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Knowledge and attitudes of Australian general practitioners towards medicinal cannabis: a cross-sectional survey

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Abstract

Objectives: To examine the knowledge and attitudes of Australian general practitioners (GPs) towards medicinal cannabis, including patient demand, GP perceptions of therapeutic effects and potential harms, perceived knowledge and willingness to prescribe.

Design, setting and participants: A cross-sectional survey completed by 640 GPs (response rate = 37%) attending educational seminars in five major Australian cities between August and November 2017.

Main outcome measures: Number of patients enquiring about medicinal cannabis, perceived knowledge of GPs, conditions where GPs perceived it to be beneficial, willingness to prescribe, preferred models of access, perceived adverse effects, and safety relative to other prescription drugs.

Results: The majority of GPs (61.5%) reported one or more patient enquiry about medicinal cannabis in the last 3 months. Most felt that their own knowledge was inadequate and only 28.8% felt comfortable discussing medicinal cannabis with patients. Over half (56.5%) supported availability on prescription, with the preferred access model involving trained GPs prescribing independently of specialists. Support for use of medicinal cannabis was condition-specific, with strong support for use in cancer pain, palliative care and epilepsy, and much lower support for use in depression and anxiety.

Conclusions: The majority of GPs are supportive or neutral with regards to medicinal cannabis use. Our results highlight the need for improved training of GPs around medicinal cannabis, and the discrepancy between GP-preferred models of access and the current specialist-led models.

Article Summary

Strengths and limitations of this study

- This is the first study to have examined the attitudes and knowledge of Australian general practitioners (GPs) about medicinal cannabis.
- It shows that most GPs report inadequate knowledge of available medicinal cannabis products and patient access routes, confirming the need for better training and support for GPs in this area.
- Limitations include a self-selected sample who attend GP training events and are motivated to complete a survey on the topic.

INTRODUCTION

There is strong and increasing public support for the use of medicinal cannabis in Australia.[1] This support has been a driver of a number of legislative and policy changes enacted over the last two years. These changes have allowed approved companies to cultivate cannabis plants and manufacture cannabis products, and have facilitated legal access to medicinal cannabis for approved patients.[2]

Despite this, patient access remains complex and highly restricted. Doctors wishing to prescribe medicinal cannabis products must either apply to become authorised prescribers for a class of patients, or apply for access for individual patients under the "Special Access Scheme Category B (SAS-B)"[3] via the Therapeutic Goods Administration (TGA), a regulatory body for therapeutic goods in Australia. Parallel approvals are also required from the relevant State or Territory Department of Health. Even with these approvals in place, patients often find available products prohibitively expensive.

Consequently, few doctors and patients are accessing medicinal cannabis in Australia. Currently, there are only about 30 authorised prescribers, servicing around 100 patients, and a further 150 patients granted SAS-B approval (TGA, personal communication, November 2017). This contrasts with the more mature access schemes of countries such as Canada, where approximately 200,000 patients are serviced.[4]

Under current schemes, Australian GPs are typically only permitted to prescribe medicinal cannabis if supported by a specialist.[3] Nonetheless, GPs are generally the first point of contact for patients enquiring about, or seeking access to, medicinal cannabis. Australian medical

bodies have warned that patient demand for medicinal cannabis is set to increase.[5] With ongoing media coverage fuelling unrealistic patient expectations regarding therapeutic efficacy and cannabis access,[6] GPs may be forced into the role of gatekeepers despite having limited knowledge and training in the field.

The attitudes of Australian GPs towards medicinal cannabis are unknown. Statements from peak medical bodies such as the Royal Australian College of General Practitioners (RACGP), Australian Medical Association (AMA) and the Australian, and New Zealand College of Anaesthetists' (ANZCA) Faculty of Pain Management generally advise caution on the basis of limited evidence for efficacy and safety.[5,7-9] Surveys from other countries suggest that clinicians are generally more reticent toward medicinal cannabis than the general public, particularly in the US,[10,11] with concerns centred on limited evidence for efficacy and adverse effects, including abuse and dependence.[10-12] Nevertheless, recent analyses suggest that the majority of GPs and specialists internationally support the use of medicinal cannabis for specific conditions.[13]

This article describes the results of a survey of Australian GPs on medicinal cannabis, including their clinical experiences, perceived knowledge, and beliefs about its regulation, safety, indications for use, and the preferred role of GPs in its prescription.

METHODS

Printed surveys were distributed at one-day general practice educational seminars held in five major Australian cities (Sydney, Melbourne, Brisbane, Adelaide, and Perth) between August and November 2017. All GPs and GP registrars were eligible to participate (n = 1728). Seminars

covered a range of topics relevant to general practice with around 18 different topics covered on the day in consecutive 20 - 30 minute presentations. One of the authors (ISM) spoke on the topic of medicinal cannabis at each event, but surveys were completed and collected prior to this presentation.

Participants first completed a series of closed questions on demographics, vocational experience (years in practice, registrar status, hours per week), and practice characteristics (size, state/territory, geographical classification). The survey proper consisted of 46 items on topics related to medicinal cannabis including clinical experience (4 items); perceived knowledge (5 items); concerns and awareness about safety and efficacy (18 items); appropriate indications for use (14 items); and views on the role of GPs, and specialists in its prescribing (5 items).

Participants rated the extent to which they agreed with 44 statements on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). There were also two multiple-choice questions concerning patient demand and prescribing preferences (role of GPs/specialists). The latter was introduced after the first seminar (included in 73% of completed surveys). A space for open-ended comments was provided at the end of the survey. The study was approved by The University of Sydney Human Research Ethics Committee (2017/692) and questions were reviewed by an advisory group of GPs (copy of full survey available in the online supplementary material).

Results were summarised using descriptive statistics (frequency, percentage of valid responses). As responses were largely complete, missing data were excluded from analyses.

Likert scale responses were generally collapsed into three categories: Agree, Neutral, and Disagree. Open-ended comments were reviewed for common themes. A composite score for Perceived Knowledge was created by summing scores from five knowledge-related questions. Age, sex, and perceived knowledge were tested as potential predictors of views on medicinal cannabis availability using separate ordinal logistic regression analyses. Chi-square tests were used to investigate differences in responses after stratifying on specific items. Analyses were conducted using IBM SPSS Statistics for Windows, version 24.0 (IBM Corp., Armonk, N.Y., USA), and graphs were created using GraphPad Prism version 7.02 for Windows (GraphPad Software, La Jolla, California, USA).

RESULTS

Demographic data

Demographic and practice details of the 640 participants are shown in Table 1. The majority of participants were female (67.3%), aged between 35 and 64 years (77.5%), and residing in Victoria (30.3%) and New South Wales (27.5%). Over half of respondents had been practicing for >15 years (56.7%), worked >30 hours/week (63.4%), and serviced metropolitan areas (60.3%). Only 8.2% were in single-GP practices and 7.9% were registrars.

Table 1. Demographic and practice characteristics of GPs in this study, and all GPs in Australia.

	GP survey (n = 640)		Australia (n = 34606)[25]	p (X^2 test)
	n	Valid %	%	
Age (n = 640)				<0.001
<35	57	8.9	13.4	
35-44	134	20.9	24.9	
45-54	177	27.7	24.9	
55-64	185	28.9	23.1	
65+	87	13.6	13.7	
Sex (n = 636)				<0.001
Female	428	67.3	44.7	
GP registrar (n = 611)				0.08
Yes	48	7.9	10.0	
State/territory (n = 627)				0.001
New South Wales	175	27.9	30.6	
Victoria	193	30.8	24.1	
Queensland	129	20.6	21.7	
South Australia	81	12.9	7.8	
Western Australia	39	6.2	10.2	
Geographical area (n = 611)				
Metropolitan	381	62.4	68.2	0.01
Regional	206	33.7	28.0	
Remote	24	3.9	3.9	
Years as GP (n = 637)				
<2	38	6.0		
2-5	90	14.1		
6-15	148	23.2		
16-25	136	21.4		
26+	225	35.3		

Experience, practice and general attitudes

A majority of GPs (61.5%) had experienced at least one patient enquiry regarding medicinal cannabis in the prior three months, with 7.5% reporting more than five enquiries. When considering GPs working >30 hours/week, the proportion with at least one enquiry increased to 69.0% and 11.8% received more than five enquiries (Table 2).

Table 2. Reported number of patient enquiries about medicinal cannabis in the prior three months, for all respondents and those working over 30 hours per week, on average.

Number of patients enquiring	All respondents (n = 615)		Respondents >30 h/week (n = 391)	
	N	%	N	%
0	237	38.5	116	31.0
1	159	25.9	90	24.1
2-5	173	28.1	124	33.2
6-10	33	5.4	32	8.6
>10	13	2.1	12	3.2

More than half of GPs agreed with the statement that medicinal cannabis should currently be available on prescription for certain indications (strongly agree: 19.6%, n = 125/637; slightly agree: 36.9%), while 14.9% disagreed (Figure 1). GPs were more likely to agree if they were older (χ^2 (4) = 25.63, p < 0.001) and had greater perceived knowledge (χ^2(2) = 5.54, p = 0.02), but there was no difference between sexes (χ^2 (1) = 2.55, p = 0.11).

More GPs agreed that they had patients who would benefit from medicinal cannabis (44.0%, n = 280/636) than disagreed (21.4%), with 34.6% expressing a neutral opinion (Figure 1). Conversely, fewer respondents agreed that they would like to be able to prescribe medicinal

cannabis (28.9%, n = 183/633) than disagreed (33.8%), again with a high number of neutral responses. Approximately half of respondents (n = 51.9%; n = 328/632) did not feel comfortable discussing medicinal cannabis with their patients.

