Baseline characteristics of gay and bisexual men in an HIV pre-exposure prophylaxis demonstration project with equity quotas in Auckland, New Zealand

Original Research article, open-label single-arm treatment evaluation study

Peter JW Saxton [A E], *Sunita.Azariah* [B], *Richard A Franklin* [B], *Rose F Forster* [B], *Suzanne F Werder* [B], *Renee Jenkins* [B], *Jason M Myers* [C], *Joseph G Rich* [C], *Whatitiri P Te Wake* [C], *Mark D Fisher* [D]

[A] Gay Men's Sexual Health research group, Department of Social and Community Health, School of Population Health, University of Auckland, Auckland, New Zealand.

[B] Auckland Regional Sexual Health Service, Auckland District Health Board, Auckland, New Zealand.

[C] New Zealand AIDS Foundation, Auckland, New Zealand.

[D] Body Positive, Auckland, New Zealand.

[E] Corresponding author. Email: p.saxton@auckland.ac.nz

Correspondence

Peter Saxton, Department of Social and Community Health, University of Auckland, Private Bag 92109, Auckland. p.saxton@auckland.ac.nz

3263 words

Abstract

Background: In New Zealand, PrEP should target gay and bisexual men (GBM) and equity is an important principle. We describe baseline characteristics of GBM offered PrEP in a demonstration project with an enrolment quota of 50% non-Europeans.

Methods:

We used an open-label single-arm treatment evaluation study design ("NZPrEP"). The settings were four publicly-funded sexual health clinics in Auckland in 2017. The study population was 150 GBM recruited from clinics, community sources and social media. Participants self-completed an online questionnaire about PrEP awareness, attitudes and sexual risk behaviour in the last three months. We describe baseline characteristics and examine whether these were associated with PrEP initiation status (self-referral versus doctor/nurse recommendation).

Results:

We enrolled 150 GBM of whom half (52%) were non-European including 21.3% Maori, 19.3% Asian and 8.7% Pacific. Two-thirds (65.3%) self-referred for PrEP and a third (34.7%) were recommended PrEP by the doctor/nurse. Participants reported a high number of male condomless receptive anal intercourse partners (MenAICLR) (median 3, range 0-50), with 10% reporting 10 or more MenAICLR and 45.3% reporting group sex. In the previous year 65.3% had a sexually transmitted infection (STI), 18% had rectal chlamydia or gonorrhoea at enrolment. Half (47.7%) had recently used drugs with sex, including 8.1% using methamphetamine. Participants recommended PrEP had lower education, lived less centrally and had a higher STI prevalence than PrEP self-referrers but their risk behaviour was similar.

Conclusions:

Early PrEP adopters in New Zealand have high HIV risk. Demonstration projects should consider equity mechanisms so that minorities can participate meaningfully.

250 words

Additional Keywords: Equity; Targeted; Maori; Indigenous; Pacific; Asian; Ethnicity; Implementation; Homosexual men

Abridged title:

A PrEP demonstration project with equity quotas in NZ

Introduction

The global HIV epidemic is expanding due to ongoing transmission,(1) with gay and bisexual men (GBM) disproportionately affected.(2) New interventions are needed to minimise HIV acquisition risks and, in turn, interrupt transmission within sexual networks. Studies have shown that pre-exposure prophylaxis (PrEP) effectively prevents infection among GBM (3-5) and WHO has called for demonstration projects to guide implementation in local contexts.(6) A small number of these have been published but evidence from diverse settings is still absent.(7-10)

New Zealand has a comparatively successful record controlling HIV among GBM based on primary prevention by condom use.(11) The epidemic nadir between 1997 and 2000 saw only 21 annual diagnoses of domestically-acquired HIV attributed to GBM, among the lowest per capita rates internationally.(12) However recently this trend has changed and 98 such diagnoses were reported in 2016, the highest number since reporting began.(13) In combination with increased HIV testing, prompt treatment and widespread condom use, PrEP can therefore play an important role in reversing the epidemic.(14) Indeed New Zealand is in a unique position to capitalise from a PrEP programme that is well-targeted, is scaled-up and has high adherence. This is due to a small population (4.7 million), a concentrated epidemic (GBM account for >80% of domestically acquired HIV), high condom use,(15) a centralised HIV prevention agency (New Zealand AIDS Foundation), publicly funded sexual health clinics and relatively low HIV incidence despite recent experiences.

