



## Patient Education

# Clinician assessment, advice and referral for multiple health risk behaviors: Prevalence and predictors of delivery by primary health care nurses and allied health professionals



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## ABSTRACT

**Objective:** Primary care clinicians have considerable potential to provide preventive care. This study describes their preventive care delivery.

**Methods:** A survey of 384 community health nurses and allied health clinicians from in New South Wales, Australia was undertaken (2010–11) to examine the assessment of client risk, provision of brief advice and referral/follow-up regarding smoking inadequate fruit and vegetable consumption, alcohol misuse, and physical inactivity; the existence of preventive care support strategies; and the association between supports and preventive care provision.

**Results:** Preventive care to 80% or more clients was least often provided for referral/follow-up (24.7–45.6% of clinicians for individual risks, and 24.2% for all risks) and most often for assessment (34.4–69.3% of clinicians for individual risks, and 24.4% for all risks). Approximately 75% reported having 9 or fewer of 17 supports. Provision of care was associated with: availability of a paper screening tool; training; GP referral letter; and number of supports.

**Conclusion:** The delivery of preventive care was limited, and varied according to type of care and risk. Supports were variably associated with elements of preventive care.

**Practice implications:** Further research is required to increase routine preventive care delivery and the availability of supports.

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## 1. Introduction

In developed countries, tobacco smoking, poor nutrition, risky alcohol use and physical inactivity constitute the primary

behavioral risks for the most common causes of mortality and morbidity [1–3]. In such countries, the majority of adults have at least one chronic disease risk [4–6], and a substantial proportion have three or more [4,6,7]. Routine, opportunistic delivery of preventive care by primary health care service providers to all clients is recommended to reduce this disease burden [8–11] with systematic review evidence supporting the efficacy of such care [12–16]. It has been recommended that such care be provided for multiple risks [8–10], and given the competing priorities and brevity of a clinical consultation, that its essential elements include: risk assessment, brief advice and referral/follow-up [10,11,17].

Primary health care clinicians are potentially key providers of preventive care [18–31] as they have a focus on chronic disease prevention [20,22] and deliver care on multiple occasions to population groups with a high prevalence of behavioral health risks [20–22,32]. The multi-disciplinary nature of the primary care

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workforce in many countries offers further potential for the delivery of preventive care [26,33–37]. This workforce can include a variety of health care professionals such as nurses, physiotherapists, dietitians, occupational therapists, and other allied health professionals [26,22,36–38].

Despite the potential of primary health care services to provide preventive care, studies of the prevalence of its delivery have reported less than optimal levels of delivery for a range of risk factors [39–42]. Similarly, research regarding the prevalence of such care provided by primary care nurses and allied health clinicians suggests variable and often sub-optimal levels of care delivery [32,37,43–60], particularly regarding referral or follow-up [49,53,55], with care delivery varying by type of preventive care, health risk behavior [32,37,44–49,53,55,56,58–61], service type and other service characteristics including location and consultation type [32,55,61–63], client's presenting condition [32] and health care provider characteristics such as education level/knowledge, length of employment and age [49,62]. However, existing studies have focused primarily on the delivery of preventive care for single behavioral risks (predominantly smoking) [43–46,48,49,51–55,57,59], and on single elements of preventive care, predominantly risk assessment [32,45,46,48,49,53,55,57–60] and/or brief advice [37,43,45–56,58–60], with no single study describing the prevalence of each of the recommended multiple elements of preventive care for the four behavioral risks (smoking, poor nutrition, risky alcohol use and physical inactivity) individually or combined. The prevalence of care provision by primary care nurses and other allied health clinicians for each of the recommended elements of preventive care for multiple health risk behaviors is unknown.

Systematic reviews and intervention trial evidence have reported that the availability of practice support strategies (strategies that support best practice care delivery) in the clinical practice setting is important for the uptake of recommended forms of clinical practice by health providers generally [64] and for the provision of preventive care by primary health care providers specifically [34,45,48,59,65–67]. Strategies suggested by such studies to be effective in facilitating practice change include: printed educational materials, educational meetings, local opinion leaders, audit and feedback, and reminders [64]. Intervention research involving nurses and other allied health clinicians within the primary care setting also suggests that multi-strategic interventions using combinations of such strategies can improve preventive care [48,59,66–68]. However, all studies were related to the provision of preventive care for a single behavioral risk, mostly smoking [45,48,66–68].