Perceived knowledge

GPs generally rated their knowledge of medicinal cannabis as poor (Figure 2). On all five knowledge-related items, over two-thirds of respondents disagreed that they had knowledge of the topic in question. Notably, 65.4% (n = 417/638) 'strongly disagreed' that they knew how to access medicinal cannabis for patients, and more than half 'strongly disagreed' that they knew about available products (55.5%, n = 354/638) or the current regulatory approach (57.8%, n = 370/630).

Views on medicinal cannabis access models

Respondents were more likely to endorse an access model permitting prescribing by trained and accredited GPs (78.6% agree, n = 503/640), or by GPs in a 'shared care' arrangement with a specialist (63.2%, n = 401/634) than specialist-only prescribing (44.6%, n = 283/634). When asked to choose one preferred model, 41.2% (n = 164/398; excludes Sydney participants) indicated trained GPs as their preferred prescriber, followed by shared care (29.6%). Specialist-only prescribing was preferred by 14.6% of respondents, while only 12.1% preferred that all GPs have the right to prescribe.

Indications for use and evidence for efficacy

Almost half of respondents (48.0%, n = 305/635) were neutral as to whether there was sufficient scientific evidence for the efficacy of medicinal cannabis, with 22.8% supporting the statement. Those who agreed that medicinal cannabis should be available on prescription had higher endorsement of the statement than those who disagreed (40.2% versus 11.7%). The most highly endorsed indications for use were chronic cancer pain (80.2% agree, n = 506/631), palliative care (78.8%, n = 494/627), and intractable epilepsy (70.3%, n = 441/627; Figure 3). Use in chronic non-cancer pain and neuropathic pain was endorsed by 39.1% (n = 246/629), and 38.3% (n = 241/630) of respondents respectively, with a high degree of neutrality. Less than 15% of GPs supported use in anxiety, insomnia or depression.

Perceived features and adverse effects of medicinal cannabis

Approximately two-thirds of respondents disagreed with the statement that medicinal cannabis was no different to street cannabis (43.9% strongly disagree; n = 271/640; 20.5% slightly disagree), while 14.4% agreed.

The side effects of medicinal cannabis endorsed by more than half of respondents were driving impairment (64.9% agree, n = 408/629), adverse effects on the developing brain (58.4%, n = 366/627), cognitive impairment (56.5%, n = 356/630), and addiction and dependence (56.3%, n = 353/627); psychosis was endorsed by 49.9% (n = 313/627).

Overall, 27.7% of respondents (n = 177/637) agreed that they would not prescribe medicinal cannabis due to the risk of abuse and dependence, and 19.8% (n = 127/638) due to other side effects. These proportions were higher among GPs who disagreed with the

availability of medicinal cannabis on prescription (58.1% and 44.2% respectively) and among those who disagreed that they would like to prescribe medicinal cannabis (47.6% and 34.6% respectively).

A high proportion of GPs were neutral with respect to whether medicinal cannabis was more hazardous than other prescription medicines (range: 43.7% to 51.3%; Figure 4). Of the remaining responses, a majority believed that medicinal cannabis was safer than chemotherapy drugs (78.1%, n = 278/356), opioid analgesics (75.6%, n = 248/328), benzodiazepines (74.5%, n = 248/333) and antipsychotics (68.3%, n = 209/306), and over 50% for antidepressants and statins.

Open-ended responses

Of the 156 open-ended responses, 48.1% concerned the participant's lack of knowledge about medicinal cannabis and/or the desire for training. Other common themes included the need for more evidence of efficacy (n = 18) and concerns about harms (n = 19), namely abuse and dependence (n =10), cannabis-seeking for recreational use (n = 5), repeating mistakes made with opioids/benzodiazepines (n = 6) and other side effects (n = 4).

DISCUSSION

To our knowledge, this is the first study of the experiences, attitudes and knowledge of Australian GPs regarding medicinal cannabis. The survey demonstrates that many GPs have fielded recent enquiries about medicinal cannabis from their patients, yet half were not comfortable dealing these enquiries and most felt poorly informed about medicinal cannabis and its current regulation and uses. This perceived lack of knowledge was strongly conveyed in

the open-ended comments, as well as broadly reflected in the large number of neutral responses to questions regarding therapeutic and adverse effects.

In agreement with international clinician surveys,[10,11] Australian GPs were somewhat conservative in their attitudes about medicinal cannabis: only about half agreed that medicinal cannabis should be available on prescription compared to approximately 85% of the general Australian population.[1] GPs were generally more supportive of use of medicinal cannabis in conditions with a stronger evidence-base (such as spasticity in multiple sclerosis, chemotherapy-induced nausea/vomiting) and/or where few effective alternatives exist (palliative care, cancer pain, intractable epilepsy).[14] This also aligns with the indications for use suggested by various state governments.[15,16] By contrast, less than 40% of GPs supported use of medicinal cannabis in chronic non-cancer pain. This may reflect the mixed findings regarding efficacy for this indication,[14,17] concerns about inappropriate use, particularly in light of the problems associated with prescription opioids,[18] and the lack of endorsement by Australian government and medical organisations.[9,15] Similarly, concerns about limited evidence for efficacy, risk of worsening illness, and inappropriate use may underlie the very low support for use in depression, anxiety and insomnia.[14,15] It is somewhat troubling that these latter indications were among the most common reasons for illegal use of cannabis for medicinal purposes in a survey of more than 1700 current users in the Australian community (Lintzeris *et al*, under review).

Although GPs exhibited responses that suggested at least some familiarity with the scientific and clinical literature, perceived knowledge about the effects, products and process of accessing medicinal cannabis was generally very low. Less than 10% of GPs in our survey

reported understanding the current regulations concerning medicinal cannabis or how it can be accessed for patients. It is well known that poor knowledge and low levels of comfort discussing issues with patients are barriers to optimal patient care.[11,19] Provision of continuing medical education and guidelines on the regulatory, pharmacological and clinical aspects of medicinal cannabis are vital for equipping GPs to manage patients effectively.

One surprising aspect of this survey was how GPs rated medicinal cannabis relative to other common classes of prescription medicines. Of those expressing a non-neutral opinion (approximately 50%), about three-quarters rated medicinal cannabis as less harmful than opioids and benzodiazepines, and notably, just over half rated it less harmful than antidepressants and statins. This perception of the relative safety of medicinal cannabis compared to opioids and benzodiazepines may reflect its negligible rate of mortality and relatively mild dependence and withdrawal syndrome.[20] Nonetheless, cannabis can clearly produce dependence; recent estimates suggest that there are over 45,000 treatment episodes each year for Australians seeking control over their cannabis use.[21] Concerns about abuse, misuse and dependence was an identified theme of the open-ended comments in our survey. Moreover, almost half of the GPs who did not want to be able to prescribe cannabis cited the risk of abuse and dependence as a primary concern.

Although there was a high degree of neutrality with respect to the desire of GPs to prescribe medicinal cannabis, the vast majority supported a model of prescribing in which GPs played a significant role. A model in which trained, accredited GPs could prescribe without specialist input received the strongest support, followed by GP prescribing in a 'shared care' arrangement with a specialist. This contrasts with the current model in Australia, where

prescribing is conducted by specialists, although shared care arrangements are theoretically possible.[3] Although specialist-only prescribing may provide greater restrictions on use, the extension of prescribing rights to appropriately trained GPs arguably enables more holistic patient care, more frequent monitoring, better detection of adverse effects, and more timely treatment.[22] It is notable that GPs are empowered to prescribe, or permit access to, medicinal cannabis products in countries such as Canada and the United States.[11,19,23]

The strength of the study is the unique nature of the survey and the relatively large sample size enabled by accessing the GPs attending popular educational events. While our response rate of 37% appears relatively low, it exceeds typical published response rates of GP surveys[24]. Limitations relate to accessing a subpopulation of GPs that are motivated to attend such events and to fill out a survey on medicinal cannabis. Another limitation of the study is that the findings cannot be generalised to other countries such as the United States and Canada, among others, where access to medicinal cannabis is not as strictly regulated. There was also a disproportionate representation of female GPs in our study, which may be due to a tendency for greater survey response from females relative to males in general.[26]

In conclusion, our results demonstrate guarded support for medicinal cannabis availability among Australian GPs, but very low levels of perceived knowledge. Clearly, there is an urgent need for improved training of GPs around medicinal cannabis, and, in the future, a reconsideration of the role of GPs in its prescription.

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Competing Interests

This study was supported by the Lambert Initiative for Cannabinoid Therapeutics, a philanthropically-funded centre for medicinal cannabis research at the University of Sydney. Iain McGregor is Academic Director of the Lambert Initiative and an NHMRC Principal Research Fellow and receives research funding from the ARC and NHMRC. He is involved in an NHMRC-funded clinical trial using the cannabis extract, Sativex. This survey was conducted at seminars run by HealthEd. Ramesh Manocha is the CEO of Healthed, and Iain McGregor received speaker fees from Healthed for lectures on conducted at these events. All other authors have no competing interests to declare.

Author contributions

R.M., I.S.M., E.A.K., A.S., and N.E. conceived the study; I.S.M. collected the data; E.A.K. and I.S.M. conducted the data analysis and wrote the manuscript; All authors reviewed the manuscript.

Ethics approval

Ethical approval for the survey was granted by The University of Sydney Human Research Ethics Committee.

Data sharing statement

No additional data are available.