On March 1 2018 New Zealand became one of the first countries in the world to fully fund PrEP for individuals at highest risk of HIV. PrEP eligibility was determined by PHARMAC's "Factors for Consideration" which consider need, benefits and cost. To assess these, PHARMAC sought advice from the anti-infective subcommittee and considered local epidemiology, international guidelines and value-for-money considerations. (16) This decision followed a 2017 Consensus Statement on Comprehensive HIV Prevention in Aotearoa/New Zealand highlighting PrEP as one of six urgent actions,(17) the publication of Australasian guidelines,(18) NGO and community-led action, and commentary underlining the importance of a targeted and equitable PrEP programme.(13)

Prior to this individuals could obtain PrEP by importing generic components from low cost pharmacies internationally using a prescription from a general practitioner. Together these developments have spurred an interest in barriers to PrEP implementation.

In this study we report baseline characteristics of GBM enrolled into a fully funded PrEP programme ("NZPrEP") through public sexual health clinics in Auckland, New Zealand. This initial study had three main aims: i) to enrol GBM at high HIV risk; ii) to examine whether baseline socio-demographic characteristics, HIV and sexually transmitted infection (STI) test history, and sexual behaviours were associated with PrEP initiation status (participant-initiated or sexual health doctor/nurse-initiated); and iii) to enrol at least 50% non-European GBM, giving sufficient study power to examine sub-optimal retention, adherence and risk compensation at the study's conclusion.

Methods

Participants

The protocol is reported in detail elsewhere and was based on the New South Wales (NSW) PRELUDE demonstration project.(7, 19) Briefly, we used an open-label single-arm treatment evaluation study design. The settings were the four publicly-funded sexual health clinics (SHC) of the Auckland Sexual Health Service. Auckland is New Zealand's largest city with a multicultural population of 1.6 million and the highest prevalence of HIV.(20) The study population was 150 GBM or transgender individuals who have sex with men at elevated HIV risk. Recruitment was from patients attending SHCs, an online study waiting list, a dedicated study website, targeted promotion on social media and dating apps, community partner organisation networks and media releases, and general practitioner or self-referral. The study duration was 24 months.

Inclusion criteria were: being aged 18 or over, eligible for funded care in NZ, resident in Auckland, willing and able to provide informed written consent, take part in all study procedures and provide contact information; and fulfilled the Australasian Society for HIV Medicine Interim PrEP

Guidelines (behavioural eligibility for high risk patients).(21) The participant had to be likely to have receptive condomless anal intercourse in the next 3 months and any of the following: (a) a regular sexual partner of an HIV infected man not on antiretroviral therapy (ART) with whom receptive condomless anal intercourse had occurred in the previous 3 months; (b) reported one or more episodes of receptive condomless anal intercourse with a casual male partner who was HIV infected and not on ART, or was of unknown HIV status; (c) laboratory-confirmed diagnosis of rectal gonorrhoea, rectal chlamydia or syphilis in the previous 3 months; (d) methamphetamine use in the previous 3 months. As the sample size was limited, the PRELUDE criteria were amended after one month by requiring participants to have disclosed sex with five or more casual male partners in the previous 3 months or ten or more in the previous 6 months, as well as satisfy other eligibility criteria, in order to capture those most likely to benefit.

Exclusion criteria were: HIV positive at baseline; unwilling to provide written consent; current hepatitis B infection; an estimated creatinine clearance (glomerular filtration rate [GFR]) of less than 60ml per minute; an allergy to tenofovir disoproxil fumarate and/or emtricitabine; cognitive impairment or intellectual disability that could compromise participant safety and/or regimen adherence; or co-existing factors or conditions that could compromise their study retention.

Procedures

Potential participants were booked for a routine SHC appointment and screened for eligibility. Those fitting the inclusion criteria underwent baseline testing. Potential participants were provided with a participant information sheet and a consent form to review prior to their follow-up visit a week later. At follow-up, those testing HIV negative received risk-reduction counselling with a peer educator and were enrolled in the study. PrEP medication was dispensed at two participating community pharmacies. Participants were invited to self-complete an anonymous behavioural survey online using Surveymonkey within three days of visits that was adapted from the Australian VicPrEP study.(9) Reminders were issued by email and text message. The survey data were held securely at the

University of Auckland separate from clinic records. Data linkage was via a unique study number. Enrolled participants were not offered financial incentives to complete the survey.

Measures

Participants could claim multiple ethnicities. STI screening and diagnosis history (chlamydia, gonorrhoea, syphilis, non-specific urethritis (NSU), genital herpes, genital warts, LGV, *Mycoplasma genitalium* (MG)) was self-reported. Prevalent STIs at enrolment (chlamydia, gonorrhoea, syphilis, NSU, genital herpes and genital warts) were laboratory or clinician confirmed. Sexual behaviour in the prior three months recorded the following: sex with male and female partners; number of male sexual partners ("Men"); number of male partners had anal intercourse with ("MenAI"); number of male partners had condomless anal intercourse with ("MenAICL"); number of male partners had receptive condomless anal intercourse with ("MenAICLR"); group sex (four or more males). Frequency of substance use before or during sex in the previous three months used a five point scale (never, some of the time, half the time, most of the time, always) and included amyl nitrate, cannabis, GHB, ecstasy, amphetamine, methamphetamine, cocaine, ketamine, LSD, mephedrone, "other" and alcohol (separately asked); injecting drug use included never, in the last 12 months, more than 12 months ago. PEP use included ever and frequency in the last 12 months. PrEP use included ever and sources. Beliefs and attitudes were all asked on a 5 point scale (e.g. strongly agree, agree, neither agree nor disagree, disagree, strong disagree).