No studies have reported the prevalence of practice support strategies other than training for nurses and allied health clinicians in the primary healthcare setting [43,46,50,53–55,63]. These studies suggest the availability of such training is limited (range: 4–60%) [43,46,50,53–55,63]. Furthermore, no studies examined the association between the availability of multiple practice support strategies and the provision of multiple elements of preventive care for all four behavioral risks.

Given the limitations of past research regarding the delivery of preventive care by primary care nurses and other allied health clinicians, a study was undertaken to assess: (a) the prevalence of recommended elements of preventive care (assessment, brief advice, and referral/follow-up) provided by primary care nurses and other allied health clinicians to address smoking, inadequate fruit and vegetable consumption, risky alcohol use, physical inactivity, and all four risks combined; (b) the prevalence of practice support strategies for the delivery of such care; and (c) the association between the availability of practice supports and the delivery of such preventive care.

## 2. Methods

### 2.1. Design and setting

A cross sectional survey of primary health care nursing and allied health clinicians across a network of public community health facilities in one health district of New South Wales (NSW), Australia was undertaken between May 2010 and January 2011. In Australia, public community health services [35], are the second largest provider of health care to the general population after general practitioners [20,69]. The district includes 56 community health facilities and serves a population of approximately 840,000 people in metropolitan, regional, rural and remote locations. Nurses encompassed registered nurses and other nurses; allied health clinicians encompassed: psychologists/psychiatrists/counselors, social workers, occupational therapists, physiotherapists, dietitians/nutritionists, among others.

Public community health services in NSW have a focus on improving and maintaining health and wellbeing of individuals, families and local communities [20]. All facilities were subject to a district wide policy regarding the delivery of preventive care that required: the routine assessment of all clients regarding their status for four behavioral health risks (smoking, inadequate fruit and vegetable consumption, risky alcohol use, and physical inactivity); and the provision of brief advice and referral/follow up for clients identified as being at risk.

The data were obtained as the baseline survey of an intervention trial [70], and 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).

### 2.2. Participants and recruitment

All 56 community health facilities in the district were eligible to participate. The facilities were staffed by nurses and allied health clinicians. Clinicians were employed at the following services: community nursing, allied health, community child and family health, diabetes services, and aged care services (approximately 1300). Clinicians were eligible if they: had at least 10 appointments with adult clients (>18 years) within the last 2 months; had been employed for at least 3 months; and were not contractors. Services ineligible for inclusion were: sexual assault, palliative care, aged care assessment, dementia, genetics, and child protection services. Such services were deemed ineligible based upon the advice from the clinical services.

### 2.3. Data collection procedures

An email from the District Director of Primary and Community Health was sent to all facility managers asking them to encourage clinician participation in the survey. A sample of approximately 40% of clinicians was randomly selected from an electronic community health staff database. The selected clinicians were posted an information letter, contacted by phone to confirm eligibility, and asked to participate in a computer-assisted telephone interview during work hours. The 20 min survey was pilot tested with clinicians and conducted by trained interviewers.

Selection of 40% of staff was expected to yield a sample of around 400 clinicians (based on selection of 500 and an 80% participation rate). This sample size would allow an estimate of prevalence of care with a precision of approximately  $\pm 2.5\%$  (assuming worst case of 50% prevalence).

## 2.4. Measures

### 2.4.1. Clinician descriptors

Data regarding service and clinician characteristics collected via the survey included: clinician age (<40, 40–49, 50–59, 60+); Aboriginal or Torres Strait Islander status (yes, no); current employment status (full time, part time, casual, other); number of years in their discipline (<2, 3–4, 5–9, 10+), and years working in community health (< 2, 3–4, 5–9, 10+). Clinicians also reported their risk status in the past month for each of four behavioral risks (smoking, inadequate fruit and vegetable consumption, risky alcohol use, and physical inactivity) based on validated or recommended survey items [71–74].

Clinician and service characteristics regarding gender, professional discipline, geographic remoteness (based on service postcode) [75] and service type were obtained from the health service human resources database.

### 2.4.2. Preventive care delivery

Clinicians were asked to estimate the proportion of new adult clients they had seen in the last 2 months that they had provided each element of preventive care for each risk (0–100%, don't know), unless contraindicated (e.g. moderate alcohol consumption advice for pregnant clients).

**Behavioral risk status assessment.** Clinicians estimated the proportion of clients that they had asked about their: smoking status; fruit and vegetable intake; alcohol consumption; and current physical activity levels.