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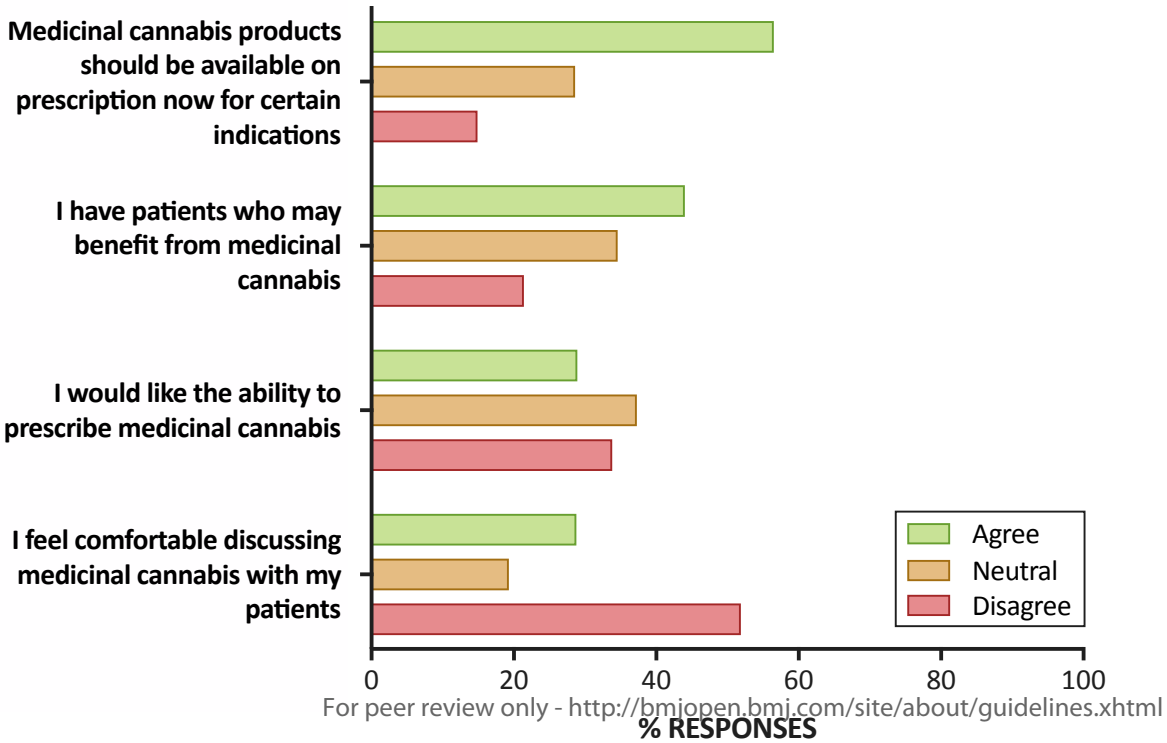
Figure legends

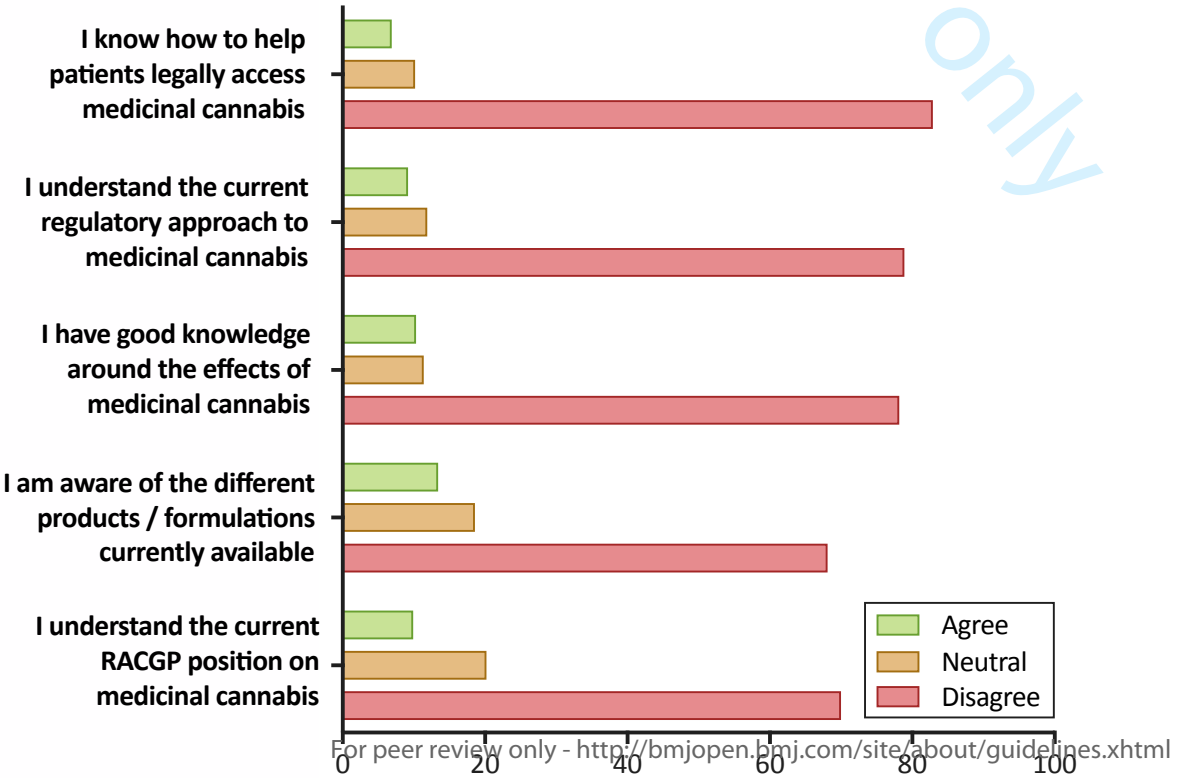
Figure 1. Attitudes and clinical experiences of general practitioners with respect to medicinal cannabis, n = 632 – 637.

Figure 2. Ratings of general practitioners on knowledge-related items, n = 636 – 640. RACGP=Royal Australian College of General Practitioners.

Figure 3. Support for use of medicinal cannabis in different conditions, n = 627 – 632. CINV=Chemo-induced nausea and vomiting; MS=Multiple sclerosis; PTSD=Post-traumatic stress disorder.

Figure 4. Ratings of relative hazards of medicinal cannabis compared to other prescription medicines, n = 627 – 632.





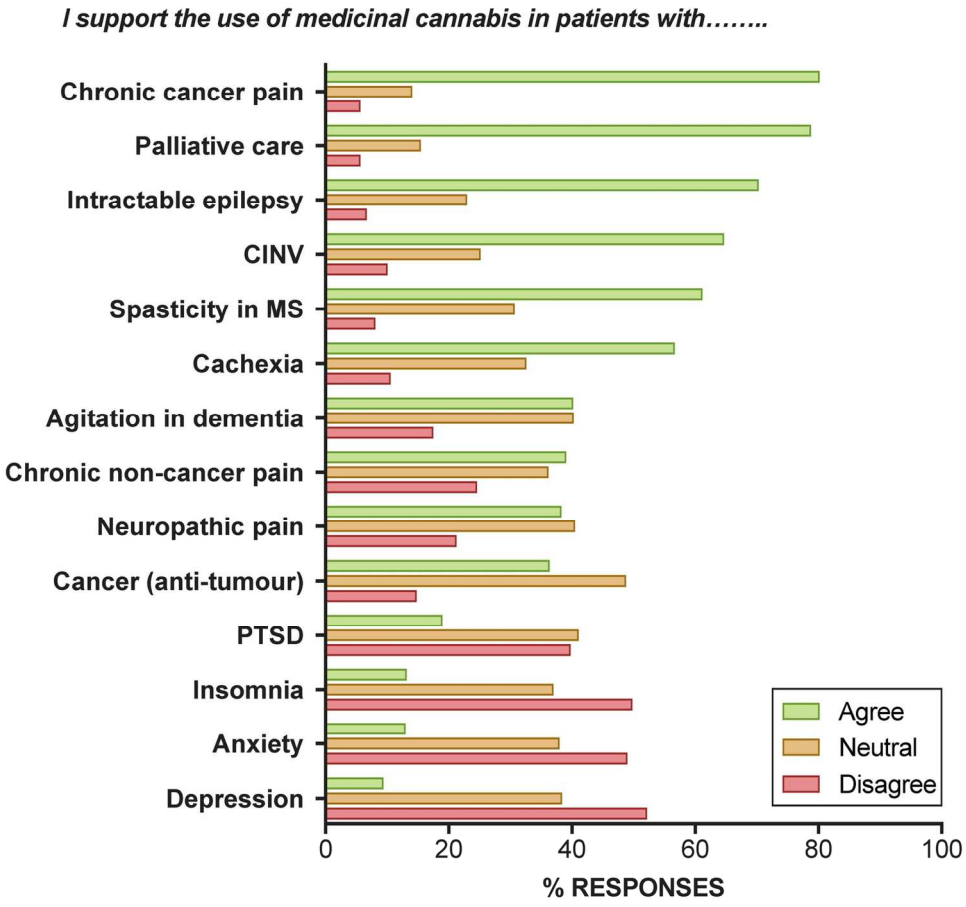


Figure 3. Support for use of medicinal cannabis in different conditions, n = 627 - 632. CINV=Chemo-induced nausea and vomiting; MS=Multiple sclerosis; PTSD=Post-traumatic stress disorder.

