31
Lower	413 (96.7)	476 (94.8)	223 (49.7)	286 (46.9)	
Higher	14 (3.3)	26 (5.2)	226 (50.3)	324 (53.1)	
Client Remoteness (ARIA) ^d					0.75
Major cities	3 (0.7)	2 (0.4)	310 (69.0)	384 (63.0)	
Regional/Remote towns	424 (99.3)	500 (99.6)	139 (31.0)	226 (37.1)	
Number of visits to service in prior 12 months ^e					<0.01*
1	142 (33.3)	175 (34.8)	110 (24.5)	134 (22.0)	
2-4	123 (28.8)	187 (37.2)	101 (22.5)	155 (25.4)	
5-10	62 (14.5)	86 (17.16)	122 (27.2)	159 (26.1)	
11+	100 (23.4)	55 (10.9)	116 (25.8)	162 (26.6)	
Aboriginal and Torres Strait Islander					0.59

Yes	21 (4.9)	37 (7.4)	14 (3.1)	23 (3.8)	
Marital Status					0.72
Living with partner	249 (58.5)	324 (64.7)	254 (56.6)	393 (64.4)	
Education					0.30
Some high school or less	116 (27.2)	108 (21.5)	107 (23.9)	117 (19.2)	
Completed high school	227 (53.3)	238 (47.4)	195 (43.5)	260 (42.6)	
Technical certificate or diploma	50 (11.7)	107 (21.3)	80 (17.9)	135 (22.1)	
University or college degree, or higher	33 (7.8)	49 (9.8)	66 (14.7)	98 (16.1)	
Employment					0.04
Employed	101 (23.7)	142 (28.2)	88 (19.6)	128 (21.0)	
Not working	63 (14.8)	39 (7.8)	52 (11.6)	76 (12.5)	
Retired	191 (44.7)	208 (41.4)	230 (51.2)	253 (41.5)	
Other (e.g. student, home duties)	72 (16.9)	114 (22.7)	79 (17.6)	153 (25.1)	
Number of conditions in the prior two months for which client needed to take medication or receive medical attention					0.79
0	67 (19.7)	113 (22.5)	66 (18.4)	148 (24.3)	
1	126 (37.1)	113 (22.5)	113 (31.6)	110 (18.0)	
2	59 (17.4)	73 (14.5)	75 (21.0)	83 (13.6)	
3	42 (12.4)	63 (12.5)	49 (13.7)	74 (12.1)	
4 or more	46 (13.5)	141 (28.0)	55 (15.4)	195 (32.0)	
Prevalence of risks					
Smoking	64 (15.0)	73 (14.5)	66 (14.7)	72 (11.8)	0.41
Inadequate fruit and vegetable consumption	350 (82.2)	363 (72.2)	363 (81.0)	448 (73.4)	0.53
Alcohol overconsumption	101 (23.7)	108 (21.5)	104 (23.2)	111 (18.2)	0.42
Physical inactivity	121 (28.3)	130 (25.8)	140 (23.2)	200 (32.8)	0.32
Number of risks					0.79
0	41 (9.6)	80 (15.9)	54 (12.1)	95 (15.6)	
1	194 (45.5)	222 (44.1)	187 (41.7)	270 (44.3)	
2	137 (32.2)	157 (31.2)	143 (31.9)	181 (29.79)	
3	48 (11.3)	38 (7.6)	56 (12.5)	57 (9.3)	
4	6 (1.4)	6 (1.2)	8 (1.8)	7 (1.2)	

^aClients over 18 years of age (e.g. the parent of the child seeing the service)

^bOther service types include: rehabilitation , chronic and complex care, women's services, migrant services, renal/dialysis, and regional health service programs.

^c2006 index of relative socio-economic advantage/disadvantage. This index is a continuum of advantage (high values) and disadvantage (low values) derived from the 2006 census. ‘Lower’ refers to the lower NSW half [≤ 991], while ‘Higher’ refers to the higher NSW half [> 991]. This was calculated using clients’ postcodes.⁶⁸

^dAccess/Remoteness Index of Australia (ARIA). ARIA is a geographical approach to defining remoteness.⁶⁹ This was calculated using clients’ postcodes.

^eCategories based on quartiles.

*Significantly differential change ($p \leq .01$) between the intervention and control groups across time.

