

Healthcare and service provider perspectives on pre-exposure prophylaxis for HIV among young Australians

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ABSTRACT

Background. The Australian Pharmaceutical Benefits Scheme was changed on 15 January 2021 to provide people aged <18 years access to government-subsidised pre-exposure prophylaxis (PrEP) for HIV. This study investigated healthcare and service providers' attitudes and practices in discussing PrEP and impacts on PrEP prescribing practices, and the differences in the provision of PrEP to young adults aged >18 years compared with people aged <18 years. **Methods.** An online cross-sectional survey, conducted February to November 2023, used purposive, convenience and snowball sampling to recruit healthcare providers eligible to prescribe PrEP (GPs, nurse practitioners) and non-prescribing healthcare/service providers (sexual health nurses, HIV community workers) in Australia. Young people were split into three age groups for comparison between young adults (aged 18–24 years) and adolescents, including those above (aged 16–17 years) and below (<16 years) the age of consent in Australia. Cross-tabulation with Pearson's chi-squared and Fisher's exact tests were performed to investigate sexual health and PrEP-related attitudes and practices. **Results.** Of the 122 respondents, 40.2% (49/122) were nurses, 18.0% (22/122) GPs, 11.5% (14/122) HIV community workers, 11.5% (14/122) were another profession (including public health physician, LGBTIQA child and family practitioner, social worker, counsellor), 10.7% (13/122) were sexual health physicians, 6.6% (8/122) nurse practitioners and two were HIV specialists. Most (73.8%, 90/122) reported initiating PrEP conversations with 18–24-year-olds, compared with 13.1% (16/122) with those aged >16 years. Of the 48 (39.3%) eligible PrEP prescribers, 47.9% (23/48) reported feeling 'extremely/somewhat' comfortable assessing PrEP eligibility, 41.7% (20/48) reported awareness of 2021 Pharmaceutical Benefits Scheme changes and 18.8% (9/48) reported changes to prescribing practices. Prescribers were significantly more likely than non-prescribers to consider PrEP suitable (54.2% vs 35.8%, $P < 0.05$) for clients aged <16 years. **Conclusion.** Guidelines and prescribing criteria need to reflect current Pharmaceutical Benefits Scheme eligibility for young people to support healthcare prescriber decision-making in recommending and prescribing PrEP for HIV for young people where appropriate. Greater education, training and support is required for healthcare providers to improve provider confidence in discussing sexual health needs, and recommending and prescribing PrEP to young people to optimise the possible benefits of access to sexual health services and PrEP in this priority sub-group.

Keywords: guidelines, healthcare provider, HIV, HIV prevention, PrEP, pre-exposure prophylaxis, prescribing, young people.

Introduction

Pre-exposure prophylaxis (PrEP) is a highly effective prevention method for human immunodeficiency virus (HIV), using antiretroviral medications.^{1–5} PrEP has been available for Australian adults under the Therapeutic Goods Administration (TGA; Australia's governing regulatory body for medicines) since 2016.⁶ PrEP is defined under the Australian Commonwealth *National Health Act 1953* as a schedule 85 (S85) drug, meaning prescriptions can be obtained from any Australian medical provider/general practitioner (GP) or nurse practitioner (NP).^{7,8} Non-prescribing clinicians (e.g. sexual health nurses) and service providers (e.g. HIV community educators, peer support workers) also play critical roles in the access, uptake

and care of PrEP-eligible individuals through education, support and referral to PrEP-prescribing services.^{9–12} In 2018, PrEP was made available under government subsidy for people aged ≥ 18 years through Australia's Pharmaceutical Benefits Scheme (PBS).⁷ Thus, adults with a valid Medicare card – Australia's universal healthcare system – could access PrEP at reduced cost;¹³ by the end of 2024, $>85,000$ people accessed PBS-subsidised PrEP in Australia.¹⁴ Based on PrEP safety/tolerability among young people (aged 15–19 years),^{15–17} the WHO recommended PrEP as primary prevention based on risk level rather than age.^{18–20} Furthermore, the US Food and Drug Administration (FDA) in 2018 approved PrEP use among young people >35 kg.²¹ PrEP remains unapproved under the TGA for use in young people under the age of 18 years in Australia due to safety/efficacy concerns regarding tenofovir disoproxil and emtricitabine;²² however, in January 2021, PrEP was expanded on the PBS for young people aged <18 years.⁷ This was made through the Pharmaceutical Benefits Advisory Committee – a statutory body independent of the TGA, consisting of medical experts who make recommendations on medications to be subsidised on the PBS.²³

Current reports show 18–24-year-olds account for 15.6% of PBS PrEP uptake.¹⁴ However, as current Australian PBS reports on PrEP use exclude data on people aged <18 years, it is difficult to determine uptake among this group. Data on PrEP use in adolescents in other high-income countries show similarly lower rates; 13.6% among 15–24-year-olds in the UK,²⁴ and 1.3% among those aged <19 years in Canada.²⁵ Research shows PrEP awareness is associated with older age, and it is suspected that the proportion of PrEP awareness/use in Australia in those aged <18 years is lower.^{26–29}

HIV in young people in Australia is predominantly concentrated among men who have sex with men (MSM).^{30–32} Although young people (aged <18 years) in Australia have maintained low HIV notification rates compared with adults (0.2 per 100,000 in 2022),³³ notification data in Australia highlight an observable age-related trend in HIV notifications that suggests young people age through a trajectory of increasing HIV risk. In 2023, there was a 14.5-fold increase in HIV notifications among 20–24-year-olds (2.9 per 100,000) compared with 15–19-year-olds (0.2 per 100,000).^{30,34} This is the largest increase seen between any age group, and although notifications have been declining due to implementation of HIV treatment/prevention (including PrEP), this consistent trend suggests young people at high risk of HIV will continue to mature through this age-related trajectory of risk unless efforts are made to improve HIV risk awareness, education and access to HIV prevention.