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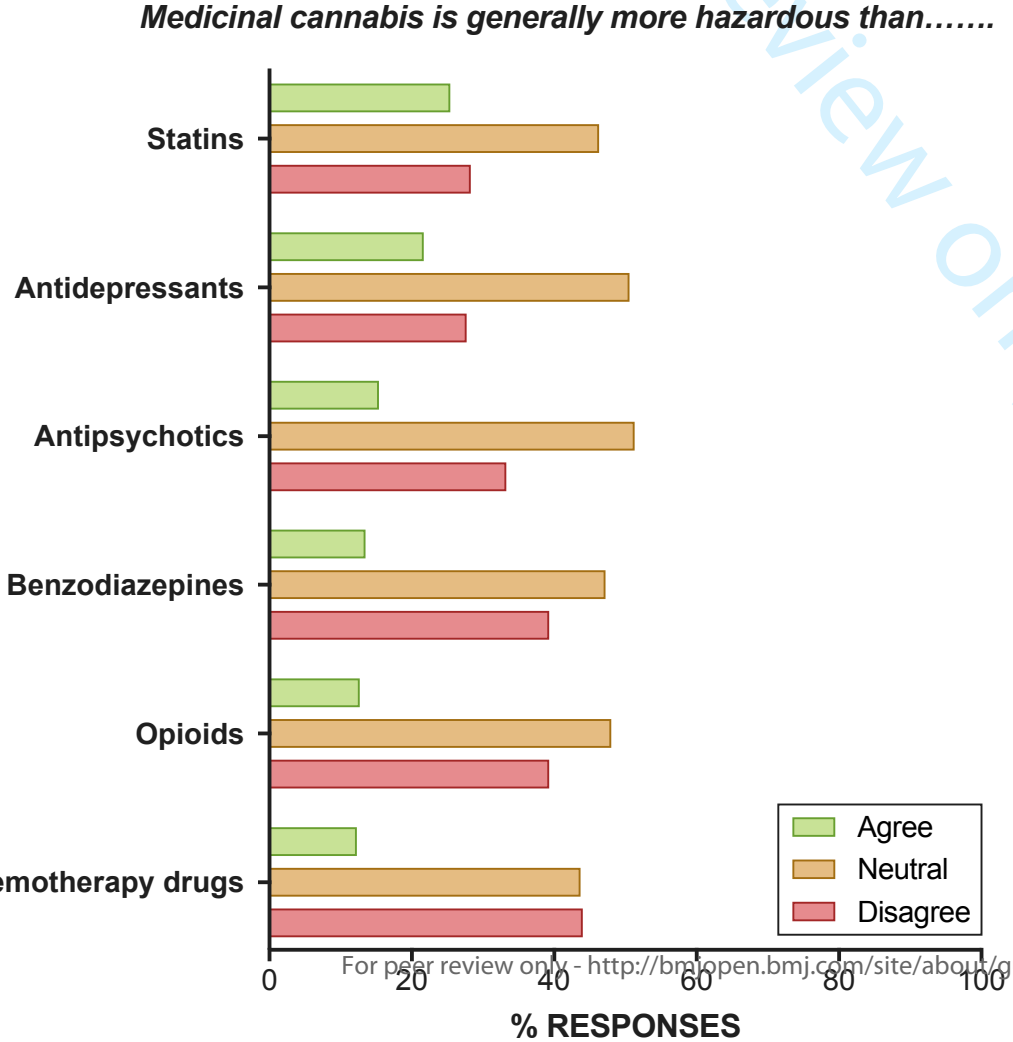

MEDICINAL CANNABIS SURVEY FOR GPs

Profession	GP ☐	NURSE ☐	MIDWIFE ☐	PHYSIO ☐	PHARMACIST ☐	O&G ☐	OTHER ☐
Age category	<35 ☐	35-44 ☐	45-54 ☐	55-64 ☐	65+ ☐		
Sex	M ☐	F ☐	OTHER ☐				
Years in general practice	<2 ☐	2-5 ☐	6-15 ☐	16-25 ☐	26+ ☐		
GP registrar?	Y ☐	N ☐					
Average hours spend in clinical practice per week	<10 ☐	11-20 ☐	21-30 ☐	31-40 ☐	>40 ☐		
Size of Practice (number of GPs)	1 ☐	2-4 ☐	5-9 ☐	10-20 ☐	>20 ☐		
State/Territory of the Practice you work in	NSW ☐	VIC ☐	QLD ☐	SA ☐	TAS ☐	WA ☐	ACT ☐
Geographical area serviced	METRO ☐		REGIONAL ☐		REMOTE ☐		
Did you attend the Women and Children's Healthed event this year?	Y ☐	N ☐					

	0	1	2-5	6-10	>10
1. In the past 3 months, how many of your patients have enquired about medicinal cannabis products?	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	*SLIGHTLY DISAGREE*	*NEUTRAL*	*SLIGHTLY AGREE*	*STRONGLY AGREE*
2. I have patients who may benefit from medicinal cannabis	☐	☐	☐	☐	☐
3. Medicinal cannabis products should be available on prescription now for certain indications	☐	☐	☐	☐	☐
4. I feel comfortable discussing medicinal cannabis with my patients	☐	☐	☐	☐	☐
5. I have good knowledge around the effects of medicinal cannabis products	☐	☐	☐	☐	☐
6. I am aware of the different medicinal cannabis products and formulations currently available	☐	☐	☐	☐	☐
7. I would like the ability to prescribe medicinal cannabis products	☐	☐	☐	☐	☐
8. Medicinal cannabis should only be prescribed by specialists	☐	☐	☐	☐	☐
9. Medicinal cannabis should be provided in "shared care" with a specialist	☐	☐	☐	☐	☐
10. Only GPs who have undergone specific training and credentialing should be allowed to prescribe medicinal cannabis	☐	☐	☐	☐	☐
11. I know how to help patients legally access medicinal cannabis	☐	☐	☐	☐	☐
12. I understand the current regulatory approach to medicinal cannabis	☐	☐	☐	☐	☐
13. I understand the current RACGP position on medicinal cannabis	☐	☐	☐	☐	☐
14. There is little difference between "street cannabis" and medicinal cannabis products	☐	☐	☐	☐	☐
15. I will not prescribe medicinal cannabis as the risk of abuse and dependence is too high	☐	☐	☐	☐	☐
16. I will not prescribe medicinal cannabis as the risk of side effects (other than abuse and dependence) is too high.	☐	☐	☐	☐	☐
17. There is sufficient scientific evidence of the efficacy of medicinal cannabis	☐	☐	☐	☐	☐

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18 . I support the use of medicinal cannabis in patients with:

	STRONGLY DISAGREE	SLIGHTLY DISAGREE	NEUTRAL	SLIGHTLY AGREE	STRONGLY AGREE
Chronic cancer pain	☐	☐	☐	☐	☐
Chronic non-cancer pain	☐	☐	☐	☐	☐
Neuropathic pain	☐	☐	☐	☐	☐
Intractable epilepsy	☐	☐	☐	☐	☐
Anti-tumour effects	☐	☐	☐	☐	☐
Spasticity in Multiple Sclerosis	☐	☐	☐	☐	☐
Dementia patients with agitation	☐	☐	☐	☐	☐
Insomnia	☐	☐	☐	☐	☐
PTSD	☐	☐	☐	☐	☐
Anxiety	☐	☐	☐	☐	☐
Depression	☐	☐	☐	☐	☐
End of life/Palliative care	☐	☐	☐	☐	☐
Chemotheraphy-induced nausea and vomiting	☐	☐	☐	☐	☐
Cachexia associated with severe illness	☐	☐	☐	☐	☐

19 . The major side effects of medicinal cannabis consumption include:

Addiction and dependence	☐	☐	☐	☐	☐
Cognitive impairment	☐	☐	☐	☐	☐
Driving impairment	☐	☐	☐	☐	☐
Weight gain	☐	☐	☐	☐	☐
Psychosis	☐	☐	☐	☐	☐
Other long-term mental health issues	☐	☐	☐	☐	☐
Interactions with other medications	☐	☐	☐	☐	☐
Impact on the developing brain	☐	☐	☐	☐	☐

20 . Medicinal cannabis is generally more hazardous than:

Prescription opioids	☐	☐	☐	☐	☐
Benzodiazepines	☐	☐	☐	☐	☐
Antipsychotics	☐	☐	☐	☐	☐
Statins	☐	☐	☐	☐	☐
Chemotherapy drugs	☐	☐	☐	☐	☐
Antidepressants	☐	☐	☐	☐	☐

21 . The right to prescribe medicinal cannabis should be available to: ***CHOOSE ONE RESPONSE ONLY***

- *All GPs* ☐
- *Only GPs with specific training and credentials* ☐
- *Only GPs in 'shared care' with a specialist* ☐
- *Only specialists* ☐
- *Medicinal cannabis should not be available on prescription* ☐

OPEN ENDED COMMENTS

Please use this space to offer any comments, opinions or observations about medicinal cannabis in Australia

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7
Bias	9	Describe any efforts to address potential sources of bias	16
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	NA
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7-8
		(*b*) Describe any methods used to examine subgroups and interactions	7
		(*c*) Explain how missing data were addressed	6
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5, 7
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	Percentage of valid responses stated for each categorical variable in tables/figures
Outcome data	15*	Report numbers of outcome events or summary measures	NA
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	12-13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15
Generalisability	21	Discuss the generalisability (external validity) of the study results	15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Knowledge and attitudes of Australian general practitioners towards medicinal cannabis: a cross-sectional survey

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Knowledge and attitudes of Australian general practitioners towards medicinal cannabis: a cross-sectional survey

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Abstract

Objectives: To examine the knowledge and attitudes of Australian general practitioners (GPs) towards medicinal cannabis, including patient demand, GP perceptions of therapeutic effects and potential harms, perceived knowledge and willingness to prescribe.

Design, setting and participants: A cross-sectional survey completed by 640 GPs (response rate = 37%) attending multiple topic educational seminars in five major Australian cities between August and November 2017.

Main outcome measures: Number of patients enquiring about medicinal cannabis, perceived knowledge of GPs, conditions where GPs perceived it to be beneficial, willingness to prescribe, preferred models of access, perceived adverse effects, and safety relative to other prescription drugs.

Results: The majority of GPs (61.5%) reported one or more patient enquiry about medicinal cannabis in the last 3 months. Most felt that their own knowledge was inadequate and only 28.8% felt comfortable discussing medicinal cannabis with patients. Over half (56.5%) supported availability on prescription, with the preferred access model involving trained GPs prescribing independently of specialists. Support for use of medicinal cannabis was condition-specific, with strong support for use in cancer pain, palliative care and epilepsy, and much lower support for use in depression and anxiety.