**Brief advice.** Clinicians reported the proportion of clients with each risk behavior to whom they provided advice to: quit smoking, or to use Nicotine Replacement Therapy or other medications to help with quitting; eat more fruit or vegetables; reduce alcohol consumption; and increase physical activity levels. “For example, clinicians were asked “Of your clients who were doing inadequate levels of physical activity, what proportion did you advise to increase their physical activity levels?”.

**Referral/follow-up care.** Clinicians reported the proportion of clients with each risk behavior to whom they provided the following forms of referral/follow-up:

- Information or advice about free specialist prevention telephone counseling services available (Quitline service for smoking: [www.icanquit.com.au/further-resources/quitline](http://www.icanquit.com.au/further-resources/quitline); Get Healthy Information and Coaching telephone service for inadequate fruit and vegetable consumption or physical inactivity: [www.gethealthynsw.com.au](http://www.gethealthynsw.com.au)). The telephone services are funded by the NSW state government to provide a free behavior change support service delivered by qualified health coaches on multiple occasions to members of the public. There is no available similar service for alcohol.
- Arranged for the telephone counseling service to call the client.
- Advised to talk to their General Practitioner/Aboriginal Medical Service provider (GP/AMS) about the behavioral health risk.
- Advised to access other specialist services (e.g. a dietician, drug and alcohol counselor, physiotherapist, etc.).
- Forwarded a summary of ‘at risk’ client’s preventive care health risk behaviors to their GP/AMS.

### 2.4.3. Practice support strategies

Clinicians reported on the availability of 17 possible practice support strategies and resources that could assist the delivery of preventive care (yes, no, don't know). Items were then grouped within the following categories (based on strategy groupings used in Cochrane systematic reviews) [64]: leadership, educational meetings, printed educational materials and supports, audit and feedback, and reminders/prompts (see Table 3).

## 2.5. Statistical analysis

All statistical analysis was undertaken using SAS (version 9.2). Descriptive statistics were used to describe sample characteristics. Clinician characteristics obtained from the health service human resources staff database were linked to the survey data. Participant and eligible non-participant characteristics were compared using chi-square analyses ( $p < .05$ ).

Descriptive statistics were used to describe: the proportion of clinicians who reported providing risk assessment, brief advice,

**Table 1**  
Community health service and clinician characteristics.

Characteristics	Participants (N = 384) n (%)
<b>Service characteristics</b>	
Service type	
Aged care	75 (19.5)
Allied health	109 (28.4)
Community child and family health	39 (10.2)
Community nurses and other nursing services	92 (24.0)
Diabetes	19 (5.0)
Other <sup>a</sup>	50 (13.0)
Remoteness of service (ARIA)	
Major cities	131 (34.1)
Regional/remote towns	253 (65.9)
<b>Clinician characteristics</b>	
Gender	
Female	351 (91.4)
Male	33 (8.6)
Age <sup>c</sup>	
20–29	39 (10.2)
30–39	74 (19.3)
40–49	95 (24.8)
50–59	141 (36.8)
60+	34 (8.9)
Discipline	
Nurses	
Registered nurse	199 (51.8)
Other nurse	57 (14.8)
Allied health	
Psychologist/psychiatrist/counselor	16 (4.2)
Social worker	21 (5.5)
Occupational therapist	37 (9.6)
Physiotherapist	19 (5.0)
Dietitian/nutritionist	17 (4.4)
Other <sup>b</sup>	18 (4.7)
Years worked in discipline <sup>c</sup>	
2 year or less	13 (3.4)
3–4 years	17 (4.4)
5–9 years	57 (14.9)
10+ years	296 (77.3)
Years worked in community health <sup>d</sup>	
2 year or less	76 (19.9)
3–4 years	57 (14.9)
5–9 years	99 (25.9)
10+ years	150 (39.3)
Employment status <sup>c</sup>	
Full time	196 (51.2)
Part time	165 (43.1)
Casual	20 (5.2)
Other <sup>e</sup>	2 (0.5)
Aboriginal and/or Torres Strait Islander <sup>c</sup>	
Yes	7 (1.8)
No	376 (98.2)
At risk for	
Smoking <sup>c</sup>	12 (3.1)
Fruit or vegetable under consumption <sup>c</sup>	298 (77.8)
Alcohol overconsumption <sup>c</sup>	153 (40.0)
Physical inactivity <sup>c</sup>	224 (58.5)

<sup>a</sup> Other service types include, e.g. rehabilitation, renal/dialysis.

<sup>b</sup> Other could include: e.g. Allied health assistant, speech pathologist, podiatrist, Aboriginal health worker.

<sup>c</sup> 1 missing value.

<sup>d</sup> 2 missing values.