Previous studies globally show healthcare and service providers play a pivotal role in PrEP access, and their perceptions/willingness to recommend and prescribe PrEP can significantly impact effective uptake/use.^{9–12,35,36} There is limited research in Australia/other high-income countries investigating healthcare provider perspectives on providing PrEP to adolescents. Research from the US indicates providers

show less willingness to prescribe PrEP to adolescents versus young adults.³⁷ Reasons include limited provider knowledge on PrEP safety for young people (e.g. impacts on bone mineral density (BMD)); concerns about medication adherence and ability of adolescents to understand PrEP risks/benefits; provider personal and cultural attitudes/beliefs about sexual activity/identity (e.g. pre-marital sex, same-sex partners); concerns of risk compensation; and lack of knowledge/confidence providing PrEP.^{37–39} Lack of awareness/knowledge of clinical guidelines on prescribing PrEP to adolescents also creates barriers to prescribing.^{39,40}

This study aimed to investigate two research questions: (1) what are healthcare and service providers' attitudes and practices in discussing PrEP and broader sexual health issues, such as sexual practices, HIV risk, testing and initiating PrEP, for young people, particularly young people aged <18 years?; and (2) has expansion of the PBS eligibility criteria for government-subsidised PrEP to include young people aged <18 years impacted healthcare prescriber practices in relation to PrEP among young people?

This research builds upon previous Australian research among healthcare providers investigating knowledge and barriers to prescribing PrEP (e.g. difficulty identifying clients who need PrEP; relying on clients to ask for PrEP; lack of knowledge of PrEP; time constraints).⁴¹ However, this is the first research to our knowledge investigating healthcare providers' perspectives/practices on provision of PrEP specifically to young Australians aged <24 years, and the first to provide insights into how attitudes/practices might differ by patient age (i.e. 18–24, 16–17 and <16 years). It also explores perspectives of non-prescribing healthcare/service providers as important facilitators in young people's HIV prevention service access.

Methods

Participants and recruitment

An online cross-sectional survey of healthcare and service providers from multiple states/jurisdictions across Australia was conducted from February to November 2023. Purposive, convenience and snowball sampling procedures were used to recruit: (1) Australian healthcare providers who were eligible to prescribe PrEP; (2) non-prescribing healthcare professionals (such as sexual health nurses and pharmacists); and (3) HIV community educators and peer support workers providing PrEP education, services and/or support. The study was advertised across medical and professional organisations supporting HIV, and the sexual health sector workforce (e.g. Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine; Royal Australian College of General Practitioners; and Australasian Sexual Health and HIV Nurses Association); youth and lesbian, gay, bisexual, transgender, intersex, queer, asexual and other sexually or gender diverse (LGBTQIA+)

groups (such as Head Space and Queensland Council for LGBTI Health); and through emails to individual general practice, sexual health clinics obtained from practice/clinic websites. Emails were also sent to organisations and services that provide care and support to LGBTQIA+ people and young people at risk of or impacted by HIV. Participants were encouraged to share study information throughout their professional networks. The sample size was determined based on survey response rates from other studies conducted investigating healthcare provider perspectives in the areas of HIV/PrEP (in Australia and other high-income/low-prevalence settings), estimating a target sample of 150–200 participants.^{42–44} Interested parties were directed via a QR code to an online Qualtrics⁴⁵ survey. Prior to completing the survey, participants were directed to a written overview of the research, and provision of their informed consent to participate was obtained through a pre-survey question.

Data collection

The survey was developed through investigating existing literature,^{35,46} current Australian prescribing guidelines⁷ and related expertise from the research team (i.e. clinicians and researchers with extensive experience in HIV epidemiology, sexual health/HIV nursing, psychology and sociology), and representatives from community partner organisations and peak bodies supporting individuals living with/impacted by HIV, the LGBTQIA+ community and young people. The survey was pilot-tested by members of the research team and an external sexual health nurse to ensure appropriateness, comprehension and gauge survey length, with minor changes made following piloting.

Participants were asked about demographic characteristics (e.g. age, gender, location), questions on their scope of practice (e.g. eligibility to prescribe PrEP), and self-reported knowledge of sexual health, HIV, PrEP, PrEP guidelines and confidence in prescribing PrEP ranging from ‘poor/limited’ to ‘expert’. The survey contained 32 mostly close-ended questions that covered three key areas. First, sexual health behaviours and practices of young people, which included questions on how often providers engage in conversations on sexual health with young people; which groups of young people providers perceived as the hardest to engage in sexual health care; and how likely providers think young people are to be aware of their sexual health, HIV and STI risk, such as ‘How often do you talk about sexual practices and risk with your clients?’ and ‘Do you think young people are aware of their personal level of risk for STIs?’.

Second, HIV and PrEP experiences and practices, which included questions on current HIV case load, and practices pertaining to the recommendation and perceptions on PrEP for young people, such as ‘Have you ever initiated PrEP conversations with a young client?’, ‘Do you think PrEP is a suitable HIV prevention method for young people?’ and ‘What do you think are the major barriers for young people accessing PrEP?’.