Conclusions: The majority of GPs are supportive or neutral with regards to medicinal cannabis use. Our results highlight the need for improved training of GPs around medicinal cannabis, and the discrepancy between GP-preferred models of access and the current specialist-led models.

Article Summary

Strengths and limitations of this study

- This is the first study to have examined the attitudes and knowledge of Australian general practitioners (GPs) about medicinal cannabis.
- The study was performed across five major cities in Australia and included a relatively large sample (n=640) of GPs.
- Limitations include utilising a survey without established psychometric properties and exclusive recruitment of self-selected GPs from educational seminars who were motivated to complete a survey on medicinal cannabis.

INTRODUCTION

There is strong and increasing public support for the use of medicinal cannabis in Australia.[1] This support has been a driver of a number of legislative and policy changes enacted over the last two years. These changes have allowed approved companies to cultivate cannabis plants and manufacture cannabis products, and have facilitated legal access to medicinal cannabis for approved patients.[2]

Despite this, patient access remains complex and highly restricted. Doctors wishing to prescribe medicinal cannabis products must either apply to become authorised prescribers for a class of patients, or apply for access for individual patients under the "Special Access Scheme Category B (SAS-B)"[3] via the Therapeutic Goods Administration (TGA), a regulatory body for therapeutic goods in Australia. Parallel approvals are also usually required from the relevant State or Territory Department of Health. Even with these approvals in place, patients often find available products prohibitively expensive. Moreover, no formal educational training programs for doctors on the topic of medicinal cannabis have been initiated since the recent legislative changes.

Consequently, few doctors and patients are accessing medicinal cannabis in Australia. Currently, there are only about 31 authorised prescribers, servicing around 100 patients, with a further 386 patients granted access via SAS-B approvals (TGA, personal communication, March 2018). This contrasts with the more mature access schemes of countries such as Canada, where approximately 200,000 patients are serviced.[4]

Under current schemes, Australian GPs are typically only permitted to prescribe medicinal cannabis if supported by a specialist.[3] Nonetheless, GPs are generally the first point of contact for patients enquiring about, or seeking access to, medicinal cannabis. Australian medical bodies have forecasted that patient demand for medicinal cannabis is set to increase.[5] With ongoing media coverage fuelling unrealistic patient expectations regarding therapeutic efficacy and cannabis access,[6] GPs may be forced into the role of gatekeepers despite having limited knowledge and training in the field.

The attitudes of Australian GPs towards medicinal cannabis are unknown. Statements from peak medical bodies such as the Royal Australasian College of Physicians (RACP) [7], Australian Medical Association (AMA), and the Australian and New Zealand College of Anaesthetists' (ANZCA) Faculty of Pain Management generally advise caution on the basis of limited evidence for efficacy and safety.[5,8-10] Surveys from other countries suggest that clinicians are generally more reticent toward medicinal cannabis than the general public, particularly in the United States,[11,12] with concerns centred on limited evidence for efficacy and adverse effects, including abuse and dependence.[11-13] Nevertheless, recent analyses suggest that the majority of GPs and specialists internationally support the use of medicinal cannabis for specific conditions.[14]

This article describes the results of a survey of Australian GPs around medicinal cannabis issues, including their clinical experiences, perceived knowledge, and beliefs about its regulation, safety, indications for use, and the preferred role of GPs in its prescription.

METHODS

Printed surveys were distributed at one-day general practice educational seminars held in five major Australian cities (Sydney, Melbourne, Brisbane, Adelaide, and Perth) between August and November 2017. All GPs and GP registrars were eligible to participate (n = 1728). Seminars covered a range of topics relevant to general practice with around 18 different topics covered on the day in consecutive 20 - 30 minute presentations. GPs and GP registrars received professional education points for attending the seminars. One of the authors (ISM) spoke on the topic of medicinal cannabis at each event, but surveys were completed and collected prior to this presentation. During the opening of each *Healthed* seminar, participants were informed that the survey and its information and consent form were located in their conference satchel. Participants were instructed to turn in their surveys, before afternoon tea, into drop boxes at the conference.

The survey was devised specifically for use in this study, and thus, had not been psychometrically validated. Questions were reviewed by an advisory group of GPs to ensure appropriate wording and clarity (see Supplementary Material online for copy of full survey). Participants first completed a series of closed questions on demographics, vocational experience (years in practice, registrar status, hours per week), and practice characteristics (size, state/territory, geographical classification). The survey proper consisted of 46 items on topics related to medicinal cannabis including clinical experience (4 items); perceived knowledge (5 items); concerns and awareness about safety and efficacy (18 items); appropriate indications for use (14 items); and views on the role of GPs, and specialists in its prescribing (5 items).

Participants rated the extent to which they agreed with 44 statements on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). There were also two multiple-choice questions concerning patient demand and prescribing preferences (role of GPs/specialists). The latter question was only introduced after the first seminar (included in 73% of completed surveys; excludes respondents from the Sydney event). A space for open-ended comments was provided at the end of the survey. The study was approved by The University of Sydney Human Research Ethics Committee (2017/692).

Results were summarised using descriptive statistics (frequency, percentage of valid responses). Likert scale responses were generally collapsed into three categories: Agree, Neutral, and Disagree. Open-ended comments were reviewed for common themes. A composite score for Perceived Knowledge was created by summing scores from five knowledge-related questions. Age, sex, and perceived knowledge were tested as potential predictors of views on medicinal cannabis availability ('medicinal cannabis should currently be available on prescription for certain indications'; 1 = strongly disagree to 5 = strongly agree) using separate ordinal logistic regression analyses. Chi-square tests were used to compare the demographic characteristics of our sample to the Australian population of GPs.[15]

One section of the questionnaire asked whether GPs support the use of medicinal cannabis in 14 different medical conditions. To assess whether their support was consistent with current evidence for efficacy, each indication was categorised as having either "Good Evidence for Efficacy" (spasticity in MS, intractable epilepsy, chronic cancer pain, chronic non-cancer pain, neuropathic pain, CINV, and insomnia) or "Poor Evidence for Efficacy" (anxiety, depression, PTSD, cachexia, cancer/ anti-tumour effects, agitation in dementia) based on two recent

authoritative reviews,[16,17] and levels of support expressed compared to this evidence base. The evidence for 'palliative care' was not assessed in either review and was thus excluded for the purposes of this analysis. Further, GP respondents were categorised as having either "Good Perceived Knowledge" or "Poor Perceived Knowledge" using a cut-off score of 15 on the composite score for Perceived Knowledge (the midpoint between the lowest (=5) and highest (=25) possible scores for the 5 questions relating to self-knowledge). Chi-square tests were used to assess whether GPs with Good Perceived Knowledge expressed greater support for specific indications than those with Poor Perceived Knowledge. Bonferroni correction were used to control for these multiple comparisons.

Analyses were conducted using IBM SPSS Statistics for Windows, version 24.0 (IBM Corp., Armonk, N.Y., USA), and graphs were created using GraphPad Prism version 7.02 for Windows (GraphPad Software, La Jolla, California, USA).

Patient and Public Involvement

Patients were not involved in this study.

RESULTS

Demographic data

Demographic and practice details of the 640 participants are shown in Table 1. The majority of participants were female (67.3%), aged between 35 and 64 years (77.5%), and residing in Victoria (30.3%) and New South Wales (27.5%). Over half of respondents had been practicing for >15 years (56.7%), worked >30 hours/week (63.4%), and serviced metropolitan areas (60.3%). Only 8.2% were in single-GP practices and 7.9% were registrars.

Table 1. Demographic and practice characteristics of GPs in this study, and all GPs in Australia.

	GP survey (n = 640)		Australia (n = 34,606) [15]	p (X^2 test)
	n	Valid %	%	
Age (n = 640)				<0.001
<35	57	8.9	13.4	
35-44	134	20.9	24.9	
45-54	177	27.7	24.9	
55-64	185	28.9	23.1	
65+	87	13.6	13.7	
Sex (n = 636)				<0.001
Female	428	67.3	44.7	
GP registrar (n = 611)				0.08
Yes	48	7.9	10.0	
State/territory (n = 627)				0.001
New South Wales	175	27.9	30.6	
Victoria	193	30.8	24.1	
Queensland	129	20.6	21.7	
South Australia	81	12.9	7.8	
Western Australia	39	6.2	10.2	
Geographical area (n = 611)				
Metropolitan	381	62.4	68.2	0.01
Regional	206	33.7	28.0	
Remote	24	3.9	3.9	
Years as GP (n = 637)				
<2	38	6.0		
2-5	90	14.1		
6-15	148	23.2		
16-25	136	21.4		
26+	225	35.3		

Experience, practice and general attitudes

A majority of GPs (61.5%) had experienced at least one patient enquiry regarding medicinal cannabis in the prior three months, with 7.5% reporting more than five enquiries. When considering GPs working >30 hours/week, the proportion with at least one enquiry increased to 69.0% and 11.8% received more than five enquiries (Table 2).

Table 2. Reported number of patient enquiries about medicinal cannabis in the prior three months, for all respondents and those working over 30 hours per week, on average.

Number of patients enquiring	All respondents (n = 615)		Respondents >30 h/week (n = 391)	
	N	%	N	%
0	237	38.5	116	31.0
1	159	25.9	90	24.1
2-5	173	28.1	124	33.2
6-10	33	5.4	32	8.6
>10	13	2.1	12	3.2

More than half of GPs agreed with the statement that medicinal cannabis should currently be available on prescription for certain indications (strongly agree: 19.6%, n = 125/637; slightly agree: 36.9%), while 14.9% disagreed (Figure 1). GPs were more likely to agree if they were older (χ^2 (4) = 25.63, p < 0.001) and had greater perceived knowledge (χ^2(2) = 5.54, p = 0.02), but there was no difference between sexes (χ^2 (1) = 2.55, p = 0.11).