Analysis

Ethnicity classification was based on the total response approach (e.g. dichotomised to any Pacific identity vs non-Pacific identities).(22) Sexual behaviour data (e.g. MenAICLR) were summarised by the median, range and percentage reporting 10 or more such partners. Substance use was dichotomised into "heavy use" (most of the time or always") or "none or moderate use", and "chemsex" was defined as using methamphetamine, GHB or mephedrone before sex. We compared participant socio-demographics, HIV and STI screening, PrEP information sources and motivation, sexual behaviour and drug use according to whether PrEP was recommended by the participant or by

the doctor or nurse, using chi-square tests of proportion, Fisher's exact test for small cell sizes and t-tests as appropriate. All statistical analyses were conducted using Stata vers 14.0 (StataCorp, College Station, TX, USA) and assumed an alpha of 5% ($p<0.05$).

Equity quotas

Of the 150 participants we proposed quotas of 75 European and 75 non-European (30 Maori, 30 Pacific, 15 Asian or other). These were based on overseas study data and the following power calculations.(4,8) Power calculation 1: We have 85% power to detect if retention of non-Europeans at 48 weeks is 60% or lower vs 80% in Europeans if non-Europeans comprise half (n=75) the entry sample. Power calculation 2: We have 72% power to detect if retention of indigenous Maori at 48 weeks is 60% or lower vs 80% in non-Maori if Maori comprise 20% of the entry sample (n=30). Power calculation 3: We have 81% power to detect a change in high risk behaviour (10+ MenAICLR) from 10% at baseline to 21% at 48 weeks if 120 participants (80%) are retained. In this paper we restricted our analysis to a baseline comparison of ethnic groups across four traits: MenAICLR; prevalent rectal STI; any drug use during sex; and agreement that "I worry about becoming too dependent on these pills".

The study received ethics approval from the Health and Disability Ethics Committee #16/NTA/112.

Results

We enrolled 150 GBM over 42 weeks. All completed their baseline survey (median 21 minutes). The mean age was 32.3 years (range 18-51 years). Most (83%) were enrolled at Greenlane, the most central and largest clinic, and the majority (58.7%) lived in central Auckland. Half the participants (52%) were of non-European ethnicity including 21.3% identifying as indigenous Maori, 19.3% as Asian and 8.7% as Pacific. Most (92%) identified as gay and all as cis-gender male. Almost all (96%) had heard of PrEP before their clinic visit. Two thirds (65.3%) had initiated the discussion about taking PrEP and for a third (34.7%) PrEP had been suggested by the sexual health doctor or nurse.

Most participants had tested for HIV (94%) and for STIs (94%) in the 12 months prior to the clinic visit. Almost two-thirds (65.3%) reported that they had been diagnosed with an STI in the previous year and 42.2% with a rectal STI. The most common STIs reported (any site) were chlamydia (43.6%), gonorrhoea (40.9%), syphilis (10.1%), herpes (5.4%), warts (4.0%) and *Mycoplasma genitalium* (1.3%). At baseline 12.7% of participants were diagnosed with chlamydia, 11.3% with gonorrhoea, 2.7% with syphilis and 1.3% with NSU (overall 24%). Eighteen percent were diagnosed with rectal chlamydia or gonorrhoea and 19.3% with rectal chlamydia or gonorrhoea or infectious syphilis.

Table 1 describes participants' characteristics overall and by PrEP initiation source. Those who had been recommended PrEP by the sexual health doctor or nurse were significantly more likely than self-initiators to live outside central Auckland, to have lower educational attainment and to have had an STI diagnosis in the previous 12 months, and were proportionately more likely (though not significantly so) to have a non-European ethnic identity and a prevalent STI.

Fig. 1 lists PrEP information sources prior to study enrolment in rank order (not mutually exclusive). Friends (71.5%) were the most commonly cited source of PrEP information and the top five were all gay community channels including HIV organisations and sex partners (Fig. 1). Participants who had been recommended PrEP by a doctor/nurse were less likely than self-initiators to list sources such as an HIV organisation (43.1% vs 62.4%, p=0.026) (not shown).