Third, new PrEP modalities, which included questions on provider perspectives of suitability of new PrEP modalities for young people, such as ‘Do you think availability of these new modalities will make young people more likely to initiate PrEP?’ and ‘What are your perceptions on the suitability of the long-acting injectable PrEP?’. Built-in branching logic was used to provide an additional section of 14 predominantly close-ended questions to prescribing healthcare providers to gain insights into their PrEP prescribing perceptions and practices for young people, and awareness of relevant clinical guidelines and that included questions, such as ‘Do you refer to the Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine guidelines when prescribing PrEP?’ and ‘Were you aware of the addition of PrEP to the PBS for youth under the age of 18 years that occurred in January 2021?’.

Questions were stratified into three age groups, 18–24 years, 16–17 years and <16 years. Young adults aged 18–24 years were included to compare difference in attitudes and practices between young adults and adolescents. Whereas adolescents were stratified into those aged 16–17 years and those aged <16 years to determine differences in groups of adolescents over and under the age of consent in most Australian states and territories (excluding South Australia and Tasmania).⁴⁷ Questions used 5-point Likert scales (ranging from ‘extremely likely/always’ to ‘extremely unlikely/never’) for questions on likelihood or frequency of perceptions, behaviours and practices; and where participants were asked to identify populations or barriers for young people, they were provided options to select multiple items or provide an open text response. Following the anonymous survey, participants self-selected to enter a separate prize draw containing one of two A\$500 gift-cards.

Data analysis

Survey data including demographic, behavioural, HIV and PrEP information stratified across three age groups (18–24, 16–17 and <16 years) were analysed using Stata Statistical Software: Release 17 (StataCorp).⁴⁸ Data cleaning revealing suspected errors in responses was assessed on a case-by-case basis by the first author and AD, an experienced epidemiologist, with errors recoded as missing. Cross-tabulation with Pearson’s chi-squared and Fisher’s exact tests were performed to investigate differences in perceptions and practices of eligible prescribers and non-prescribers in conversations about sexual health and provision of PrEP to young people. Of 163 responses, 41 were removed due to no endorsed consent ($n = 29$) and no responses recorded ($n = 12$).

Ethics approval

Ethical approval for this study was received from the University of Queensland Human Research Ethics Committee (approval number 2022/HE000560).

Results

Just under half of the total cohort (49/122, 40.2%) were nurses, 18.0% (22/122) were GPs, 11.5% (14/122) were HIV community educator/peer support officers, 6.6% (8/122) were NPs and 11.5% (14/122) reported another profession (e.g. public health physician, LGBTIQ+ child and family practitioner, social worker, counsellor). Over half reported currently working with clients living with HIV (59.8%, 73/122), and a little over one-third reported that they were PrEP prescribers (39.3%, 48/122). Full participant demographics are shown in Table 1.

Most self-reported advanced to expert levels of knowledge for sexual health (95/122, 77.8%), PrEP (90/122, 73.8%), HIV (68/122, 55.7%) and PrEP guidelines (82/122, 67.2%; see Table 2).

Discussing sexual practices, risk and HIV testing

When asked about initiating conversations about sexual practices and HIV risk with young people healthcare/service providers reported ‘always’ or ‘most of the time’ discussing this with clients aged 18–24 years (77.0%, 94/122) compared with those aged 16–17 years (60.7%, 74/122) and <16 years (43.4%, 53/122). The most common factor healthcare/service providers use to raise conversations about PrEP was ‘risk factors’. Prescribing healthcare providers were significantly more likely to discuss PrEP with <16-year-olds based on risk factors than non-prescribing healthcare and service providers. This was highest for those aged 18–24 years (83.6.7%, 102/122) compared with young people aged 16–17 years (75.4%, 92/122) and <16 years (63.1%, 77/122). Only 43.4% (53/122) of healthcare/service providers reported cultural and ethnic background as a prompt to initiate conversations about sexual health with 18–24-year-olds, 38.5% (47/122) with 16–17-year-olds and 27% (33/122) with those aged <16 years (see Table 3).

Healthcare and service provider PrEP perceptions and practices with young clients

PrEP was most frequently discussed with young clients who identified as MSM (89.6%, 43/48 prescribers; 82.1%, 55/67 non-prescribers), gay men (83.3%, 40/48 prescribers; 77.6%, 52/67 non-prescribers), MSM from countries/regions with high HIV prevalence (83.3%, 40/48 prescribers; 67.2%, 45/67 non-prescribers) and bisexual men (81.3%, 39/48 prescribers; 74.6%, 50/67 non-prescribers). Prescribers were significantly more likely than non-prescribers to discuss PrEP with MSM from high-prevalence settings (40/48, 83.3% compared with 45/67, 67.2%, $P < 0.05$), people who inject drugs (32/48 66.7% compared with 28/67, 41.8%, $P < 0.05$), Aboriginal and Torres Strait Islander peoples (27/48, 56.3% compared with 19/67, 28.4%, $P < 0.05$), bisexual women (14/48 29.2% compared with 16/67 23.9, $P < 0.05$) and

Table 1. Participant demographics ($n = 122$).