More GPs agreed that they had patients who would benefit from medicinal cannabis (44.0%, n = 280/636) than disagreed (21.4%), with 34.6% expressing a neutral opinion (Figure 1). Conversely, fewer respondents agreed that they would like to be able to prescribe medicinal

cannabis (28.9%, n = 183/633) than disagreed (33.8%), again with a high number of neutral responses. Approximately half of respondents (n = 51.9%; n = 328/632) did not feel comfortable discussing medicinal cannabis with their patients.

Perceived knowledge

GPs generally rated their knowledge of medicinal cannabis as poor (Figure 2). On all five knowledge-related items, over two-thirds of respondents disagreed that they had knowledge of the topic in question. Notably, 65.4% (n = 417/638) 'strongly disagreed' that they knew how to access medicinal cannabis for patients, and more than half 'strongly disagreed' that they knew about available products (55.5%, n = 354/638) or the current regulatory approach (57.8%, n = 370/630). According to their own self-ratings, 543 (86%) GPs had Poor Perceived Knowledge (<15/25 composite score) while 88 (14%) GPs were categorised as having Good Perceived Knowledge (≥15/25 composite score).

Respondents were more likely to endorse an access model permitting prescribing by trained and accredited GPs (78.6% agree, n = 503/640), or by GPs in a 'shared care' arrangement with a specialist (63.2%, n = 401/634) than specialist-only prescribing (44.6%, n = 283/634). When asked to choose one preferred model, 41.2% (n = 164/398; note this question was not included in the survey used at the first seminar in Sydney) indicated trained GPs as their preferred prescriber, followed by shared care (29.6%). Specialist-only prescribing was preferred by 14.6% of respondents, while only 12.1% preferred that all GPs have the right to prescribe, regardless of training.

Indications for use and evidence for efficacy

Almost half of respondents (48.0%, n = 305/635) were neutral as to whether there was sufficient overall scientific evidence for the efficacy of medicinal cannabis, with 22.8% supporting the statement. Those who agreed that medicinal cannabis should be available on prescription had higher endorsement of the statement than those who disagreed (40.2% versus 11.7%). GPs supported the use of medicinal cannabis in chronic cancer pain (80.2% agree, n = 506/631), palliative care (78.8%, n = 494/627), and intractable epilepsy (70.3%, n = 441/627; Figure 3). Use in chronic non-cancer pain and neuropathic pain was endorsed by only 39.1% (n = 246/629), and 38.3% (n = 241/630) of respondents respectively, with a high degree of neutrality. Less than 15% of GPs supported use in anxiety, insomnia or depression with a majority of GPs declining to support use in these conditions (Figure 3).

GPs with Good Perceived Knowledge of medicinal cannabis were more likely to support its use in neuropathic pain (52.9%) and chronic non-cancer pain (54%) than GPs with Poor Perceived Knowledge (35.6% and 36.4%, respectively) (neuropathic pain, X^2 (2, N=620) = 9.9, p=0.007; chronic non-cancer pain, X^2 (2, N=620) = 11.2, p=0.004). No other significant differences between GPs perceived knowledge level and their support for specific medical conditions were identified.

Perceived features and adverse effects of medicinal cannabis

Approximately two-thirds of respondents disagreed with the statement that medicinal cannabis was no different to street cannabis (43.9% strongly disagree; n = 271/640; 20.5% slightly disagree), while 14.4% agreed.

The side effects of medicinal cannabis endorsed by more than half of respondents included driving impairment (64.9% agree, n = 408/629), adverse effects on the developing brain (58.4%, n = 366/627), cognitive impairment (56.5%, n = 356/630), and addiction and dependence (56.3%, n = 353/627); psychosis was endorsed by 49.9% (n = 313/627).

Overall, 27.7% of respondents (n = 177/637) agreed that they would not prescribe medicinal cannabis due to the risk of abuse and dependence, and 19.8% (n = 127/638) due to other side effects. These proportions were higher among GPs who disagreed with the availability of medicinal cannabis on prescription (58.1% and 44.2% respectively) and among those who disagreed that they would like to prescribe medicinal cannabis (47.6% and 34.6% respectively).

A high proportion of GPs were neutral with respect to whether medicinal cannabis was more hazardous than other prescription medicines (range: 43.7% to 51.3%; Figure 4). Of the remaining responses, a majority believed that medicinal cannabis was safer than chemotherapy drugs (78.1%, n = 278/356), opioid analgesics (75.6%, n = 248/328), benzodiazepines (74.5%, n = 248/333) and antipsychotics (68.3%, n = 209/306), and over 50% for antidepressants and statins.

Open-ended responses

Of the 156 open-ended responses, 48.1% concerned the participant's lack of knowledge about medicinal cannabis and/or the desire for training. Other common themes included the need for more evidence of efficacy (n = 18) and concerns about harms (n = 19), namely abuse

and dependence (n =10), cannabis-seeking for recreational use (n = 5), repeating mistakes made with opioids/benzodiazepines (n = 6) and other side effects (n = 4).

DISCUSSION

To our knowledge, this is the first study of the experiences, attitudes and knowledge of Australian GPs regarding medicinal cannabis. The survey demonstrates that many GPs have fielded recent enquiries about medicinal cannabis from their patients, yet half were not comfortable dealing these enquiries and most felt poorly informed about medicinal cannabis and its current availability, regulation and uses. This perceived lack of knowledge was strongly conveyed in the open-ended comments, as well as broadly reflected in the large number of neutral responses to questions regarding therapeutic and adverse effects.

In agreement with clinician surveys in the United States,[11,12] Australian GPs were somewhat conservative in their attitudes about medicinal cannabis: only about half agreed that medicinal cannabis should be available on prescription compared to approximately 85% of the general Australian population.[1] This rate however has somewhat risen since previous surveys, with just under 30% of Australian GPs reporting that cannabis should be available for medicinal purposes in 2012.[18] This suggests a possible shift in attitudes over time as increasing community support has driven a number of legislative and policy changes for greater patient access and clinical trials in Australia. In the present survey, GPs were generally more supportive of use of medicinal cannabis in conditions with a stronger evidence-base (such as spasticity in multiple sclerosis, chemotherapy-induced nausea/vomiting) and/or where few effective alternatives exist (palliative care, cancer pain, intractable epilepsy).[16] This also aligns with the

indications for use suggested by various state governments.[19,20] By contrast, less than 40% of all GPs supported use of medicinal cannabis in chronic non-cancer pain. This may reflect the mixed findings regarding efficacy for this indication,[16,21] concerns about inappropriate use, particularly in light of the problems associated with prescription opioids,[22] and the lack of endorsement by Australian government and medical organisations.[10,19] Similarly, concerns about limited evidence for efficacy, risk of worsening illness, and inappropriate use may underlie the very low support for use in depression, anxiety and insomnia.[16,19] It is somewhat troubling that these latter indications were among the most common reasons for illegal use of cannabis for medicinal purposes in a survey of more than 1700 current users in the Australian community (Lintzeris *et al*, in press).

Although GPs exhibited responses that suggested at least some familiarity with the scientific and clinical literature, perceived knowledge about the effects, products and process of accessing medicinal cannabis was generally very low. Less than 10% of GPs in our survey reported understanding the current regulations concerning medicinal cannabis or how it can be accessed for patients. It is well known that poor knowledge and low levels of comfort discussing issues with patients are barriers to optimal patient care.[12,23] Provision of continuing medical education and guidelines on the regulatory, pharmacological and clinical aspects of medicinal cannabis are vital for equipping GPs to manage patients effectively.

One surprising aspect of this survey was how GPs rated medicinal cannabis relative to other common classes of prescription medicines. Of those expressing a non-neutral opinion (approximately 50%), about three-quarters rated medicinal cannabis as less harmful than opioids and benzodiazepines, and notably, just over half rated it less harmful than

antidepressants and statins. This perception of the relative safety of medicinal cannabis compared to opioids and benzodiazepines may reflect its negligible rate of mortality and relatively mild dependence and withdrawal syndrome.[24] Nonetheless, cannabis can clearly produce dependence; recent estimates suggest that there are over 45,000 treatment episodes each year for Australians seeking control over their cannabis use.[25] Concerns about abuse, misuse and dependence was an identified theme of the open-ended comments in our survey. Moreover, almost half of the GPs who did not want to be able to prescribe cannabis cited the risk of abuse and dependence as a primary concern.

Although there was a high degree of neutrality with respect to the desire of GPs to prescribe medicinal cannabis, the vast majority supported a model of prescribing in which GPs played a significant role. A model in which trained, accredited GPs could prescribe without specialist input received the strongest support, followed by GP prescribing in a 'shared care' arrangement with a specialist. This contrasts with the current model in Australia, where prescribing is conducted by specialists, although shared care arrangements are theoretically possible.[3] Although specialist-only prescribing may provide greater restrictions on use, the extension of prescribing rights to appropriately trained GPs arguably enables more holistic patient care, more frequent monitoring, better detection of adverse effects, and more timely treatment.[26] It is notable that GPs are empowered to prescribe, or permit access to, medicinal cannabis products in countries such as Canada and the United States,[12,23,27] and the Royal Australian College of GPs (RACGP) recently updated their position statement to explicitly endorse a direct role for GPs in medicinal cannabis access.[28]

The strength of the study is the unique nature of the survey and the relatively large sample size enabled by accessing the GPs attending popular educational events. While our response rate of 37% appears relatively low, it exceeds typical published response rates of GP surveys.[29] Limitations include the sole recruitment of self-selected GPs from *Healthed* seminars, reliance on self-report of service provision, and utilising a survey without established psychometric properties. Furthermore, the survey respondents differed on a number of demographic and practice characteristics to the general population of GPs in Australia, suggestive of a non-representative sample. For instance, there was a disproportionate representation of female GPs in our study, which may be due to a tendency for greater survey response from females relative to males in general.[30] Finally, the findings cannot be generalised to other countries such as the United States and Canada, among others, where access to medicinal cannabis is not so strictly regulated.

