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Nicotine vaping product use, harm perception and policy support among pharmacy customers in Brisbane, Australia

Daniel A Erku^{1*}, Coral E Gartner^{2, 3}, Unchanok Tengphakwaen¹, Kylie Morphett², and Kathryn J Steadman¹

¹School of Pharmacy, The University of Queensland, 20 Cornwall Street, Woolloongabba 4102, Queensland, Australia

²School of Public Health, The University of Queensland, Herston Road, Herston 4006, Queensland, Australia

³Queensland Alliance for Environmental Health Sciences, The University of Queensland, 20 Cornwall Street, Woolloongabba 4102, Queensland, Australia

Email addresses:

Daniel A Erku: d.erku@uq.edu.au

Coral Gartner: c.gartner@uq.edu.au

Unchanok Tengphakwaen: unchanok.tengphakwaen@uq.net.au

Kylie Morphett: k.morphett@uq.edu.au

Kathryn Steadman: k.steadman@uq.edu.au

[Short running title: Pharmacy customers' use and opinion on vaping]

*Corresponding author

Postal address: School of Pharmacy, The University of Queensland, Pharmacy Australia Centre of Excellence, 20 Cornwall Street, Woolloongabba QLD 4102, Australia

Abstract

Introduction and Aims. Despite regulatory barriers for accessing nicotine liquid, use of nicotine vaping products (NVPs) has increased rapidly in Australia. Legal use of NVPs to aid smoking cessation requires a prescription, and pharmacies report receiving enquiries about the use of and access to NVPs. In this study, we assessed NVPs use, harm perception and policy support among community pharmacy customers.

Design and Methods. A cross-sectional survey was conducted among customers (n=470) from a large community pharmacy chain in Brisbane, Australia. Multivariable logistic regression was used to examine perception of NVPs as less harmful than combustible cigarettes and regulatory recommendations in relation to demographics, smoking status and NVP use.

Results. Almost one-third of the sample (31%) had either tried NVPs in the past (16%) or were current vapers (15%), the majority of them being current smokers (67%) who are trying to quit (31%) or substitute smoking (41%). Vapers primarily depended on family/friends as a source of information (76%). Current smokers and vapers were more likely to perceive NVPs as less harmful than cigarettes than non-smokers and non-vapers. Perceiving NVPs as safer than cigarettes was correlated with a recommendation to regulate as a tobacco product.

Discussion and Conclusions

There was widespread misperception about relative risk of nicotine-containing products, with 37% of respondents perceiving nicotine-containing NVPs to be as harmful as combustible cigarettes. Community pharmacies represent an ideal setting for educating smokers about smoking and vaping. Thus, pharmacy staff need educational support to ensure that they are equipped to provide current evidence-based information to customers.

Key words: E-cigarette, Harm perception, Vaping, Australia

Introduction

Nicotine vaping products (NVPs), also known as electronic nicotine delivery systems (exemplified by electronic cigarettes or e-cigarettes), are a group of products that deliver nicotine in the form of an aerosol (1). There has been a rapid increase in NVP use globally since their first introduction into the market in mid 2000s (2). Acceptance and patterns of use vary considerably across countries with rapid uptake evident in countries that have more liberal regulations concerning the use and marketing of these products (3, 4). For instance, these products are now more popular than nicotine replacement therapies (NRTs) for smoking cessation in the UK, where they are widely available as consumer products (5).