Characteristic	<i>n</i>	%
Age (years)		
20–29	17	13.9
30–39	53	43.5
40–49	21	17.2
50–59	21	17.2
60–69	10	8.2
Gender (multiple could be selected)		
Female	80	65.6
Male	31	25.4
Non-binary/third gender	10	8.2
Transgender male	2	1.6
Other genders reported (Genderqueer, Genderfluid)	2	1.6
Prefer not to say	1	0.8
Country of birth		
Australia	84	68.9
United Kingdom	17	13.9
Hong Kong (SAR)	3	2.5
Malaysia	3	2.5
Pakistan	2	1.6
Poland	2	1.6
South Africa	2	1.6
Sri Lanka	2	1.6
Brazil	1	0.8
Canada	1	0.8
China	1	0.8
Finland	1	0.8
Peru	1	0.8
Singapore	1	0.8
Spain	1	0.8
State/jurisdiction where practising/working		
Queensland	48	39.4
New South Wales	42	34.4
Victoria	22	18.0
South Australia	4	3.3
Western Australia	3	2.5
Tasmania	2	1.6
Northern Territory	1	0.8
Profession ^A		
Nurse	49	40.2
GP	22	18.0
Other (e.g. public health physician, LGBTIQ+ child and family practitioner, social worker, counsellor)	14	11.5
HIV community educator/peer support officer	14	11.5
Sexual health physician	13	10.7

(Continued on next page)

Table 1. (Continued).

Characteristic	n	%
Nurse practitioner	8	6.6
HIV specialist	2	1.6
Years in practice		
1	7	5.7
2	3	2.5
3	2	1.6
4	5	4.1
5–10	47	38.5
11–20	20	16.4
21–30	24	19.7
31–40	8	6.6
≥41	5	4.1
Missing	1	0.8
Experience working in HIV speciality (years)		
0	23	18.9
1	18	14.8
2	11	9.0
3	17	13.9
4	7	5.7
5–10	16	13.1
11–20	18	14.8
≥20	8	6.5
Missing	4	3.3
Eligible to prescribe PrEP in Australia ^A		
No	67	54.9
Yes	48	39.3
Missing	7	5.7
Do you have clients living with HIV?		
Yes	73	59.8
No	39	32.0
Missing	10	8.2
Have you received training or attended a course in prescribing PrEP? (prescribers only <i>n</i> = 48)		
Yes	26	54.1
No	9	18.8
Missing	13	27.1

^AEligible prescribers in Australia include medical officers/general practitioners and nurse practitioners.

heterosexual men (12/48, 25.0% compared with 8/67 11.9%, $P < 0.05$; Supplementary Table S1).

Most healthcare/service providers reported having a young client aged 18–24 years (70.1%, 86/122) ask about PrEP compared with 32% (39/122) having a 16–17-year-old client ask and 6.6% (8/122) having a client aged <16 years ask. Of the cohort, 73.8% (90/122) reported initiating

conversations about PrEP with 18–24-year-olds compared with 45.9% (56/122) with 16–17-year-olds and 13.1% (16/122) with those aged <16 years.

Almost half of healthcare/service providers reported having a young client aged 18–24 years (47.5%, 58/122) currently on PrEP, whereas 8.2% (10/122) and 1.6% (2/122) reported having clients aged 16–17 years and <16 years, respectively. Just over half (52.5%, 64/122) reported young people aged <16 years as one of the most difficult groups to engage in testing for sexually transmissible infections and HIV, along with young people from culturally/ethnically diverse backgrounds (63.9%, 78/122) and Aboriginal and Torres Strait Islander young peoples (52.5%, 64/122).

Prescribers were more likely to consider PrEP suitable for young people across all age groups than non-prescribers, and prescribers were significantly more likely than non-prescribers to consider PrEP suitable for young people aged <16 years (54.2% vs 35.8%, $P < 0.05$). However non-prescribers were also significantly more likely to ‘always’ recommend PrEP (32.4%, 19/67) compared with prescribers who were more likely to recommend PrEP ‘some of the time’ for clients aged 16–17 years (35.4% 17/48, $P < 0.05$; Table 4).

Prescriber awareness of guideline changes and prescribing practices

Of the 48 (39.3%) respondents who reported they were eligible to prescribe PrEP, 27 (56.3%) reported receiving or attending PrEP training. Twenty-three (47%) reported feeling ‘extremely’ or ‘somewhat comfortable’ assessing eligibility for PrEP, whereas 12 (25.0%) reported feeling ‘uncomfortable’ or ‘extremely uncomfortable’. Thirty-three (68.8%) reported ‘always’ or ‘mostly’ referring to the current Australian PrEP guidelines.⁴⁹ Only 20 (41.7%) were aware of the changes to the PBS prescribing criteria (making PrEP available at a subsidised cost for people aged <18 years), and 19 (39.6%) were aware of the removal of age restrictions to prescribing guidelines. A modest 18.8% (9/48) reported changes in their prescribing practices, and none reported increases in young people asking about PrEP since the expansion of the PBS eligibility criteria (Table 5).

Discussion

Findings from this study highlight few healthcare/service providers initiated conversations about PrEP, sexual health and sex practices with young people aged <18 years, and even fewer for those aged <16 years. More providers reported uncertainty in the suitability of PrEP for young people aged <18 years, and even more were unsure for those aged <16 years. Approximately one-quarter of prescribers reported feeling ‘uncomfortable’ or ‘extremely uncomfortable’ assessing eligibility for PrEP for young people across all ages. Although just under half of prescribers were aware of PBS changes, very

Table 2. Healthcare and service provider STI/HIV knowledge and confidence prescribing PrEP.