Table 2. Preventive Care Delivery to Clients from Intervention and Control Groups at Baseline and Follow-up N (%)

Outcome	Intervention (N=930)		Control (N=1059)		Interaction
	Baseline	Follow-up	Baseline	Follow-up	p-value ^a
ASSESSMENT					
Smoking	273 (63.9)	361 (71.8)	294 (65.5)	403 (66.1)	0.05
Fruit and vegetable consumption	137 (32.1)	281 (55.9)	132 (29.4)	170 (27.9)	<0.01*
Alcohol consumption	232 (54.3)	338 (67.2)	244 (54.3)	348 (57.0)	0.02
Physical activity	198 (46.4)	289 (57.5)	197 (43.9)	266 (43.6)	0.01*
All risks combined	97 (22.7)	199 (39.6)	83 (18.5)	107 (17.5)	<0.01*
BRIEF ADVICE (FOR 'AT RISK' CLIENTS)					
Smoking (to quit or about NRT)	47 (73.4)	51 (69.9)	39 (59.1)	53 (73.6)	0.24
Inadequate fruit and vegetable consumption	84 (24.0)	157 (43.3)	81 (22.3)	91 (20.3)	<0.01*
Alcohol overconsumption	19 (18.8)	36 (33.3)	42 (40.4)	35 (31.5)	0.01*
Physical inactivity	47 (38.8)	61 (46.9)	53 (37.9)	75 (37.5)	0.33
All applicable risks combined	77 (20.0)	145 (34.3)	67 (17.0)	99 (19.2)	0.01*
REFERRAL/FOLLOW-UP (FOR 'AT RISK' CLIENTS)					
Offered to have referral arranged^b					
Smoking (to Quitline) ^c	3 (4.7)	7 (9.6)	3 (4.5)	7 (9.7)	0.96
Inadequate fruit and vegetable consumption (to Get Healthy) ^c	3 (0.9)	13 (3.6)	2 (0.6)	7 (1.6)	0.59
Physical inactivity (to Get Healthy) ^d	1 (0.8)	5 (3.8)	2 (1.4)	7 (3.5)	1.00
Offered to have referral arranged for all relevant risks combined ^c	3 (0.8)	11 (2.7)	2 (0.5)	9 (1.8)	0.89
Advised to use support from general practice/Aboriginal medical service^d					
Smoking ^c	3 (4.7)	16 (21.9)	6 (9.1)	7 (9.7)	0.12
Inadequate fruit and vegetable consumption	1 (0.3)	3 (0.8)	2 (0.6)	1 (0.2)	0.48
Alcohol overconsumption	0 (0.0)	5 (4.6)	2 (1.9)	1 (0.9)	0.12
Physical inactivity	0 (0.0)	1 (0.8)	2 (1.4)	0 (0.0)	0.25
All applicable risks combined	1 (0.3)	4 (0.9)	2 (0.5)	0 (0.0)	0.14
Advised to use support from another professional or support group^e					
Smoking ^d	2 (3.1)	2 (2.7)	3 (4.5)	2 (2.8)	1.00
Inadequate fruit and vegetable consumption ^c	33 (9.4)	48 (13.2)	30 (8.3)	53 (11.8)	0.78
Alcohol overconsumption ^c	3 (3.0)	7 (6.5)	3 (2.9)	5 (4.5)	0.71

Physical inactivity ^c	3 (3.0)	7 (6.5)	13 (9.3)	29 (14.5)	0.73
All applicable risks combined ^c	14 (3.6)	25 (5.9)	19 (4.8)	41 (8.0)	1.00
Offered to send a summary of their health risk behaviours to their GP/AMS	73 (19.0)	97 (22.9)	68 (17.3)	86 (16.7)	0.19
Offered to send a summary to GP/AMS or referral/follow-up for all risks (offered telephone lines or advised GP/AMS or other professional/support group^e)	88 (22.9)	122 (28.8)	87 (22.1)	117 (22.7)	0.16

^a P values adjusted by age, gender, and number of visits to service in prior 12 months.

^b No equivalent for alcohol overconsumption.

^c Exact logistic regression could not be used due to 'insufficient memory' of computing resources.

^d Exact logistic regression were used due to small numbers.

^e Other professional or support group included: smoking: pharmacist or support group; inadequate fruit and vegetable consumption: dietician or support group; alcohol overconsumption: drug and alcohol counsellor, detox clinic, phone-based support, or support group (e.g. alcoholics anonymous); physical inactivity: physiotherapist, or community exercise group.

*Significant results $p \leq 0.01$