In Australia, the laws regulating NVPs are complex and vary between jurisdictions. In all states and territories, apart from Western Australia, vaping devices without nicotine can be sold as consumer products. Over the past five years, most Australian states and territories have introduced further regulations on the sale and use of nicotine-free vaping products similar to regulations that are applied to combustible cigarettes. However, it is illegal to use nicotine (classified as a dangerous poison or Schedule 7) in vaping products unless for a therapeutic purpose such as quitting smoking, in which case nicotine delivered by lung inhalation is classified as a prescription-only medicine (Schedule 4) and the user must hold a valid medical prescription written by a registered medical practitioner. The Therapeutic Goods Administration (TGA) has indicated that it is possible for a nicotine-containing NVP to be approved as an aid to quit smoking (6), but as no product has progressed through the regulatory system there is currently no commercial product available to be prescribed. So, currently Australians can only access nicotine for use in NVPs using one of the legal pathways for accessing unapproved therapeutic goods: personal importation, the Special Access Scheme, Authorised Prescriber Scheme and extemporaneous compounding (7). Despite this regulatory barrier, use of NVPs among Australian smokers significantly increased between 2013 and 2016 (8). In 2016, approximately one third of smokers in Australia (31%) had tried vaping and 4.4% reported currently vaping (8). It is unclear what proportion of those respondents vape with nicotine, but in a separate study conducted in 2016, 91% of NVP users in Australia reported that their devices contained nicotine (9). The public's understanding of the regulations, and their beliefs on what future regulatory frameworks should look like, could inform regulatory efforts and implementation of new NVP-related policies. Assessing risk perceptions and policy opinions of smokers, particularly those who have difficulty quitting smoking, are valuable since they are the population who may benefit from using NVPs to quit smoking. The views of

non-smokers are also relevant because of concerns about non-smoking youth accessing NVPs and potentially becoming addicted to nicotine.

Understanding perceptions of individuals about the relative safety of a particular behaviour provides a basis for a predictive relationship between perception and engagement in such behaviours. For instance, there appears to be a direct relationship between smokers' perception of the relative harm of tobacco cigarettes and NVPs and the likelihood of switching from smoking to vaping (10, 11). A longitudinal study showed that smokers/ex-smokers who perceived NVPs as less harmful than smoking were more likely to subsequently try them (10). In the majority of studies that assessed perceptions regarding the continuum of risk across nicotine products, NVPs, hookah and smokeless tobacco products were perceived as less harmful compared to combustible cigarettes (12). However, a considerable proportion of smokers also report lack of knowledge about the relative safety (13), or believe NVPs are equally harmful to tobacco cigarettes (13, 14). Similar misperceptions have also been reported for nicotine in general, with a belief that nicotine is responsible for most smoking-related death and disease (14, 15). Such lack of knowledge or misperception regarding relative harm could potentially impede switching from smoking to lower-risk alternative products such as NVPs.

In a study conducted to evaluate the effect of recruitment setting on the composition of samples consisting of adult smokers, community pharmacy settings were found to be better than general practice sites in terms of recruiting hard-to-quit smokers and those who are pre-contemplators of smoking cessation (16). This conclusion led the authors to suggest that community pharmacies, being situated at the interface between primary health care and the general public, represent an ideal recruitment site for targeting smokers who are either unwilling or less likely to succeed at quitting. In addition, community pharmacies are an ideal setting for brief interventions (e.g. providing smoking cessation counselling in the form of ask, advise and refer approach) particularly to underserved and priority populations (17). Pharmacy staff represent a highly accessible trained workforce and are uniquely positioned to provide evidence-based information about the relative risks of various nicotine-containing products to smokers(18). A recent study conducted in Australia found that pharmacy staff are frequently asked about NVPs by their customers, but reported feeling uninformed about these products and indicated the need for more information and guidance about NVPs (19). Exploring customers' level of knowledge, harm perceptions and motivations for use of NVPs could, therefore, inform the development of practice guidelines for pharmacy staff that will ultimately assist in providing a customised, evidence-based and unbiased information to their customers. In this study, we

assessed pharmacy customer use of NVPs, reason/motivation for use, and source of information as well as perceived beliefs regarding the relative risk of various nicotine-containing products (i.e. smokeless tobacco products, NRTs, NVPs and combustible tobacco cigarettes). We also asked respondents to indicate their views regarding how the sale of NVPs (with and without nicotine) should be regulated in Australia.

Methods

A cross-sectional survey of pharmacy customers was conducted. All adult pharmacy customers who visited four pharmacies of a large private pharmacy chain in various suburbs of Brisbane, Queensland, Australia, during a one-week period in March 2015 for each pharmacy, were approached and invited to participate. These were a convenience sample selected to access a range of pharmacy customers (two based in the city and two in suburban areas). Human Research Ethics approval was granted by the University of Queensland, School of Pharmacy Ethics Committee. Participants were provided with an information sheet explaining the aim of the survey and consent to participate was confirmed verbally prior to data collection. Participants were given the option to complete the survey via a face-to-face interview or to complete the questionnaire themselves in the presence of the data collector. Participation was voluntary and no incentive was provided.