HIV/STI knowledge <i>n</i> (%)	Expert	Advanced	Intermediate	Novice	Poor/limited
Sexual health ^A	26 (21.3%)	69 (65.6%)	23 (18.9%)	3 (2.5%)	0
HIV ^B	25 (20.5%)	43 (35.3%)	43 (35.3%)	8 (6.6%)	2 (1.6%)
PrEP	31 (25.4%)	59 (48.4%)	20 (16.4%)	10 (8.2%)	2 (1.6%)
PrEP guidelines	29 (23.8%)	53 (43.4%)	25 (20.5%)	9 (7.4%)	6 (7.4%)
Confidence prescribing PrEP ^C	18 (37.5%)	20 (41.6%)	6 (12.5%)	3 (6.3%)	1 (2.1%)

^ASTI/HIV, sexually transmissible infection and human immunodeficiency virus.

^BOne response missing from knowledge on sexual health and HIV.

^CParticipants reporting being eligible to prescribe in Australia (*n* = 48).

Table 3. Healthcare provider practices in discussing sexual practices by prescribing and non-prescribing providers.

	Age 18–24 years, <i>n</i> (%)				Age 16–17 years, <i>n</i> (%)				Age <16 years, <i>n</i> (%)			
	Total	Prescribers	Non-prescribers	<i>P</i> -value	Total	Prescribers	Non-prescribers	<i>P</i> -value	Total	Prescribers	Non-prescribers	<i>P</i> -value
How often do you talk about sexual practices and risk with your clients												
Always	66 (61.7)	24 (53.3)	42 (67.7)	0.176	58 (54.7)	22 (48.9)	36 (59.02)	0.051	37 (34.6)	16 (35.6)	21 (33.9)	0.340
Most of the time	23 (21.5)	14 (31.1)	9 (14.5)		16 (15.1)	11 (24.4)	5 (8.2)		14 (13.1)	7 (15.6)	7 (11.3)	
Some of the time	17 (15.9)	7 (15.6)	10 (16.1)		18 (17.0)	10 (22.2)	8 (13.1)		20 (18.7)	11 (24.4)	9 (14.5)	
Rarely	1 (0.9)	0 (0)	1 (1.6)		6 (5.7)	1 (2.2)	5 (8.2)		11 (10.3)	5 (11.1)	6 (9.7)	
Never	0 (0)	0 (0)	0 (0)		2 (1.9)	0 (0)	2 (3.3)		2 (1.7)	0 (0)	2 (3.2)	
I don't work with this age group	0 (0)	0 (0)	0 (0)		6 (5.7)	1 (2.2)	5 (8.2)		23 (21.5)	6 (13.3)	17 (27.4)	
What prompts you to initiate conversations about sexual health												
Risk factors	102 (88.7)	43 (89.6)	59 (88.1)	0.245	92 (80.0)	41 (85.4)	51 (76.1)	0.273	77 (67.0)	38 (79.2)	39 (58.2)	0.019
Sexual identity/behaviours	96 (83.5)	39 (81.3)	57 (85.1)	0.230	87 (75.7)	38 (79.2)	49 (73.1)	0.150	65 (56.5)	31 (64.6)	34 (50.8)	0.066
If the client initiates	96 (83.5)	40 (83.3)	56 (83.6)	0.240	87 (75.7)	38 (79.2)	49 (73.1)	0.407	70 (61.0)	32 (66.7)	38 (56.7)	0.269
Symptomatic presentation	92 (80.0)	40 (83.3)	52 (77.6)	0.258	89 (77.4)	41 (85.4)	48 (71.6)	0.069	72 (62.6)	34 (70.8)	38 (56.7)	0.259
Age	78 (67.8)	33 (68.8)	45 (67.2)	0.757	68 (59.1)	29 (60.4)	39 (58.2)	0.779	48 (41.7)	21 (43.8)	27 (40.3)	0.696
Gender	61 (53.0)	22 (45.8)	39 (58.2)	0.189	53 (46.1)	20 (41.7)	33 (49.3)	0.800	37 (32.2)	14 (29.2)	23 (34.3)	0.883
Cultural/ethnic background	53 (46.1)	17 (35.2)	36 (53.7)	0.596	47 (41.0)	16 (33.3)	31 (46.3)	0.614	33 (28.7)	13 (27.1)	20 (29.7)	0.197
Other	16 (13.9)	8 (16.7)	8 (11.9)	0.107	17 (14.8)	8 (16.7)	9 (13.4)	0.202	14 (12.2)	7 (14.6)	7 (10.5)	0.243

Note: incorrect responses for eligibility to prescribe were marked as missing, missing responses were not included in analysis.

few reported changes to their prescribing practices. Lack of awareness of PBS changes and limited changes to their prescribing habits identified in this study suggests prescribing healthcare providers may be less likely to recommend PrEP for young people, particularly those aged <18 years.

Overall, among our sample and the wider literature, providers report discomfort assessing PrEP eligibility, and provider perceptions of PrEP suitability decrease with client age; that is, providers are more likely to recommend/prescribe PrEP to adults compared with adolescents.^{37,41,46,50,51} Our sample showed prescribers were significantly more likely than non-prescribers to consider PrEP suitable, and non-prescribers were more likely to 'always' recommend

PrEP to clients aged <16 years. Non-prescribing healthcare providers play a key role in linkage to HIV prevention services and PrEP for young people.^{9–12,36} Thus, it is important to ensure information and support for young people is provided through these services to facilitate access.