<sup>e</sup> Not specified.

and referral/follow-up for each risk separately and for all risks combined (derived analytically from the individual risk items) using the following categories: 0%, 1–49%, 50–79%, and 80–100% of clients; and to describe the prevalence of practice support strategies. A ‘number of available supports’ score was calculated and categorized into three levels (0–4, 5–9, 10–17).

### 2.5.1. Optimal preventive care

Based on recommendations of clinical guidelines [8–11] for routine clinician delivery of preventive care to all clients regarding multiple risks [8–10], optimal care delivery was defined as preventive care delivery to 80% or more clients for all risks

combined. These optimal care delivery variables were created by combining outcome measures for the individual risks: smoking, inadequate fruit and vegetable consumption, alcohol misuse, and physical inactivity.

**Assessment.** Clinicians assessed 80% or more clients for all four risks.

**Brief advice.** Clinicians provided 80% or more of ‘at risk’ clients with brief advice for all four risks.

**Referral/follow-up.** Clinicians provided at least one of the following options to 80% or more ‘at risk’ clients for all risks: spoke about the telephone service; arranged for the telephone

**Table 2**

Proportion of clinicians reporting they provide clients with preventive care ( $N=384$ ).

Preventive care outcomes	0% of clients $n$ (%) <sup>a</sup>	1–49% of clients $n$ (%)	50–79% of clients $n$ (%)	80–100% of clients $n$ (%)
<b>Assessment</b>				
Smoking	49 (12.8)	44 (11.5)	25 (6.5)	266 (69.3)
Fruit and vegetable under consumption	115 (30.0)	85 (22.1)	52 (13.5)	132 (34.4)
Alcohol overconsumption	78 (20.3)	52 (13.5)	32 (8.3)	222 (57.8)
Physical inactivity	54 (14.1)	39 (10.2)	51 (13.3)	240 (62.5)
All risks <sup>b</sup>	7 (1.8)	NA	NA	90 (23.4)
At least 1 risk	NA	NA	NA	323 (84.1)
<b>Brief advice for “at risk” clients</b>				
Smoking (to quit)	140 (36.5)	29 (7.6)	18 (4.7)	197 (51.3)
Smoking (advice about NRT)	205 (53.4)	30 (7.8)	21 (5.5)	128 (33.2)
Smoking (to quit or about NRT)	130 (33.9)	NA	NA	212 (55.2)
Fruit or vegetable under consumption	125 (32.6)	31 (8.1)	33 (8.6)	195 (50.8)
Alcohol overconsumption	209 (54.4)	14 (3.7)	6 (1.6)	155 (40.4)
Physical inactivity	90 (23.4)	35 (9.1)	42 (10.9)	217 (56.5)
All risks <sup>b</sup>	26 (6.8)	NA	NA	60 (15.6)
At least 1 risk	NA	NA	NA	321 (83.6)
<b>Forms of referral/follow-up for “at risk” clients</b>				
<b>Spoke to clients about telephone service</b>				
Smoking (Quitline)	205 (53.4)	28 (7.3)	37 (9.6)	114 (29.7)
Fruit or vegetable under consumption (Get Healthy)	323 (84.1)	23 (6.0)	17 (4.4)	21 (5.5)
Physical inactivity (Get Healthy)	336 (87.5)	19 (5.0)	17 (4.4)	12 (3.1)
All risks <sup>b</sup>	180 (46.9)	NA	NA	3 (0.8)
At least 1 risk	NA	NA	NA	127 (33.1)
<b>Arrange telephone service to call client</b>				
Smoking (to Quitline)	369 (96.1)	11 (2.9)	2 (0.5)	2 (0.5)
Fruit or vegetable under consumption (to Get Healthy)	364 (94.8)	11 (2.9)	5 (1.3)	4 (1.0)
Physical inactivity (to Get Healthy)	366 (95.3)	12 (3.1)	3 (0.8)	3 (0.8)
All risks <sup>b</sup>	349 (90.9)	NA	NA	0 (0)
At least 1 risk	NA	NA	NA	7 (1.8)
<b>Advise clients to talk to their GP/AMS</b>				
Smoking	187 (48.7)	41 (10.7)	31 (8.1)	125 (32.6)
Fruit and vegetable under consumption	312 (81.3)	28 (7.3)	17 (4.4)	27 (7.0)
Alcohol overconsumption	269 (70.2)	30 (7.8)	12 (3.1)	72 (18.8)
Physical inactivity	245 (63.8)	62 (16.2)	35 (9.1)	42 (10.9)
All risks <sup>b</sup>	130 (33.9)	NA	NA	7 (1.8)
At least 1 risk	NA	NA	NA	158 (41.2)
<b>Advise clients to use other types of support<sup>c</sup></b>				
Smoking	235 (61.2)	46 (12.0)	28 (7.3)	75 (19.5)
Fruit and vegetable under consumption	154 (40.1)	59 (15.4)	58 (15.1)	113 (29.4)
Alcohol overconsumption	263 (68.5)	34 (8.9)	20 (5.2)	67 (17.5)
Physical inactivity	111 (28.9)	69 (18.0)	85 (22.1)	119 (31.0)
All risks <sup>b</sup>	44 (11.5)	NA	NA	12 (3.1)
At least 1 risk	NA	NA	NA	222 (57.8)
Sent summary of client’s risk behaviors to GP/AMS	265 (69.0)	20 (5.2)	21 (5.5)	78 (20.3)
<b>At least 1 referral/follow-up<sup>d</sup></b>				
Smoking	NA	NA	NA	175 (45.6)
Fruit and vegetable under consumption	NA	NA	NA	134 (34.9)
Alcohol overconsumption	NA	NA	NA	95 (24.7)
Physical inactivity	NA	NA	NA	134 (34.9)
All risks <sup>b,e</sup>	NA	NA	NA	93 (24.2)