No suitable validated tool was identified, so the questionnaire was developed based on other surveys conducted by our collaborators about consumer views and preferences of lower-risk alternatives to smoking including NVPs (20-22). The questionnaire was piloted for comprehensibility with five members of the general public recruited through the research team's social networks, and slight adjustments made accordingly. The final questionnaire included three sections. Section one contained questions on demographic characteristics of the participants including age, gender, educational status, ever use of combustible cigarettes and quit attempts. Among smokers who had previously made a quit attempt, a follow up item queried the type of smoking cessation methods used/tried. Respondents were also asked whether they had ever tried and/or were currently vaping, and asked to specify whether they used nicotine or non-nicotine NVPs. All respondents who had ever used and/or were currently using NVPs were asked about their reasons for using them with the following possible answers, selecting all that apply from the following list: to quit smoking; to cut down the number of tobacco cigarettes I smoke; as a substitute for smoking tobacco; because it does not have smoke; because it is safer than smoking tobacco; to use in areas where smoking is banned; my

friends or family members recommended them; my health professional (Pharmacist, Doctor, Counsellor etc.) recommended them; I like the taste; and to save money.

Section two assessed the perceived beliefs of respondents regarding the relative risk of various nicotine-containing products including smokeless tobacco products, NRTs, NVPs compared to combustible tobacco cigarettes with the question, “How harmful are the following items/products, compared to regular tobacco cigarettes?” Responses were measured on a 5-point Likert scale ranging from “Much less harmful” to “Much more harmful”. Perception regarding short and long term safety of nicotine-containing NVPs were also assessed by the questions “Nicotine-containing e-cigarettes are safe to use for (1) short term (<6 months); (2) long term (>6 months or lifetime)” and “Nicotine-containing e-cigarettes are safer than NRTs”. Responses were measured on a 5-point Likert scale ranging from “Strongly disagree to “Strongly agree”.

Finally, respondents were asked to indicate their views on whether the sale of NVPs (with or without nicotine) should be regulated in Queensland as consumer, tobacco, or medicinal products, with the following options: 1) Should be sold on the shelf in general retail outlets; 2) Should be sold under the counter to adults, like tobacco; 3) Should only be sold in pharmacies with advice from a pharmacist; 4) should require a prescription from a doctor; and 5) should be illegal to sell.

Data analysis

The data were entered into and analysed using IBM SPSS Statistics 24.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (frequencies and percentages) were employed to summarise demographic and smoking characteristics of participants, stratified as ‘never’, ‘former’ or ‘current’ NVP users. Descriptive statistics were also used to explore respondents’ views on the sale of NVPs, stratified by smoking status (‘current’, ‘former’, and ‘non-smoker’). Bivariate analysis and multivariable logistic regression analysis were employed to determine factors associated with (1) perceiving NVPs as less harmful than combustible cigarettes (vs equally or more harmful) and (2) regulatory recommendations (a consumer product, a tobacco product, medicinal product or complete ban) were examined using multivariable logistic regressions. The results were adjusted for demographics characteristics, smoking status and NVP use. Odds ratio (OR) with 95% confidence interval (95% CI) were also computed along with corresponding *p*-value; *p* < 0.05 was taken as indicating statistical significance.

Results

Demographic and smoking characteristics

A total of 744 pharmacy customers were invited to participate, of which 470 respondents consented and completed the questionnaire giving a response rate of 63.2%. The socio-demographic characteristics of respondents are described in Table 1. The sample consisted of approximately equal proportion of men (52%) and women (48%), nearly half (47%) had a tertiary level qualification and a small proportion identified as Aboriginal and/or Torres Strait Islander (12%). Over half of the respondents (53.6%) were either current smokers (31.5%) or ex-smokers (22.1%). Among current smokers, 112 (76%) indicated having tried to quit smoking at least once, with the most common methods being ‘cold turkey’ (91%), NRTs (64%) and NVPs (51%).