Fig. 2 lists reasons participants gave for agreeing to PrEP. The most common reason was "I wanted to do everything possible to prevent getting HIV" (90.7%), 58.7% stated it was because PrEP was being fully funded, and 48% mentioned they couldn't rely on using condoms. Participants who had been recommended PrEP were more likely than self-initiators to cite wanting regular health checks (40.4% vs 22.5%, p=0.021) and to list their doctor's advice (23.1% vs 3.1%, p<0.001), and

were less likely than self-initiators to mention that they can't rely on condoms (36.5% vs 54.1%, p=0.041) (not shown).

Participants reported a high number of male sexual partners in the previous three months (Table 2). Across the four categories of Men, MenAI, MenAICL and MenAICLR the median number (and range) was 10.5 (2-70), 9 (1-60), 4 (0-60) and 3 (0-50). Correspondingly a high proportion reported 10 or more such partners in the previous three months (61.3%, 48.7%, 22.7% and 10% respectively). Just under half (46%) reported group sex, 28% having done so twice or more. Around half (47.7%) reported using substances before or during sex in the last three months, 10.1% at "heavy" levels (most of the time or always), 15.4% reported chemsex and 8.1% had used methamphetamine. Few had injected drugs in the last 12 months (4.7%). One in 5 (18.9%) had ever previously used PEP (10.8% in the previous year, not shown) and one in 10 (9.4%) had ever previously used PrEP, sources being a doctor or nurse (n=6), overseas (n=5) and the internet (n=3). The majority (79.1%) had experienced erection difficulties at least once in their life and over a third (37.2%) had used erectile dysfunction medication in the last three months. There were no differences in sexual behaviour or substance use by PrEP initiation status (Table 2) with the exception of PrEP self-initiators who were more likely to report heavy alcohol use before sex (p=0.047).

A quarter (26.2%) of participants felt they would have contracted HIV in the next few months, most (89.9%) considered HIV to be very serious, almost all (98%) said it was important for them to stay HIV negative, and all but one (99.3%) believed PrEP was effective at preventing HIV. Likewise almost all (98.7%) believed PrEP was an acceptable way to avoid HIV and 99.3% said they were motivated to take PrEP to achieve this (including 92.6% saying they were "completely motivated") (data not shown). Nevertheless, Fig. 3 shows that almost two-fifths (38.9%) thought missing a pill for a day wouldn't matter and 28.9% worried about becoming too dependent on PrEP. Over half reported feeling under pressure to not use condoms (53.7%) or that condoms caused erection difficulties (69.8%). Most (78.5%) were worried about contracting STIs. Almost everyone (98.0%) said that they felt the sexual health doctor or nurse had listened to them at the clinic visit, that

PrEP had been adequately explained (99.3%), and only two respondents felt pressured to take PrEP. Overall 97.3% said their overall clinic experience was extremely or somewhat positive (data not shown).

At baseline, non-European participants as a group were more likely than European-only participants to agree that "I worry about becoming too dependent on these pills" (p=0.019), but had similar rates of 10+ MenAICLR, prevalent rectal STI and any drug use during sex (Table 3). Asian participants were more likely than non-Asian participants to have a prevalent rectal STI at baseline (p=0.042).

Discussion

New Zealand's first PrEP demonstration project at Auckland's Sexual Health Service successfully attracted HIV-negative GBM whose behaviours place them at very high risk of infection. These included elevated rates of receptive anal intercourse with multiple partners, rectal bacterial STI, group sex and substance use during sex. Participants acknowledged they were vulnerable to HIV, believed PrEP was effective and were highly motivated to avoid infection. Two-thirds of participants had referred themselves into the PrEP study, while a third of participants had been recommended PrEP by the doctor or nurse during a clinic appointment. The latter reported the same risk behaviour as self-initiators and therefore had similar potential benefit from PrEP. However they were significantly less likely to live centrally, to have tertiary education, and to have heard of PrEP from an HIV organisation. Participants rated their PrEP experience at the clinic highly.

A novel variant of our demonstration project was the 50% enrolment quota for non-European GBM which we achieved. We believe this makes it among the most ethnically diverse demonstration studies in GBM to date. Study retention and PrEP adherence was found to be lower among Black GBM in the US, and there are concerns internationally that uneven uptake of PrEP will exacerbate existing health inequalities surrounding HIV.(8) Now that PrEP is fully-funded via the public health

system in New Zealand it will be important to identify any suboptimal outcomes for non-Europeans and address these promptly. In our study at baseline, non-European participants had a similar behavioural risk profile to European-only participants, however they were more likely than Europeans to worry about becoming too dependent on PrEP. This could signal concerns among non-Europeans that clinic-based or medication-based HIV prevention options like PrEP will be difficult or undesirable to sustain over long periods. This might reflect or indeed anticipate negative healthcare experiences or barriers, and further highlights the need to monitor the experience of ethnic minorities in PrEP implementation.