NA, not available as unable to calculate from questions asked or nonsensical.

<sup>a</sup> Clinicians who reported ‘don’t know’ were counted as providing 0% care for each care element. For brief advice and referral variables, 0% care also included clinicians reporting 0% assessment (as these clinicians were not asked about delivery of brief advice and referral) and clinicians who reported having ‘no clients at risk’ (smoking  $n=44$ , inadequate fruit and vegetable consumption  $n=6$ , alcohol overconsumption  $n=199$ , physical inactivity  $n=5$ ).

<sup>b</sup> ‘All risks’ variables are a composite of the four individual risks as clinicians did not report a specific proportion for all risks combined.

<sup>c</sup> Other types of support included: referral to other health professionals, websites or written resources (brochures).

<sup>d</sup> At least one of the applicable forms of referral/follow-up provided for that risk behavior to 80–100% of clients.

<sup>e</sup> At least one of the applicable forms of referral/follow-up provided to 80–100% of clients for each of the four risks, or sent a summary of the client’s risk behaviors to their GP/AMS for 80–100% of clients.



service to call the client; advised clients to talk to their GP/AMS; advised other types of support; or forwarded a summary of all the clients risk behaviors to the client's GP/AMS.

Chi-square analysis was initially used to examine the association between optimal preventive care delivery (for all risks combined) for each of the three preventive care outcomes (assessment, brief advice, referral/follow-up) and the reported availability of practice supports (variables shown in Table 3). Service and clinician characteristics were also tested to identify other potential predictors.

Variables with a *p*-value of 0.20 or less from the chi-square analyses were then included in separate logistic regression models for each of the three care elements. A backward selection process was adopted for each regression model [76] whereby the variable with the highest *p* value was removed until all predictors in the model had a *p* value less than .05. Any potential interaction between variables that remained in the final model was also examined to ensure the model was sound and that results for each variable could be interpreted independently from other variables [76].

### 3. Results

#### 3.1. Sample characteristics

Of 493 randomly selected clinicians, 462 (93.7%) were eligible. Ineligible clinicians were those who saw no new adult clients in the prior 2 months (*n* = 13), or had left the service (*n* = 18). Of the eligible clinicians 384 completed the survey (83.1%). Thirty clinicians refused, 37 were on leave, and 11 could not be contacted. Participating clinician and service characteristics are provided in Table 1. Compared to participants, eligible non-participants were more likely to be from major cities (*p* = 0.03), and more likely to be from community nursing services and less likely to be from allied health services (*p* < 0.01). The study sample was representative of the full population of clinicians

from within the health district, with the exception of service type (*p* < 0.01), whereby child and family health services were underrepresented (10.2% vs 16.7%).

#### 3.2. Prevalence of preventive care delivery

The proportion of clients reported by clinicians to have received preventive care are shown in Table 2. Assessment was delivered to the majority (80% or more) of clients most frequently for smoking (69.3%) and least frequently for inadequate fruit and/or vegetable consumption (34.4%). For brief advice, care delivery to the majority of clients was most frequent for physical inactivity (56.5%) and least for alcohol overconsumption (40.4%). The type of referral/follow-up provided most often to the majority of clients for smoking and alcohol overconsumption was advice to talk to the GP/AMS (32.6% and 18.8% respectively), and for physical inactivity and inadequate fruit and vegetable consumption, advice to use other types of support (31.0% and 29.4% respectively) (Table 2). For individual risks, a number of clinicians reported providing care to 0% of their clients; ranging from 12.8–30.0% for assessment, 23.4–54.4% for brief advice, and from 28.9–96.1% of clinicians for referral/follow-up.