Table 1. Demographic and smoking characteristics of participants, stratified by NVP use, n=470

Variables	NVP use, n (%)						Total n (%)	
	Never		Former		Current			
Gender								
Male	142	(30.2)	51	(10.8)	51	(10.8)	244	(51.9)
Female	183	(38.9)	24	(5.1)	19	(4.0)	226	(48.1)
Age								
18-25	40	(8.5)	16	(3.4)	33	(7.0)	89	(18.9)
26-35	86	(18.3)	35	(7.4)	27	(5.7)	148	(31.5)
36-45	63	(13.4)	14	(3.0)	8	(1.7)	85	(18.1)
≥46	136	(29.9)	10	(2.0)	2	(0.4)	148	(31.5)
Educational level								
Less than year 12	14	(3.0)	6	(1.3)	2	(0.4)	22	(4.7)
Senior school certificate	79	(16.8)	29	(61.7)	18	(3.8)	126	(26.8)
Post-school qualification	67	(14.2)	17	(3.6)	17	(3.6)	101	(21.5)
University level	165	(35.1)	23	(4.9)	33	(7.0)	221	(47)
Ethnicity (n=458)								
Australian	192	(58.5)	29	(39.7)	21	(30.4)	242	(51.5)
Aboriginal or Torres Strait	27	(8.2)	26	(35.6)	14	(20.3)	57	(12.1)
European	37	(11.3)	8	(10.9)	12	(17.4)	57	(12.1)
East Asian	42	(12.8)	8	(11)	15	(21.7)	65	(13.8)
Other*	30	(9.0)	2	(2.7)	7	(10.1)	37	(7.8)

Smoking status

Current	43	(9)	54	(11.4)	51	(10.8)	148	(31.5)
Former	69	(14.7)	17	(3.6)	18	(3.8)	104	(22.1)
Never	213	(45.3)	4	(0.8)	1	(0.2)	218	(46.4)

*Other: the Americas, Southern & Central Asian and African descent

Use of NVPs

Almost a third of the respondents (30.8%) had either tried NVPs in the past (15.9%) or were current users (14.8%). The majority of vapers (former and current) were male (70.3%, OR 4.64, 95% CI: 2.22-10.10, $p < 0.001$) and current smokers (66.7%, OR 79.3, 95% CI: 25.39-247.1, $p < 0.001$). Of the 70 people that reported being current NVP users, all except one of them were current or former smokers (Table 1). The most commonly mentioned reasons for NVP use were ‘as a substitute for smoking tobacco’ (41.4%), ‘it is safer than smoking tobacco’ (40%), ‘to quit smoking’ (31%) and ‘to cut down the number of cigarettes I smoke’ (26.2%). The majority of vapers reported that family/friends (75.9%) had recommended they try NVPs, with only two (1.4%) users reporting being advised to try them by a healthcare professional.

Perceived safety of NVPs

Over half of respondents (56%) agreed or strongly agreed that short-term use (less than 6 months) of NVPs is safe. However, respondents were wary of long-term or lifetime use of NVPs; more respondents disagreed (62%) than agreed (18%) with the statement that lifetime use of NVP is safe (Figure 1).

The majority of respondents believed that NVPs with nicotine (61.5%) or without nicotine (83.2%) are less harmful than combustible cigarettes (Table 2). When stratifying harm perception according to NVP use, the difference in harm perception among current, former and never vapers is apparent. Current vapers perceived NVPs as less harmful than combustible cigarettes, irrespective of whether they contained nicotine (93%) or were nicotine-free (97%). In contrast, nearly half of non-users (46.5%) perceived nicotine-containing NVPs to be equally as harmful as smoking, however this dropped to 20% for NVPs without nicotine. The majority of respondents disagreed (60%) and few agreed (12%) with the statement that NVPs are safer than NRTs. Nearly all respondents who disagreed (255 out of 282 respondents) did not use NVPs, with only 3 current vapers disagreeing with the statement.