Strengths of our study include the provision of PrEP under conditions and settings likely to replicate real-world implementation, the anonymous data collection, no study incentives beyond the study procedures and the use of ethnicity quotas described above. Limitations include the non-representative sample of GBM, although eligibility for our study was consistent with the ASHM "high risk" PrEP recommendations, as well as the eligibility criteria for fully funded PrEP in New Zealand adopted in March 2018. Other limitations include the small sample size that was restricted due to SHC capacity and funding, and which was therefore unable to include GBM at more moderate risk of HIV, and a reliance on self-reported data that may not be accurate.

Compared to GBM enrolled in PrEP demonstration projects elsewhere our respondents reported similar risk behaviours at baseline. In the UK PROUD study, 11.5% reported 10 or more receptive condomless sex partners, similar to NZPrEP at 10%, and 64% self-reported an STI diagnosis in the previous 12 months, also similar to NZPrEP (65.3%), although rates of chemsex in the prior three months were higher in the UK (44%) than the NZ (15.4%) study.(4) In the NSW PRELUDE study, 53% had used drugs for sex in the prior 3 months, similar to ours at 47.7%, however rates of injecting drug use and crystal meth were substantially higher in the Australian study.(23) In AMPrEP, a median of 3 condomless receptive casual partners were reported, compared to 3 of any partner type in NZPrEP,(24) and in AMPrEP 16.6% were diagnosed with rectal chlamydia or gonorrhoea at baseline, similar to 18% in NZPrEP. Alternatively, participants in PrEP Brasil were

less likely to report drug use in the previous three months (24.7%) or gonorrhoea, chlamydia or syphilis in the last year (19.9%) than our participants.(10) These findings reinforce the notion that PrEP appeals to high risk GBM from a range of contexts internationally.

Our participants are among the first in New Zealand to access fully-funded PrEP via a temporary scheme. Their elevated risk behaviour and high social and clinical engagement are consistent with them being early adopters acutely aware of their need for PrEP. Now that PrEP is publicly funded in New Zealand, our study has already identified several areas where the health system will must adapt rapidly.

For example, few respondents cited their general practitioner or advertisements when invited to recall PrEP information sources, with most citing gay community channels. PrEP promotion and training for medical professionals will need to be broadened to increase awareness, knowledge and expertise. Relatedly, PrEP access points must be extended, both within and beyond SHCs especially into primary care, so that supply can meet demand in a timely way. Service capacity and funding limited our study to 150 participants but more appointments will clearly be required. Thirdly, the high quality of care received must be maintained as PrEP services multiply. Participants rated their interactions with sexual health staff very positively, and our data can be used as a benchmark for other services including primary health care.

The next steps for this study will be to monitor retention, PrEP adherence, STIs and risk behaviour over time and to identify factors associated with suboptimal outcomes, with a careful eye on ethnic disparities. Beyond it there is an urgent need to monitor PrEP awareness, acceptability, uptake and risk compensation in the wider GBM population, preferably by adapting behavioural surveillance as conducted successfully in Australia.(25,26) Estimates of the number of GBM eligible for PrEP based on such population behavioural data and local PrEP eligibility criteria will also be necessary to monitor scale-up and gaps in coverage.(27) Investing in public health intelligence

systems that can deliver these data is essential if New Zealand is to fully realise the potential impact from PrEP.

In conclusion we have shown that ethnically diverse GBM at high risk of HIV acquisition can be recruited into a PrEP programme delivered through public sexual health services in a small country with relatively low HIV prevalence and high condom use among GBM.

Conflicts of interest

The New Zealand AIDS Foundation funded PS to conduct the baseline behavioural study. Gilead funded the clinical study and provided the study medication Truvada, but had no role in the behavioural arm. No other conflicts are declared.

Acknowledgements

The authors would like to thank the men who participated in the study and the staff at Auckland Sexual Health Service for administering study procedures. We would also like to thank Eric Ho and Tony Sie, community pharmacists, for their valuable support. We would especially like to thank Dr Dean Murphy, Prof Martin Holt and Associate Prof Iryna Zablotska at the University of NSW, Sydney, Australia for their advice and support.

PS designed the behavioural study, conducted the analysis and wrote the first draft. SA, RAF, RFF and PS designed the clinical study. SA led the ethics application. SA, RAF, RFF, SW and RJ performed clinical procedures at Auckland Sexual Health Service. WTW provided cultural advice, JM, JR, WTW and MF supported data collection and MF designed the electronic patient eligibility screening and clinic database. All authors contributed to the manuscript and approved the final version.