Regarding the prevalence of optimal care delivery (care to 80% or more clients for all risks combined), 23.4% of clinicians reported providing client assessment, 15.6% reported delivering brief advice, and 24.2% of clinicians reported providing at least one form of referral (Table 2).

#### 3.3. Prevalence of practice support strategies

Commonly reported practice support strategies included the existence of a preventive care policy, the availability of client handouts, and that their manager believed the provision of preventive care was important (68–94%) (Table 3). Clinicians were least likely to report the availability of real time reminders, performance feedback, and a nominated support staff member

**Table 3**  
Practice supports for preventive care delivery (*N* = 384).

Practice supports	<i>n</i> (%)
Leadership	
Nominated staff member to support provision of preventive care	87 (22.7)
Aware that the health district has a policy regarding preventive care	262 (68.2)
Perception that manager believes provision of preventive care is important	362 (94.3)
Educational meetings	
Training in preventive care for all health risk behaviors	130 (33.9)
Printed educational materials and support	
Fax referral forms for community telephone services	113 (29.4)
Guidelines/procedure telling how to comply with Preventive Care Policy	114 (29.7)
Resource pack of relevant forms and client handouts	135 (35.2)
Tailored client handout with client specific risks and advice provided	121 (31.5)
List of referral services	244 (63.5)
Audit and feedback	
Feedback on the level of preventive care provided in your service	79 (20.6)
Reminders/prompts	
Real time reminders of best practice preventive care for the client	61 (15.9)
Any prompts in electronic medical record to assess a client's health risk behavior	117 (30.6) <sup>a</sup>
Place in electronic medical record to record preventive care	121 (31.6) <sup>a</sup>
A screening tool in electronic medical record to assess a client's health risk behavior	122 (31.9) <sup>a</sup>
Automated production of referral letter for GP (to support delivery of preventive care)	193 (50.4) <sup>a</sup>
Paper screening tool to assess clients risk behavior away from computer	212 (55.2)
Client handouts (e.g. Pamphlets, quit packs)	263 (68.5)
Number of available supports score	
0–4	105 (27.3)
5–9	182 (47.4)
10–17	97 (25.3)

<sup>a</sup> 1 missing value.

(16–23%). Approximately three-quarters of clinicians (74.7%) reported at most only 9 of the 17 supports were available.

### 3.4. Association between the availability of practice supports, service and clinician characteristics and optimal preventive care delivery

#### 3.4.1. Assessment

The presence of a paper screening tool and provision of clinician training were positively associated with the provision of optimal levels of risk assessment for all risks combined. Additionally, clinicians from diabetes services, nursing disciplines, and clinicians whose personal fruit and vegetable consumption and physical activity levels were not in the risk category were positively associated with the provision of optimal levels of risk assessment for all risks combined (Table 4).

#### 3.4.2. Brief advice

The automated production of a referral letter for the client's GP was positively associated with the provision of optimal levels of brief advice for all risks combined. Additionally, clinicians from diabetes services, those who were male, those who had worked in community health for 10 or more years, and those who were not at risk themselves for inadequate fruit and vegetable consumption, but were at risk for alcohol overconsumption and smoking, were positively associated with the provision of optimal levels of brief advice for all risks combined (Table 4).

#### 3.4.3. Referral

The availability of more than four practice supports was positively associated with optimal referral/follow-up (at least one type of referral to 80% or more clients for each risk). Additionally,

**Table 4**

Multi-variate analysis regarding practice supports and clinician and community health characteristics associated with optimal preventive care (N = 384).