Table 2. Perceived safety of various nicotine-containing products compared to combustible cigarettes, n=470

Relative safety compared to tobacco cigarettes*	NVP use status						Total	
	Current, n (%)		Former, n (%)		Never, n (%)			
Nicotine replacement therapies								
Less harmful	68	(97.1)	71	(94.7)	318	(97.8)	457	(97.2)
Equally harmful	2	(2.9)	4	(5.3)	7	(2.2)	13	(2.8)
More harmful	0		0		0		0	
E-cigarettes with nicotine								
Less harmful	65	(92.8)	56	(74.7)	168	(51.7)	289	(61.5)
Equally harmful	5	(7.2)	18	(24)	151	(46.5)	174	(37)
More harmful	0		1	(1.3)	6	(1.8)	7	(1.5)
E-cigarettes without nicotine								
Less harmful	68	(97.1)	67	(89.3)	256	(78.8)	391	(83.2)
Equally harmful	2	(2.9)	8	(10.7)	65	(20)	75	(16)
More harmful	0		0		4	(2.2)	4	(0.8)
Herbal cigarettes								
Less harmful	28	(40)	35	(46.7)	161	(49.5)	224	(47.6)
Equally harmful	41	(58.6)	37	(49.3)	155	(47.7)	233	(49.6)
More harmful	1	(1.4)	3	(4.0)	9	(2.8)	13	(2.8)
Smokeless tobacco products								
Less harmful	33	(47.1)	36	(48)	127	(39.1)	196	(41.7)
Equally harmful	28	(40)	31	(41.3)	137	(42.1)	196	(41.7)
More harmful	9	(12.9)	8	(10.7)	61	(18.8)	78	(16.6)

*responses for 'less harmful' and 'much less harmful' were combined and presented as 'less/more harmful'. Responses for 'more harmful' and 'much more harmful' were combined and presented as 'more harmful'.

In the adjusted logistic regression model (Table 3), age, use of NVPs and smoking status were strongly correlated with accurately perceiving NVPs as less harmful compared to traditional cigarettes. Respondents in the age range of 18-25 years were 4.62 times more likely to perceive NVPs as less harmful compared to combustible cigarettes than those greater than 45 years old (OR 4.62, 95% CI: 2.30-9.26, $p < 0.001$). Current smokers (OR 2.61, 95% CI: 1.39-4.92, $p < 0.002$) and NVPs users (OR 3.89, 95% CI: 1.37-11.06, $p < 0.010$) were also more likely to perceive NVPs as less harmful compared to combustible cigarettes than non-smokers and NVP non-users.

Table 3. Logistic regression analyses of the perception that NVPs are less harmful than combustible cigarettes (vs equally/more harmful), adjusted for age range, smoking status and NVP use, n=470

Variables	β	S.E.	Odds ratio	95% CI		<i>p</i> -value
				Lower	Upper	
Age range (ref: ≥ 46)						< 0.001
18-25	1.53	0.35	4.62	2.30	9.26	< 0.001
26-35	1.19	0.27	3.29	1.92	5.68	< 0.001
36-45	0.59	0.88	1.81	1.03	3.18	0.039
Smoking status (ref: non-smokers)						0.011
Current smokers	0.96	0.32	2.61	1.39	4.92	0.002
Former smokers	0.41	0.28	1.52	0.87	2.64	0.137
NVP use (ref: non-user)						0.035
Current users	1.36	0.53	3.89	1.37	11.06	0.010
Former users	-1.32	0.79	0.27	0.06	1.26	0.095

Model summary: Chi-square: 99.13 ($p < 0.001$); Cox & Snell R Square (0.190); Nagelkerke R Square (0.258); Hosmer and Lemeshow Test (9.12; $P = 0.332$)

Opinion regarding regulation of NVPs

The majority of non-smokers supported regulating nicotine-containing NVPs either as a medicinal product (45%) or completely banning them (42.2%). They also believed that NVPs without nicotine should be treated the same as tobacco (38.1%) and only sold ‘under the counter’, which involves products being shielded from view of the general public with sale to over 18s only. Alternatively, a third (33.5%) viewed regulation as a medicinal product to be appropriate. On the other hand, the majority of current smokers recommended regulating both NVPs with (66.2%) and without nicotine (73.6%) as tobacco products, with only a minority of them recommending a medicinal route (22.3% for nicotine-containing and 6.8% for NVPs without nicotine) (Table 4). In the logistic regression model, perceiving nicotine-containing NVPs as safer than combustible cigarettes (vs equally or more harmful) was correlated with the recommendation to regulate them as tobacco products (OR 4.61, 95% CI: 1.65-12.84, $p = 0.03$).

Table 4. Opinions regarding the sale of nicotine and non-nicotine NVPs in Queensland, (n=470).