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Table 1. Socio-demographic characteristics and HIV and STI test history of gay and bisexual men enrolled in a PrEP demonstration project in sexual health clinics in Auckland, New Zealand (%)

	PrEP recommended by			
	Doctor or nurse n=52	Participant n=98	Test p-value	Total n=150
Age (mean)	30.9	33	0.156 t-test	32.3
Age group				
<30	49.0	40.4	0.327	43.4
30+	51.0	59.6		56.6
Residence				
Central Auckland	42.3	67.4	**0.003**	58.7
Rest of Auckland	57.7	32.7		41.3
Ethnicity [A]				
European	57.7	69.4	0.152	65.3
Maori	21.2	21.4	0.969	21.3
Pacific	11.5	7.1	0.362	8.7
Asian	23.1	17.4	0.398	19.3
Other	7.7	6.1	0.714	6.7
Ethnicity (grouped)				
European only	38.5	53.1	0.089	48.0
Any non-European	61.5	46.9		52.0
Highest education				
Less than tertiary degree	57.7	37.8	**0.019**	44.7
Tertiary degree	42.3	62.2		55.3
Sexual identity				
Gay	90.4	92.9	0.595	92.0
Bisexual or other	9.6	7.1		8.0
HIV test history				
Never or >12m ago	9.6	4.1	0.277 F	6.0
Tested ≤12m	90.4	95.9		94.0
STI test history				
Never or >12m ago	5.9	6.1	1.000 F	6.0
Tested ≤12m	94.1	93.9		94.0
STI diagnoses <12m[B]				
None	23.5	40.6	**0.038**	34.7
Any STI	76.5	59.4		65.3
Rectal STI <12m[C]				
None or unsure	51.0	61.5	0.221	57.8
Any rectal STI	49.0	38.5		42.2
Prevalent STI[D]				
None	67.3	80.6	0.069	76.0
Any	32.7	19.4		24.0
Prevalent rectal STI[E]				
None	75.0	85.7	0.104	82.0
Any	25.0	14.3		18.0

[A] In the total response method participants can choose multiple ethnicities and the output is reported here as a binary (e.g. any European vs no European).

[B] Chlamydia, gonorrhoea, syphilis, NSU, genital herpes, genital warts.

[C] Any of [B] rectal.

[D] Chlamydia, gonorrhoea, syphilis, NSU, genital herpes, genital warts.

[E] Rectal chlamydia or gonorrhoea.

Note: Bold denotes statistically significant p-value. F denotes Fisher's exact test. 12m denotes 12 months.

453

454 **Table 2. Sexual behaviour and substance use of gay and bisexual men enrolled in a PrEP**
455 **demonstration project in sexual health clinics in Auckland, New Zealand (%)**

	PrEP recommended by			
	Doctor or nurse n=52	Participant n=98	Test p-value	Total n=150
Sexual partners <3m				
Men only	98.1	99.0	0.646	98.7
Men and women	1.9	1.0		1.3
Men <3m				
Median (range)	10 (2-50)	11 (2-70)		10.5 (2-70)
10+	55.8	64.3	0.308	61.3
MenAI <3m				
Median (range)	8 (1-45)	9.5 (1-60)		9 (1-60)
10+	46.2	50.0	0.654	48.7
MenAICL <3m				
Median (range)	4 (0-23)	5 (0-60)		4 (0-60)
10+	17.3	25.5	0.253	22.7
MenAICLR <3m				
Median (range)	3 (0-13)	4 (0-50)		3 (0-50)
10+	7.7	11.2	0.493	10.0
Group sex<3m	40.4	49.0	0.315	46.0
Alcohol use before sex <3m				
None or moderate	94.2	82.7	**0.047**	86.7
Heavy	5.8	17.4		13.3
Substance use before sex <3m				
None or moderate	90.2	89.8	0.939	89.8
Heavy	9.8	10.2		10.1
Any substance use before sex <3m	43.1	50.0	0.426	47.7
Chemsex <3m	11.8	17.4	0.371	15.4
Methamphetamines before sex <3m	5.9	9.2	0.482	8.1
Injected drugs <12m	4.0	5.2	0.737	4.7
PEP ever	17.3	19.8	0.713	18.9
PrEP ever	3.9	12.4	0.139 F	9.4
Erection difficulties ever	76.9	80.2	0.639	79.1
Erectile dysfunction medication <3m	40.4	35.4	0.550	37.2

Note: <3m, <12m = previous 3, 12 months respectively. Men = Number of male partners. MenAI = Number of male anal intercourse partners. MenAICL = Number of male condomless anal intercourse partners. MenAICLR = Number of male receptive condomless anal intercourse partners. Bold denotes statistically significant p-value. F denotes Fisher's exact test. 3m denotes 3 months.