Variables included in the final regression model <sup>a</sup>	Assessment		Brief advice		Referral/follow-up <sup>b</sup>	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Practice supports						
Paper screening tool to assess clients risk behavior away from computer						
Yes	3.2 (1.7–6.2)*	<.001	–	–	–	–
No/don't know	1.0		–		–	
Automated production of referral letter for GP						
Yes	–	–	2.4 (1.2–4.7)*	.010	–	–
No/don't know	–		1.0		–	
Training in preventive care for all health risk behaviors						
Yes	2.0 (1.1–3.5)*	.015	–	–	–	–
No/don't know	1.0		–		–	
Number of practice supports available						
10–17	–	–	–	–	5.3 (2.3–12.4)*	<.001
5–9	–		–		4.0 (1.8–8.7)*	
0–4	–		–		1.0	
Service characteristics						
Service type						
Aged care	1.3 (0.6–3.2)	<.001	1.1 (0.4–2.8)	.016	2.5 (1.1–5.4)*	<.001
Community child and family health <sup>c</sup>	0.2 (0.0 – 0.8)*		0.5 (0.1–2.4)		0.1 (0.0–0.7)*	
Community nurses and other nursing services	1.0 (0.4–2.4)		1.7 (0.7–4.3)		1.3 (0.6–2.9)	
Diabetes	7.9 (2.4–25.6)*		6.4 (2.0–21.0)*		11.1 (3.4–36.4)*	
Other	1.9 (0.7 – 5.1)		1.9 (0.7–5.1)		1.3 (0.6–3.3)	
Allied health	1.0		1.0		1.0	
Remoteness of service (ARIA)						
Major cities	–	–	–	–	2.7 (1.6–4.7)*	<.001
Regional/remote towns	–		–		1.0	
Clinician characteristics						
Gender						
Male	–	–	3.0 (1.2–7.5)*	.022	–	–
Female	–		1.0		–	
Discipline						
Nurse	2.6 (1.2–5.7)*	.020	–	–	–	–
Allied Health	1.0		–		–	
Years worked in community health						
10 years or more	–	–	0.4 (0.2–1.0)*	.047	–	–
5–9 years	–		1.2 (0.5–2.6)		–	
4 years of less	–		1.0		–	
Inadequate fruit and vegetable consumption						
Not at risk	2.3 (1.2–4.3)*	.010	3.8 (1.8–7.8)*	<.001	–	–
At risk	1.0		1.0		–	
Physical inactivity						
Not at risk	2.0 (1.1–3.4)*	.014	–	–	–	–
At risk	1.0		–		–	
Smoking						
Not at risk	–	–	0.2 (0.1–0.8)*	.018	–	–
At risk	–		1.0		–	
Alcohol overconsumption						
Not at risk	–	–	0.5 (0.3–0.9)*	.033	–	–
At risk	–		1.0		–	

<sup>a</sup> 31 potential variables for inclusion (listed in Tables 1 and 3).

<sup>b</sup> At least one of the applicable forms of referral/follow-up provided to 80–100% of clients for each of the four risks, or sent a summary of the client's risk behaviors to their GP/AMS for 80–100% of clients.

<sup>c</sup> Clients over 18 years of age (e.g. the parent of the child seeing the service).

\* Significant at .05.

clinicians from diabetes and aged care service types, and services located in major cities were positively associated with optimal referral/follow-up (Table 4).

No interactions were found between variables that remained in the final regression for each of the three models.

#### 4. Discussion and conclusion

##### 4.1. Discussion

The study findings suggest community health nursing and allied health clinicians do not provide preventive care in a manner that is consistent with clinical guidelines. The prevalence of each element of preventive care being provided to the majority (80% or more) of clients for individual risks were variable and did not exceed 69%, with optimal preventive care for all risks combined being low. Most preventive care practice support strategies were not available to the majority of clinicians. Although the availability of such support strategies was associated with the provision of preventive care, such an association was not generalized, with single strategies being associated with the provision of single elements of preventive care. Such findings suggest that a need exists for further research to identify strategies for increasing the provision of all recommended elements of preventive care for multiple health risk behaviors.

This study highlights the existence of low levels of optimal preventive care for multiple risk factors for all of the three care elements examined (maximum 24.2%). It highlights the untapped potential among this group of clinicians within primary health care, particularly as individuals frequently present with more than one risk [5,7], and clinical guidelines recommend preventive care delivery across multiple risks [8–10]. Furthermore, while there is equivocal evidence surrounding the greater efficacy of the simultaneous versus sequential delivery of multiple behavior interventions [77,78], some evidence suggests multiple-behavior interventions have a greater impact on public health than single-behavior interventions [1,79]. Although it highlights the potential of these professional groups, this study may also bring to the fore the difficulty inherent in the provision of preventive care for multiple risk factors, as evident from the higher levels of care reported for individual risks compared to all risks combined. Future research should endeavor to make multiple behavior interventions more effective, cost effective and/or less demanding for clients and clinicians [77].