Regulation of NVPs	Smoker Status, N (%)					
	Current		Former smoker		Non-smoker	
How do you think e-cigarettes containing nicotine should be regulated?						
As consumer products	12	(8.1)	16	(15.4)	1	(0.4)
As tobacco products	98	(62.2)	25	(24)	27	(12.4)
As medicinal products*	33	(22.3)	30	(28.8)	98	(45)
Should be illegal to sell	5	(3.3)	33	(31.7)	92	(42.2)
How do you think e-cigarettes without nicotine should be regulated?						
As consumer products	26	(17.6)	23	(22.1)	8	(3.7)
As tobacco products	109	(73.6)	38	(36.5)	83	(38.1)
As medicinal products*	10	(6.7)	25	(24)	73	(34.5)
Should be illegal to sell	3	(2.1)	18	(17.4)	54	(24.8)

*pharmacy only or prescription only

Discussion

In this study, we surveyed adult pharmacy customers about their use and harm perceptions about NVPs, and opinions on their regulation. Approximately one-third of the sample had either tried NVPs in the past or were current vapers, the majority of them being current smokers who are trying to quit smoking. Although pharmacy customers did not believe vaping to be more harmful than smoking combustible cigarettes, many respondents (37%) perceived nicotine-containing NVPs to be as harmful as combustible cigarettes. This misperception about relative risk of various nicotine-containing products was also reflected in respondent regulatory recommendations as they tended to prefer a more restrictive regulatory approach for NVPs containing nicotine, supporting a complete ban or regulation as a medicinal product.

In Australia, the number of smokers who have tried NVPs has significantly increased in recent years. While only 1.2% of adults reported currently using NVPs in the 2016 National Drug Strategy Household Survey, nearly a third of smokers (31%) reported having ever having tried NVPs (23). NVP users (current or former) in our study perceived them as safer than smoked tobacco and had or were using them for the purpose of quitting, substituting or reducing the number of cigarettes smoked. Similar published studies also found male gender and being a

smoker (ex- or current) as factors associated with NVP use (24-26). While ever use of NVPs in our sample was higher (31%) than an online survey of 1,001 adults conducted in New South Wales (13%), both studies identified males and current smokers as mostly likely to be NVP users, and smoking cessation as the most common reason for using NVPs (27). Similar perceived advantages of NVP use were also reported in other studies (24, 28-30).

Over two-thirds of respondents believed that NVPs are less harmful than combustible cigarettes. In the multivariable logistic regression analysis, respondents in the age range of 18-25 years, current smokers and NVP users were more likely to perceive NVPs as less harmful than combusted tobacco. Stratifying harm perception according to NVP use generated an interesting finding. Current vapers perceived NVPs as less harmful than combustible cigarettes, irrespective of whether they contained nicotine or not. In contrast, the majority of non-users considered NVPs as less harmful than cigarettes if they were nicotine-free, but fewer non-users believed this for NVPs containing nicotine. Even though we did not specifically ask the respondents for their views on nicotine, these findings indicate a potential misperception among people who have never tried NVPs that nicotine is an important source of any harm from using NVPs. Indeed, studies conducted across the globe have reported that many believe NVPs to be less harmful than combustible cigarettes, yet a significant proportion have concerns and misperceptions regarding nicotine (10, 13, 15, 31). Nicotine is a highly addictive substance, but it is the mixture of more than 4,000 chemicals (tar) that is produced as a result of the combustion that kills nearly half of long term smokers (32). While the majority of respondents believed that short term use of NVPs is safe, they become wary when asked about safety of long term use of NVPs and relative safety compared to NRTs. Due to being relatively new products, safety of long term use of NVPs is currently not known. Findings from various toxicological and short-term human studies, however, suggest that completely switching from smoking to vaping reduces short term adverse health outcomes (33).