Despite over half the sample reporting advanced to expert levels of knowledge of PrEP guidelines, less than half were aware of changes to guidelines, resulting in less than one-fifth reporting changes to their prescribing practices. Current PrEP prescribing clinical guidelines in Australia reflect the removal of age restrictions on PrEP prescribing, and contain information on the provision of PrEP to adolescents and young people. However, PrEP for those aged <18 years has

Table 4. Healthcare and service providers' perceptions and experiences of pre-exposure prophylaxis (PrEP) for young people.

	Age 18–24 years, n (%)				Age 16–17 years, n (%)				Age <16 years, n (%)			
	Total	Prescribers	Non-prescribers	P-value	Total	Prescribers	Non-prescribers	P-value	Total	Prescribers	Non-prescribers	P-value
Has a young client every asked you about PrEP?												
Yes	86 (74.8)	39 (92.9)	47 (82.5)	0.130	39 (33.9)	18 (37.5)	21 (31.3)	0.676	8 (7.0)	5 (10.4)	3 (4.5)	0.082
No	13 (11.3)	3 (7.1)	10 (17.5)		54 (47.0)	22 (45.8)	32 (47.8)		80 (69.6)	34 (70.8)	46 (68.7)	
Unsure	0 (0)	0 (0)	0 (0)		4 (3.5)	1 (2.1)	3 (4.5)		5 (4.3)	0 (0)	5 (7.5)	
Missing	16 (14.0)	6 (12.5)	10 (14.9)		18 (15.6)	7 (14.6)	11 (16.4)		22 (19.1)	9 (18.8)	13 (19.4)	
Have you initiated PrEP conversations with a young client?												
Yes	42 (36.5)	38 (79.2)	52 (77.6)	0.898	56 (48.7)	25 (52.1)	31 (46.3)	0.418	16 (13.9)	8 (16.7)	8 (11.9)	0.266
No	9 (7.8)	4 (8.3)	5 (7.5)		35 (30.4)	15 (31.3)	20 (26.9)		70 (60.9)	30 (62.5)	40 (59.7)	
Unsure	0 (0)	0 (0)	0 (0)		6 (5.2)	1 (2.1)	5 (7.5)		7 (6.1)	1 (2.1)	6 (9.0)	
Missing	16 (13.9)	6 (12.5)	10 (14.9)		18 (15.7)	7 (14.6)	11 (16.4)		22 (19.1)	9 (18.8)	13 (19.4)	
Do you have young clients currently on PrEP?												
Yes	58 (50.4)	32 (66.7)	26 (38.8)	0.692	10 (8.7)	7 (14.6)	3 (4.5)	0.307	2 (1.7)	2 (4.2)	0	0.078
No	5 (4.3)	4 (8.3)	1 (1.5)		3 (2.6)	1 (2.1)	2 (3.0)		51 (44.3)	31 (64.6)	20 (29.9)	
Unsure	2 (1.7)	1 (2.1)	1 (1.5)		14 (12.2)	5 (10.4)	9 (13.4)		10 (8.7)	3 (6.3)	7 (10.5)	
Missing	50 (43.8)	11 (22.9)	39 (58.2)		88 (76.5)	35 (72.9)	53 (79.1)		52 (45.2)	12 (25.0)	40 (59.7)	
Do you think PrEP is suitable HIV prevention for young people?												
Yes	93 (80.7)	39 (81.3)	54 (80.9)	0.193	81 (70.4)	36 (75.0)	43 (65.2)	0.065	50 (43.4)	26 (54.2)	24 (35.4)	0.032
No	3 (2.6)	1 (2.1)	2 (3.0)		7 (6.1)	1 (2.1)	6 (9.1)		10 (8.7)	1 (2.1)	9 (13.6)	
Unsure	3 (2.6)	2 (4.2)	1 (1.5)		10 (8.7)	3 (6.3)	7 (10.4)		34 (29.6)	12 (25.0)	22 (32.8)	
Missing	16 (13.9)	6 (12.5)	10 (14.9)		19 (16.5)	8 (16.7)	11 (16.4)		21 (18.3)	9 (18.8)	12 (17.9)	
How likely do you think young people are to maintain daily adherence?												
Always	3 (2.6)	0 (0)	3 (4.5)	0.450	0 (0)	0 (0)	0 (0)	0.636	0 (0)	0 (0)	0 (0)	0.592
Most of the time	66 (57.4)	28 (58.3)	38 (56.7)		19 (16.5)	10 (20.8)	9 (13.4)		9 (7.8)	5 (10.4)	5 (6.0)	
Some of the time	26 (22.6)	13 (27.1)	13 (19.4)		42 (36.5)	17 (35.4)	25 (37.3)		23 (20.0)	10 (20.8)	13 (19.4)	
Rarely	2 (1.7)	0 (0)	2 (3.0)		16 (13.9)	5 (10.4)	11 (16.4)		24 (20.9)	8 (16.7)	16 (23.9)	
Never	0 (0)	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)		1 (0.9)	1 (2.1)	0 (0)	
Unsure	2 (1.7)	1 (2.1)	1 (1.5)		19 (16.5)	8 (16.7)	11 (16.4)		26 (22.6)	14 (29.2)	12 (17.9)	
Missing	16 (13.9)	6 (12.5)	10 (14.9)		19 (16.5)	8 (16.7)	11 (16.4)		22 (19.1)	10 (20.8)	12 (17.9)	
How likely are you to recommend PrEP to young clients?												
Always	42 (34.4)	11 (22.9)	28 (41.8)	0.144	27 (22.13)	5 (10.4)	19 (28.4)	0.003	15 (12.3)	3 (6.3)	10 (14.9)	0.265
Most of the time	34 (27.9)	19 (39.6)	14 (20.1)		20 (16.4)	9 (18.8)	11 (16.4)		9 (7.38)	3 (6.3)	6 (8.96)	
Some of the time	21 (17.2)	10 (20.8)	11 (16.4)		24 (19.7)	17 (35.4)	7 (10.5)		22 (18.0)	13 (27.1)	8 (11.9)	
Rarely	2 (1.6)	0 (0)	2 (3.0)		10 (8.2)	1 (2.1)	9 (13.4)		14 (11.5)	6 (12.5)	8 (11.9)	
Never	3 (2.5)	2 (4.2)	1 (1.5)		5 (4.1)	2 (4.2)	2 (3.0)		7 (5.7)	2 (4.2)	4 (6.0)	
Unsure	2 (1.6)	1 (2.1)	1 (1.5)		14 (11.5)	6 (12.5)	8 (11.9)		30 (24.6)	11 (22.9)	19 (28.4)	
Missing	18 (14.8)	5 (10.4)	10 (15.0)		22 (18.0)	8 (16.7)	11 (16.4)		25 (20.5)	10 (20.8)	12 (17.9)	