In conclusion, our results demonstrate guarded support for medicinal cannabis availability among Australian GPs, but very low levels of perceived knowledge. Clearly, there is an urgent need for improved training of GPs around medicinal cannabis, and, in the future, a reconsideration of the role of GPs in its prescription.

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Competing Interests

This study was supported by the Lambert Initiative for Cannabinoid Therapeutics, a philanthropically-funded centre for medicinal cannabis research at the University of Sydney. Iain McGregor is Academic Director of the Lambert Initiative and an NHMRC Principal Research Fellow and receives research funding from the ARC and NHMRC. He is involved in an NHMRC-funded clinical trial using the cannabis extract, Nabiximols (*Sativex*). This survey was conducted at seminars run by *HealthEd*. Ramesh Manocha is the CEO of *Healthed*, and Iain McGregor received honoraria and travel expenses from *Healthed* for lectures conducted at these events. All other authors have no competing interests to declare.

Author contributions

R.M., I.S.M., E.A.K., A.S., and N.E. conceived the study; I.S.M. collected the data; E.A.K., A.S., and I.S.M. conducted the data analysis and wrote the manuscript; All authors reviewed the manuscript.

Ethics approval

Ethical approval for the survey was granted by The University of Sydney Human Research Ethics Committee [2017/692].

Data sharing statement

No additional data are available.

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Figure legends

Figure 1. Attitudes and clinical experiences of general practitioners with respect to medicinal cannabis, n = 632 – 637, valid percentage.

Figure 2. Ratings of general practitioners on knowledge-related items, n = 636 – 640, valid percentage. RACGP=Royal Australian College of General Practitioners.

Figure 3. Support for use of medicinal cannabis in different conditions, n = 627 – 632, valid percentage. CINV=Chemotherapy-induced Nausea and Vomiting; MS=Multiple sclerosis; PTSD=Post-Traumatic Stress Disorder.

Figure 4. Ratings of relative hazards of medicinal cannabis compared to other prescription medicines, n = 627 – 632, valid percentage.

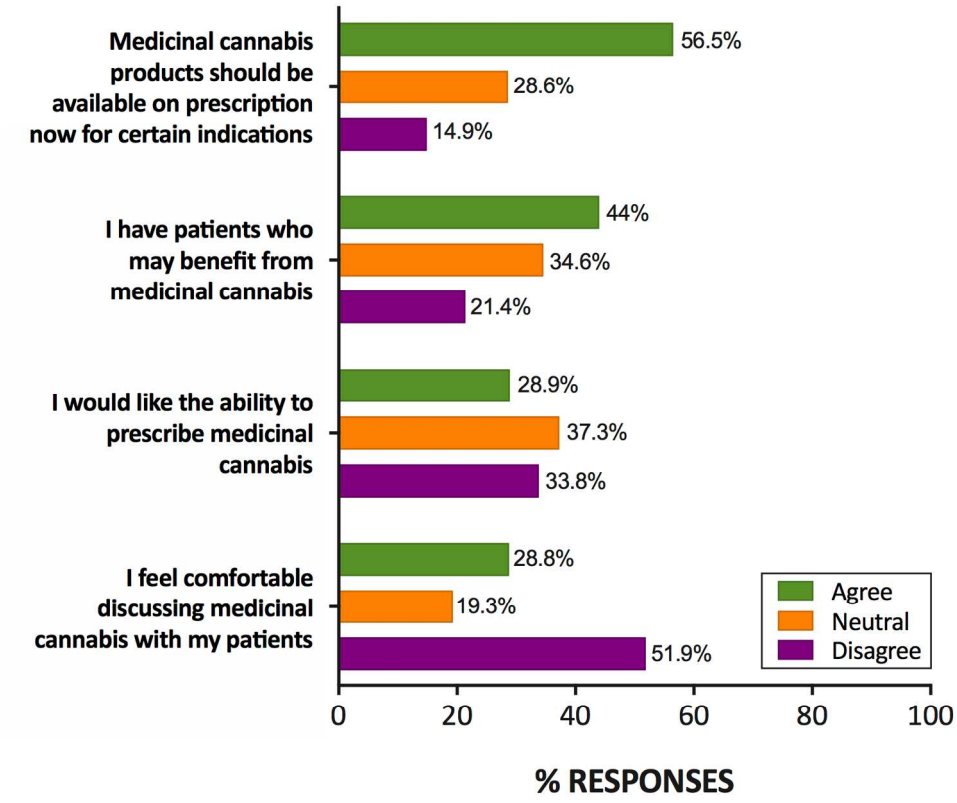

Figure 1. Attitudes and clinical experiences of general practitioners with respect to medicinal cannabis, n = 632 – 637, valid percentage.

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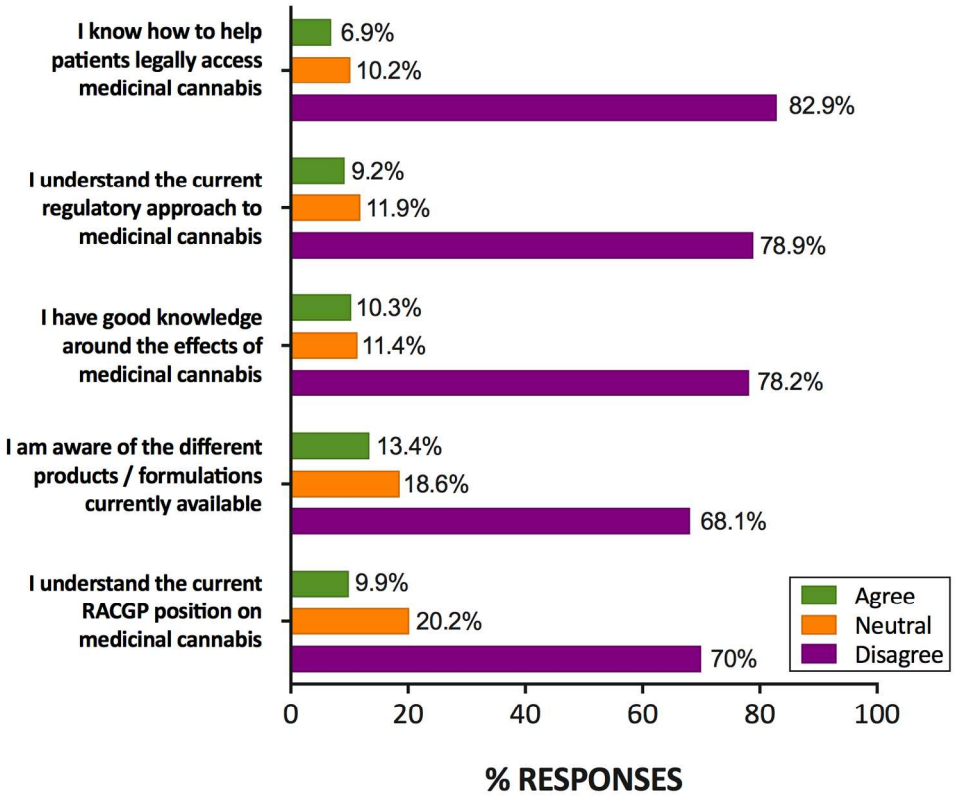

Figure 2. Ratings of general practitioners on knowledge-related items, n = 636 – 640, valid percentage. RACGP=Royal Australian College of General Practitioners.

160x134mm (300 x 300 DPI)

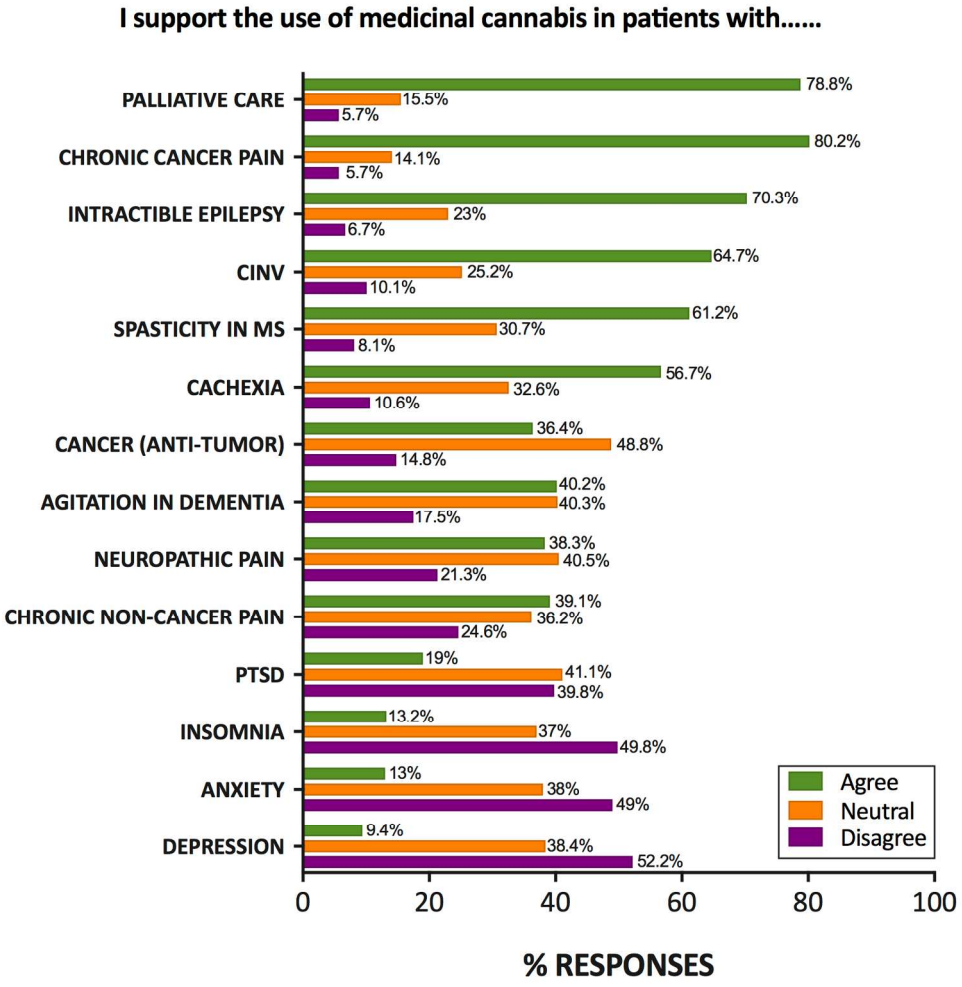

Figure 3. Support for use of medicinal cannabis in different conditions, n = 627 – 632, valid percentage. CINV=Chemotherapy-induced Nausea and Vomiting; MS=Multiple sclerosis; PTSD=Post-Traumatic Stress Disorder.