Generally, Australia follows a highly restrictive regulatory approach to NVPs. Few Australian health and medical organisations have endorsed them as a cessation aid or harm reduction tool for smokers. Rather, policy briefings, media releases and position statements from notable health bodies focus mainly on the potential dangers associated with NVPs (34) unlike some other western countries (35). This portrayal of NVPs as dangerous products could have an impact on attitudes held by smokers and the general public towards their safety and what is an appropriate regulatory approach. The majority of non-smokers in our study supported a complete ban or a medicinal route for NVPs containing nicotine while allowing NVPs without

nicotine to be sold as tobacco products, mirroring current Australian regulations (36). Most jurisdictions in Australia (except Western Australia) allow NVPs without nicotine to be legally sold and used in places where smoking is allowed. However, since nicotine is classified as a 'dangerous poison' when not in human therapeutic or veterinary products (37), it is illegal to use NVPs containing nicotine unless the person holds a valid medical prescription (7). Such a regulatory approach is difficult to monitor and enforce owing to the difficulty of differentiating nicotine-containing from nicotine-free solutions. It is also difficult to regulate product quality under the current legislation. For instance, a recent study reported that e-liquids sold in Australia as 'nicotine-free' actually contained nicotine (38), albeit at low levels, and most Australian vapers rely on overseas online sources for nicotine-containing e-liquids (39).

A significant proportion of current smokers supported a regulatory environment that would allow NVPs (with or without nicotine) to be regulated in the same way as tobacco products. This regulatory option was also preferred by respondents who perceived NVPs as safer than combustible cigarettes. In a similar study conducted among US smokers and non-smokers, it was reported that perceived beliefs in the relative safety of NVPs was directly correlated with their regulatory preference, such that respondents who believe NVPs are harmful will more likely support policies that minimize use (40). Studies also reported that NVP users, respondents having accurate knowledge about nicotine, and those who perceived NVPs as less harmful than tobacco cigarettes were more likely to support a less restrictive regulatory approach (41).

The majority of vapers in our study reported receiving information about NVPs from their family/friends whereas only 1.4% of users had been advised by a HCP to use NVPs. Previous studies conducted in the US have reported that most adults learnt about NVPs either through a personal contact (a friend or family member), seeing them displayed in retail outlets (42) or from the internet and social media (43). However, information sourced from the media and/or anecdotal experiences may be biased and could lead to confusion as the content may not be scientifically valid. The finding that few participants had received advice from a healthcare professional about NVPs corroborates findings from a recent systematic review, which found healthcare professionals do not engage in routine communication with patients regarding NVPs and other low risk alternatives to smoking (18). Due to their geographic distribution and ease of accessibility, community pharmacies represent an ideal setting to educate the public and promote behaviours that improve health, one of which is smoking cessation. More than one-third of staff (39%) in community pharmacies in Brisbane, Australia report being asked about

NVPs by their customers (19), yet nearly all of the pharmacy staff felt uninformed about these products and were unsure how to handle customer enquiries amidst the scientific uncertainty and lack of guidance from peak professional bodies. Thus, pharmacists need to be provided with education/training and relevant resources so that they can provide unbiased and evidence-based advice for customers.

Our study has a number of methodological limitations and caveats that should be taken into account while interpreting the results. First, the questionnaire used for assessing the perception of respondents was not validated. As this study employed a descriptive cross-sectional study design and recruited a convenience sample of individuals attending urban pharmacies in Brisbane, the results may not be generalizable to the wider population. Moreover, this study should be regarded as a snapshot in time as the science surrounding NVPs is fast moving and beliefs of respondents may have changed since data collection, although the regulatory framework in Australia has remained unchanged since the study was conducted. Nonetheless, this survey provides valuable insight into the existing gap in public perception of relative harm of nicotine-containing products and informs the development of educational material for pharmacy staff to facilitate provision of evidence-based information to their customers.

Conclusions

Although pharmacy customers did not believe NVPs to be more harmful than combustible cigarettes, many respondents (particularly non-users) perceived nicotine-containing NVPs to be as harmful as combustible cigarettes. Misperceptions about relative risk of various nicotine-containing products were also reflected in respondent regulatory recommendations as they tended to prefer a more restrictive regulatory approach if NVPs contain nicotine, supporting a complete ban or regulation as a medicinal product that requires a medical professional to control access. As tobacco smoking is associated with compromised health status, often requiring medical intervention, community pharmacies are an ideal setting for educating smokers about less harmful alternatives such as NVPs. The development of practice guidelines for pharmacy staff will ultimately assist in providing a customised, evidence-based and unbiased information to their customers.

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Competing interest

All authors declare that there is no actual or potential conflict of interest.

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Figure legend

Figure 1. Respondents' opinions about the safety of e-cigarettes containing nicotine, n=470