not been approved by the TGA in Australia, and guidelines do not reflect the availability of PrEP on the PBS for young people, suggesting PrEP be obtained through an off-label script and overseas importation.⁵² Government-endorsed healthcare and medicine approval bodies, such as the TGA and Pharmaceutical Benefits Advisory Committee, are important factors in supporting healthcare providers recommending and prescribing PrEP. A study in the US found that awareness of

FDA approval of PrEP for adolescents was a factor that would encourage healthcare providers to prescribe PrEP to younger clients.³⁷ Therefore, a lack of reflection of PBS changes and Pharmaceutical Benefits Advisory Committee endorsement of PrEP could result in provider discomfort or greater hesitation in prescribing PrEP to young people. This may be particularly so for prescribing healthcare providers relying on or referring to prescribing guidelines, which was two-thirds of our sample.

Table 5. Prescriber confidence prescribing pre-exposure prophylaxis (PrEP) and awareness of guidelines and Pharmaceutical Benefits Scheme (PBS) changes prescribing practices (n = 48).

	n = 48	%
How comfortable do you feel assessing eligibility for PrEP?		
Extremely comfortable	18	37.5
Somewhat comfortable	5	10.4
Neither comfortable or uncomfortable	1	2.1
Somewhat uncomfortable	2	4.2
Extremely uncomfortable	10	20.8
Missing	13	27.1
Do you refer to the Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine (ASHM) guidelines when prescribing PrEP?		
Always	13	27.1
Most of the time	8	16.7
Sometimes	12	25.0
Never	1	2.1
I use other guidelines	2	4.2
Unsure	1	2.1
Missing	13	27.1
Were you aware age restrictions to <18 years were removed from ASHM PrEP guidelines in 2021?		
Yes	19	39.5
No	15	31.3
Unsure	2	4.2
Missing	13	27.1
Were you aware of the addition of PrEP to the PBS for <18 years in January 2021?		
Yes	20	41.7
No	14	29.7
Unsure	1	2.1
Missing	14	29.7
Has addition to the PBS for <18 years changed your PrEP discussions with <18 years?		
Yes	10	20.8
No	21	43.8
Unsure	4	8.3
Missing	14	29.7
Has addition to the PBS for <18 years increased no.of <18 years asking about PrEP?		
Yes	0	0
No	20	41.7
Unsure	15	31.3
Missing	14	29.7
Has addition to the PBS for <18 years changed your PrEP prescribing for <18 years?		
Yes	9	18.8
No	19	39.6

(Continued on next column)

Table 5. (Continued).

	n = 48	%
Unsure	7	14.6
Missing	14	29.2

Highlighting lower provider confidence in recommending and providing PrEP to young people could be due to limitations in systemic factors supporting PrEP provision rather than individual prescriber confidence, knowledge or attitudes. It is vital that guidelines are updated to ensure providers are aware of PrEP accessibility options for young people to ensure implementation and access to these changes is available for populations. Additionally, a lack of inclusion of PBS access for young people could result in healthcare providers inadvertently providing inaccurate information on access to PrEP for young people in Australia.

Concerns around safety of PrEP in young people could further impact provider comfort in recommending and prescribing PrEP to young people. PrEP is known to have impacts on BMD, which has been found to reverse upon PrEP cessation; however, studies that include young people aged 15–22 years suggest that full recovery is not achieved.⁵³ A systemic review and metaanalysis found that supplementing vitamin D and calcium reverses the effect of tenofovir disoproxil and emtricitabine on BMD among PrEP users and those living with HIV.⁵⁴ However, further research is needed into the longer-term effects of PrEP on BMD and supplementary vitamin D and calcium in young people. Warranted concerns of the safety of PrEP in young people could result in further hesitancy among providers in prescribing PrEP to young people. Considerations should be made by healthcare providers on the suitability and tolerability of PrEP for individual young people, weighing up potential risk of HIV acquisition against PrEP use, and consider it as part of HIV prevention packages for young people, along with education and condoms.