Table 3. Baseline traits by equity group of gay and bisexual men enrolled in a PrEP demonstration project in sexual health clinics in Auckland, New Zealand (%)

	Proportion of each ethnic equity group reporting this trait at baseline							
	10+ MenAICLR <3m[A]		Prevalent rectal STI[B]		Any substance use before sex <3m		"I worry about becoming too dependent on these pills" (agree)	
	%	p-value[D]	%	p-value[D]	%	p-value[D]	%	p-value[D]
Ethnicity [C]								
European	9.2	0.647	16.3	0.464	53.1	0.067	23.7	0.058
Maori	3.1	0.144	9.4	0.152	43.8	0.618	37.5	0.223
Pacific [E]	7.7	-	0.0	-	38.5	-	46.2	-
Asian	10.3	0.945	31.0	**0.042**	39.3	0.325	41.4	0.097
Other [E]	20.0	-	30.0	-	40.0	-	20.0	-
Ethnicity (grouped)								
European only	11.1	0.663	18.1	0.986	52.8	0.226	19.7	**0.019**
Any non-European	9.0		18.0		42.9		37.2	

[A] 10+ MenAICLR<3m = Ten or more male receptive condomless anal intercourse partners in the previous three months.

[B] Rectal chlamydia or gonorrhoea.

[C] In the total response method participants can choose multiple ethnicities and the output is reported here as a binary (e.g. any European vs no European).

[D] Chi^2 test p-value compares row with all other respondents combined.

[E] Numbers too small for reliable analysis.

Note: Bold denotes statistically significant p-value. 3m denotes 3 months.

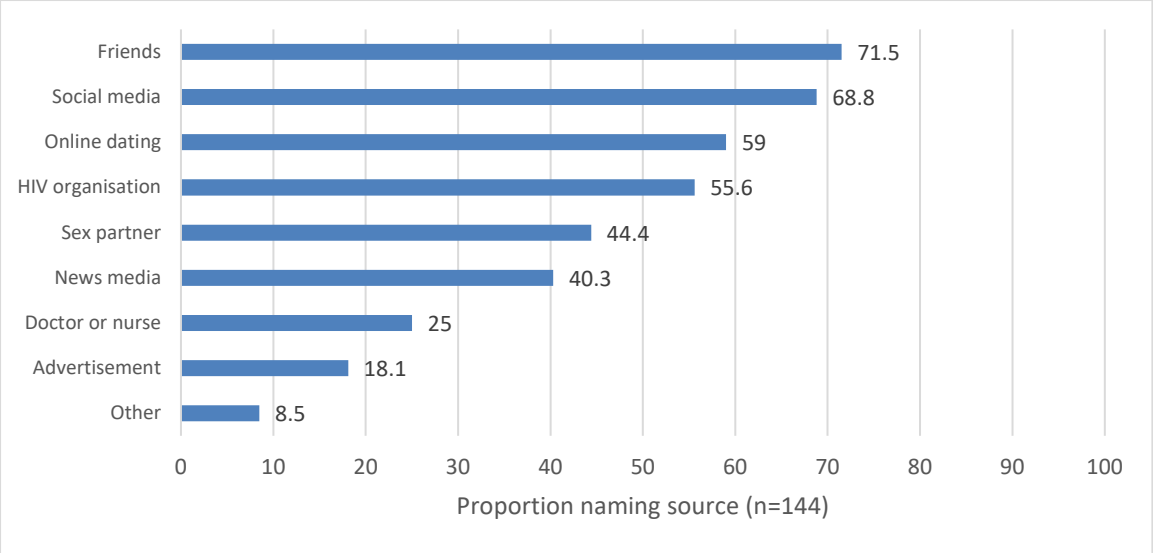

Fig. 1. Sources of PrEP awareness prior to study among gay and bisexual men enrolled in a PrEP demonstration project in sexual health clinics in Auckland, New Zealand