166x173mm (300 x 300 DPI)

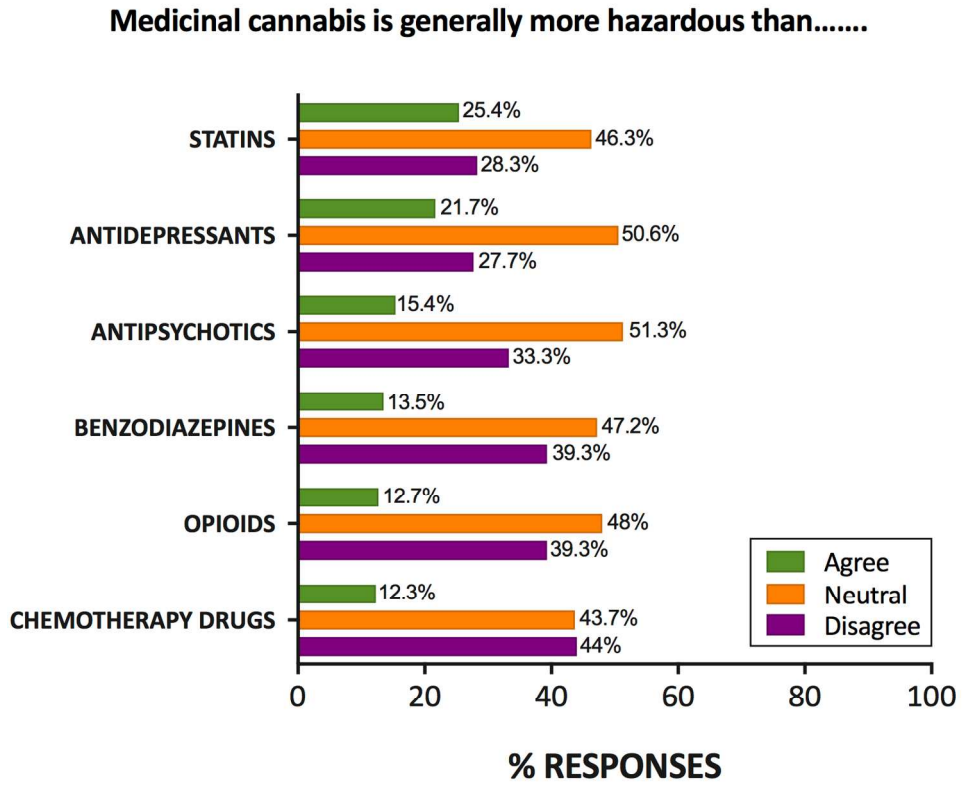

Figure 4. Ratings of relative hazards of medicinal cannabis compared to other prescription medicines, n = 627 – 632, valid percentage.

149x121mm (300 x 300 DPI)

MEDICINAL CANNABIS SURVEY FOR GPs

Profession	GP ☐	NURSE ☐	MIDWIFE ☐	PHYSIO ☐	PHARMACIST ☐	O&G ☐	OTHER ☐
Age category	<35 ☐	35-44 ☐	45-54 ☐	55-64 ☐	65+ ☐		
Sex	M ☐	F ☐	OTHER ☐				
Years in general practice	<2 ☐	2-5 ☐	6-15 ☐	16-25 ☐	26+ ☐		
GP registrar?	Y ☐	N ☐					
Average hours spend in clinical practice per week	<10 ☐	11-20 ☐	21-30 ☐	31-40 ☐	>40 ☐		
Size of Practice (number of GPs)	1 ☐	2-4 ☐	5-9 ☐	10-20 ☐	>20 ☐		
State/Territory of the Practice you work in	NSW ☐	VIC ☐	QLD ☐	SA ☐	TAS ☐	WA ☐	ACT ☐
Geographical area serviced	METRO ☐		REGIONAL ☐		REMOTE ☐		
Did you attend the Women and Children's Healthed event this year?	Y ☐	N ☐					

	0	1	2-5	6-10	>10
1. In the past 3 months, how many of your patients have enquired about medicinal cannabis products?	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	*SLIGHTLY DISAGREE*	*NEUTRAL*	*SLIGHTLY AGREE*	*STRONGLY AGREE*
2. I have patients who may benefit from medicinal cannabis	☐	☐	☐	☐	☐
3. Medicinal cannabis products should be available on prescription now for certain indications	☐	☐	☐	☐	☐
4. I feel comfortable discussing medicinal cannabis with my patients	☐	☐	☐	☐	☐
5. I have good knowledge around the effects of medicinal cannabis products	☐	☐	☐	☐	☐
6. I am aware of the different medicinal cannabis products and formulations currently available	☐	☐	☐	☐	☐
7. I would like the ability to prescribe medicinal cannabis products	☐	☐	☐	☐	☐
8. Medicinal cannabis should only be prescribed by specialists	☐	☐	☐	☐	☐
9. Medicinal cannabis should be provided in "shared care" with a specialist	☐	☐	☐	☐	☐
10. Only GPs who have undergone specific training and credentialing should be allowed to prescribe medicinal cannabis	☐	☐	☐	☐	☐
11. I know how to help patients legally access medicinal cannabis	☐	☐	☐	☐	☐
12. I understand the current regulatory approach to medicinal cannabis	☐	☐	☐	☐	☐
13. I understand the current RACGP position on medicinal cannabis	☐	☐	☐	☐	☐
14. There is little difference between "street cannabis" and medicinal cannabis products	☐	☐	☐	☐	☐
15. I will not prescribe medicinal cannabis as the risk of abuse and dependence is too high	☐	☐	☐	☐	☐
16. I will not prescribe medicinal cannabis as the risk of side effects (other than abuse and dependence) is too high.	☐	☐	☐	☐	☐
17. There is sufficient scientific evidence of the efficacy of medicinal cannabis	☐	☐	☐	☐	☐

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18 . I support the use of medicinal cannabis in patients with:

	STRONGLY DISAGREE	SLIGHTLY DISAGREE	NEUTRAL	SLIGHTLY AGREE	STRONGLY AGREE
Chronic cancer pain	☐	☐	☐	☐	☐
Chronic non-cancer pain	☐	☐	☐	☐	☐
Neuropathic pain	☐	☐	☐	☐	☐
Intractable epilepsy	☐	☐	☐	☐	☐
Anti-tumour effects	☐	☐	☐	☐	☐
Spasticity in Multiple Sclerosis	☐	☐	☐	☐	☐
Dementia patients with agitation	☐	☐	☐	☐	☐
Insomnia	☐	☐	☐	☐	☐
PTSD	☐	☐	☐	☐	☐
Anxiety	☐	☐	☐	☐	☐
Depression	☐	☐	☐	☐	☐
End of life/Palliative care	☐	☐	☐	☐	☐
Chemotheraphy-induced nausea and vomiting	☐	☐	☐	☐	☐
Cachexia associated with severe illness	☐	☐	☐	☐	☐

19 . The major side effects of medicinal cannabis consumption include:

Addiction and dependence	☐	☐	☐	☐	☐
Cognitive impairment	☐	☐	☐	☐	☐
Driving impairment	☐	☐	☐	☐	☐
Weight gain	☐	☐	☐	☐	☐
Psychosis	☐	☐	☐	☐	☐
Other long-term mental health issues	☐	☐	☐	☐	☐
Interactions with other medications	☐	☐	☐	☐	☐
Impact on the developing brain	☐	☐	☐	☐	☐

20 . Medicinal cannabis is generally more hazardous than:

Prescription opioids	☐	☐	☐	☐	☐
Benzodiazepines	☐	☐	☐	☐	☐
Antipsychotics	☐	☐	☐	☐	☐
Statins	☐	☐	☐	☐	☐
Chemotherapy drugs	☐	☐	☐	☐	☐
Antidepressants	☐	☐	☐	☐	☐

21 . The right to prescribe medicinal cannabis should be available to: ***CHOOSE ONE RESPONSE ONLY***

- *All GPs* ☐
- *Only GPs with specific training and credentials* ☐
- *Only GPs in 'shared care' with a specialist* ☐
- *Only specialists* ☐
- *Medicinal cannabis should not be available on prescription* ☐

OPEN ENDED COMMENTS

Please use this space to offer any comments, opinions or observations about medicinal cannabis in Australia

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-8
Bias	9	Describe any efforts to address potential sources of bias	17
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	NA
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7-8
		(*b*) Describe any methods used to examine subgroups and interactions	7-8
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6, 8
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8-9
		(b) Indicate number of participants with missing data for each variable of interest	Percentage of valid responses stated for each categorical variable in tables/figures
Outcome data	15*	Report numbers of outcome events or summary measures	NA
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	14-15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.