Our findings indicate many healthcare providers are not regularly engaging in conversations surrounding broader sexual health-related topics with young people, particularly those aged <16 years. This is consistent with previous research, which shows healthcare providers are more likely to discuss sexual health with adults compared with adolescents.⁵⁵ Evidence shows engaging young people in such conversations promotes ongoing positive sexual health decision-making.^{36,56–58} Although these conversations can be uncomfortable,^{59,60} discomfort can be alleviated when providers cultivate trusting relationships with clients that facilitate open conversations.⁵⁶ Thus, avoidance of these conversations with young people, particularly those aged <16 years, may mean that young people are less equipped/empowered to access these services as they start to engage in sexual practices that could increase risks of HIV/STIs. Additionally, if healthcare providers are not engaging in such conversations with young people, their ability to assess need for HIV

prevention (including PrEP) for young people who may be at risk of HIV, which largely relies on assessing sexual practices and risk,^{49,61} is reduced.

Studies have shown a number of healthcare provider barriers to discussing sexual health with young people/adolescents, including provider discomfort, lack of knowledge and confidence on how to appropriately engage in such conversations, reliance on client initiation, and personal beliefs/attitudes relating to same-sex partners or pre-marital sex.^{56,62} In Australia and internationally, healthcare provider discomfort in discussing sex with clients has been identified as a barrier to awareness/access to STI/HIV prevention in young and adult populations across a range of contexts, including PrEP provision,³⁵ chronic conditions,⁵⁶ pregnancy⁶³ and pre/post travel consultations.^{64,65} Thus, a greater emphasis needs to be placed on the importance of sexual health education, screening and conversations in health care, and the role that education provided through medical schools could play in educating medical students and registrars on the importance of sexual health and HIV prevention in young people.

Providers in our sample reported young people aged <16 years, and young people who identify as culturally- and linguistically-diverse and Aboriginal and Torres Strait Islander young peoples, are among the hardest groups to engage in sexual health care. This could be due to a lack of accessible culturally-appropriate services, experiences of racism and cultural norms within communities that relate to sexual health/healthcare-seeking behaviours.^{66,67} However, our sample also showed few healthcare providers engage in sexual health conversations with young people based on cultural and ethnic backgrounds regardless of age. This could be in part be due to a reluctance among healthcare providers to engage in conversations around sexual health for fears of 'overstepping' boundaries due to younger age and/or cultural/religious norms.⁶⁸ Thus, policy and practice need to consider the access to culturally-sensitive healthcare services for young people across Australia.

Findings from this study indicate there is a need to support healthcare and service providers in discussing sexual health, and recommending and prescribing PrEP to young people. Provider willingness to prescribe PrEP to adolescent/young adult populations is linked to knowledge of the provision and safety of PrEP in young people.^{37,46} Thus, it should be ensured that guidelines are up-to-date, along with the development of a training package or curriculum that can help support the provision of PrEP to young people and clarify concerns regarding safety/efficacy.^{51,69} Training needs to also focus on sexual health and well-being, and consider the inclusion of culturally and LGBTQIA+ affirming and sensitivity training, using patient-centred care.⁷⁰ This could help providers feel equipped with knowledge/skills to initiate sexual health conversations among diverse groups of clients, and support inclusion of conversations surrounding sexual practices and risk with young clients.⁷¹

Strengths and limitations

Our study is the first in Australia to investigate perceptions of PrEP with a focus on the provision in young people by healthcare and services providers. Including age-stratified responses gave insight into differences among healthcare and service providers for various groups of young people, including those aged <18 years and <16 years. Our final sample consisted of 122 healthcare and service providers, and a small sample of eligible prescribers across Australia, limiting statistical analyses that could be performed between groups, which should be taken into consideration when interpreting findings. This highlights the need for better methods of reaching and engaging healthcare and service providers in research.

The sample included an overrepresentation of participants from Queensland, which could further impact generalisability due to differences in attitudes and perceptions across jurisdictions. Only a small number of participants were from outer regional (4) and remote (1) settings, limiting insight into differences in urban versus remote clinical settings. Future research should aim to engage rural and remote healthcare workers to understand differences in perceptions and access across regions of Australia.

Data were self-reported, which can result in various recall and response biases to be present across data. Prescribers were not asked about their awareness of PrEP prescribing criteria: further research should include prescriber awareness of eligibility, as well as exploration into why prescribers may not be discussing sexual health or PrEP with young patients. Data were not captured on provider and prescriber experiences in working with young people; thus, it is unclear to what extent perceptions and attitudes are associated with experience or lack thereof in working with young people. Finally, further research should also consider the role of parents in the provision of PrEP to young people, as research has shown that parents/guardians are key stakeholders in access to PrEP for young people, engagement in HIV prevention care and healthcare provider provision of PrEP to young people.^{36,72}

Conclusion

Our study highlights several barriers to the provision of PrEP for young people aged <18 years in Australia. Guidelines and prescribing criteria need to reflect current PBS eligibility for young people to support healthcare prescriber decision-making in recommending and prescribing PrEP for young people where appropriate. Greater education, training and support is required to improve healthcare provider confidence in discussing sexual health needs, and recommending and prescribing PrEP to young people to optimise the possible benefits of access to sexual health services and PrEP in this priority sub-group.

Supplementary material

Supplementary material is available online.

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