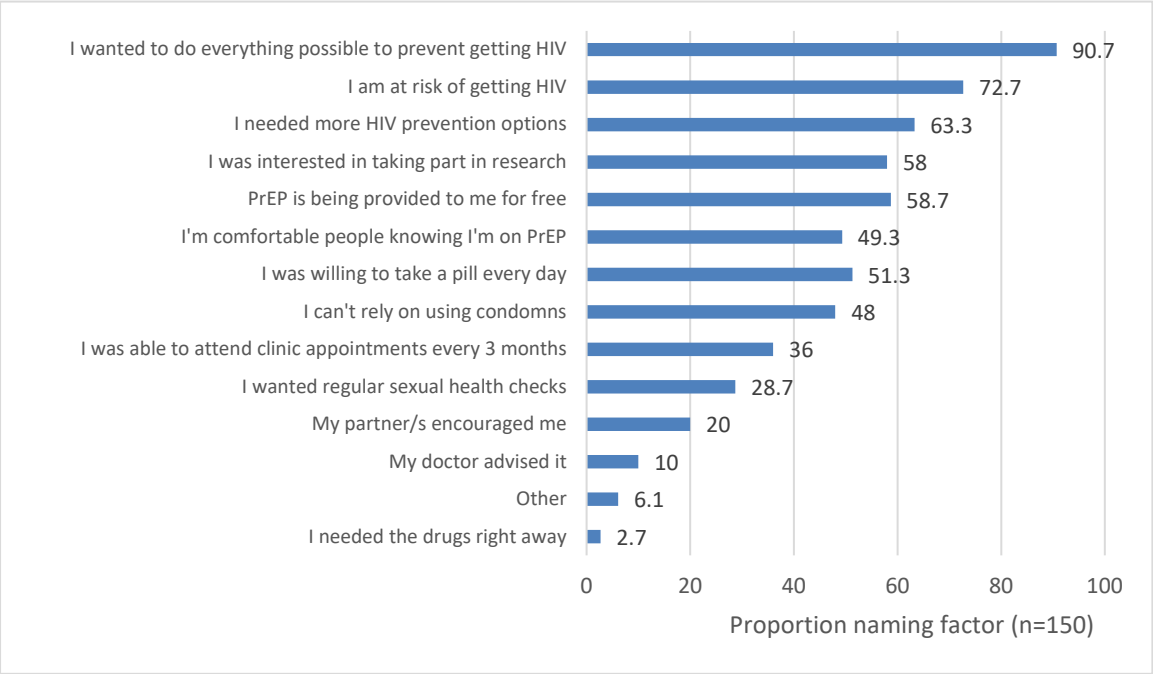

Fig. 2. Motivations for PrEP among gay and bisexual men enrolled in a PrEP demonstration project in sexual health clinics in Auckland, New Zealand

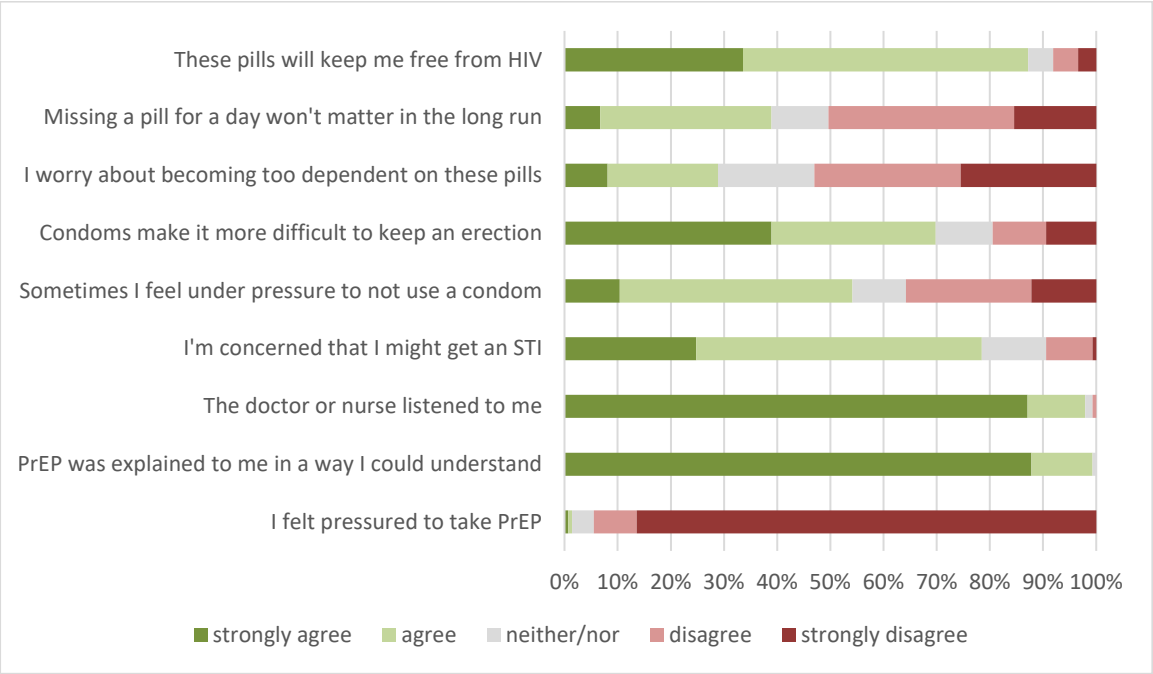

Fig. 3. Attitudes to PrEP, condom difficulties and PrEP prescribing among gay and bisexual men enrolled in a PrEP demonstration project in sexual health clinics in Auckland, New Zealand.