Despite the difficulty in comparing the findings of this study with past research due to methodological differences between studies, the pattern of preventive care delivery is similar to that found previously [32,37,43–60,80]. There were generally higher levels of assessment, moderate levels of brief advice, and lower levels of at least one referral. Although assessment was most frequently provided for smoking, over 30% of clinicians still do not assess the majority of clients. Of the four risks, assessment was lowest for fruit and vegetable consumption, whereby over 65% of clinicians do not assess the majority of clients. This delivery of preventive care is incongruent with the prevalence of such risks among clients, whereby inadequate fruit and vegetable consumption is most prevalent, and smoking least prevalent [81].

The provision of brief advice was generally lower than assessment (with the exception of fruit or vegetable under consumption), and again while most frequently provided for smoking, almost half of clinicians (45%) do not provide brief advice to the majority of at risk clients. However, relative to assessment, there was less variation in the provision of brief advice to the majority of clients across the four risks. While provided least frequently for alcohol overconsumption, the difference compared to smoking brief advice was less than 15%.

Levels of care to the majority of clients regarding the various referral/follow-up outcomes for individual risks were variable and generally lower than assessment and brief advice, but were similarly most frequently provided for smoking (and while highest for at least one referral/follow-up, this was only provided by under half of clinicians). While there were a range of options utilized across each of the risks, the community telephone services did not appear to be widely used despite their potential as an effective referral source [82–84]. Even more familiar referral points such as the client's GP/AMS were not high. Furthermore, after accounting for clinicians who did not provide other types of support because they provided this support in their role, the rate of referral was still low (see Table 2, footnotes). Potentially referral to sources outside of community health facilities and to telephone services is less familiar to clinicians [37]. Referral may be less readily considered part of their remit compared to assessment and brief advice [37]. The general trend of increased preventive care provision regarding smoking cessation is likely due to the more well-established guidelines [85] and greater client acceptability generally of smoking cessation care provision [81].

The availability of strategies suggested to be effective in facilitating practice change including printed educational materials, educational meetings, local opinion leaders, audit and feedback, and reminders [64], were not widely available to clinicians. Furthermore, despite the existence of a preventive care policy, there was only moderate awareness of it (68.2%). Such findings suggests a broader adoption of support strategies is required to assist with the delivery of all elements of preventive care and that additional investment in modifying the clinical practice environment is required if care delivery is to occur at a level that is to realize the intended benefit of opportunistic delivery of preventive care by health care providers [86].

Although at least one type of support (of 17) was associated with each element of preventive care, no one type of practice change support nor number of supports was positively associated with all elements of preventive care. Such a finding challenges the sufficiency of a one-size-fits-all approach to the type of practice change strategies implemented to support each of the elements of care for all risks. This finding is novel because unlike past studies (which were predominantly conducted in a limited number of facilities) [32,37,43,45,46,50,56,60], this study examined associations across a large network of services that encompass a wide variety of clinicians and service types. Further, it is the only known study in this setting to examine the association of supports with multiple elements of care for any of the four risks. Furthermore, findings of differential care delivery by service type further challenge a one-size-fits-all approach. Research should investigate if support strategies should be tailored to the care elements required, and change across a network of services and between service types.

With regard to the study limitations, the findings may be an overestimation of care delivery, as the study outcomes were based on clinician self-report, and healthcare professionals have been found to often overestimate their performance by around 20–30% [87]. However, such an overestimation would reinforce the low levels of preventive care delivery found by this study. Additionally, the generalizability of the study findings may be limited as the community health services were sampled from one health district of one state of Australia. However, the range of services and clinician types included in the study may make the findings relevant to other researchers and policy makers.

##### 4.2. Conclusion

This study highlights the untapped potential among nursing and allied health clinicians in primary care systems in the

provision of preventive care [26,36,37]. This group of professionals have reach in accessing the Australian population [20,31,69] and can provide clients a broad range of referral/follow-up opportunities. The finding that preventive care is delivered differentially based on available supports confirms the need for additional strategies to support all primary care nurses and allied health clinicians to adopt an opportunistic primary prevention approach to the provision of preventive care to all clients. Practice change theories [88–91] and evidence from reviews of practice change interventions suggest a multi-strategic approach is most likely to increase clinician provision of preventive care on an opportunistic basis [31,92–97].

### 4.3. Practice implications

Further research and intervention are required to increase the low levels of preventive care delivery and increase the clinician supports available, ensuring a focus across all elements of preventive care, from assessment to referral/follow-up.

### Ethical approval

I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

### Conflict of interest

The authors declare that they have no competing interests. The funding sources had no involvement in the: study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication.

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