HIV MEDICINE
British HIV Association BHIVA

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Journal:	*HIV Medicine*
Manuscript ID	HIV-OA-03-2021-5387
Manuscript Type:	Original research
Date Submitted by the Author:	13-Mar-2021
Keywords:	HIV, HIV prevention, Combination prevention, TasP, PrEP, MSM

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The success of HIV combination prevention: the Dean Street model.

Running head: Fall in HIV diagnoses with combination prevention.

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No financial support was received for this study

All authors: No reported conflicts of interest

ABSTRACT

56 Dean Street combination prevention model, a strong engagement with the LGBTQI community and flexible services adapted to users' changing needs led to an 80% drop in HIV diagnoses in MSM from 2015 to 2017. We describe the service changes at 56 Dean Street since 2012 which resulted in an increase in the frequency of HIV testing, earlier HIV diagnosis and a shorter time to viral suppression in those living with HIV. This model could be adapted to deliver similar results in those settings of high HIV prevalence among MSM and where access to technological innovation in healthcare and engagement with the community can be achieved.

Introduction

Public Health England (PHE) reported a 30% fall in the number of new HIV diagnoses in 2017 from 6,271 in 2015. The decline was most marked amongst men who have sex with men (MSM) who were white, aged 15-24, UK born and resident in London and modelling of this cohort suggests that HIV transmission most likely began to decline in 2012 [1]. Earlier reports indicated that five sexual health clinics in London observed the largest drop in new diagnoses in comparison to the rest of the country [2]. 56 Dean Street (56DS) is a publicly funded combined sexual health and HIV service located in Soho, central London, an area known for its high concentration of LGBTQI venues and considered a major hub for gay culture. Of the five clinics studied, 56DS is the clinic which observed the largest decline of new HIV diagnoses at 80% between 2015 and 2017 [3].

Over the past decade, the benefits of frequent testing, access to pre-exposure prophylaxis (PrEP) amongst groups at high risk of HIV acquisition, and rapid antiretroviral treatment (ART) initiation in those with newly diagnosed HIV, have become increasingly apparent, influencing public health and clinical guidelines [4]. 56DS responded promptly to implement these policies and guidelines, often ahead of formal commissioning [5]. We describe the evolution of the HIV combination prevention model at 56DS using key markers to assess its impact, namely, trends in new HIV diagnoses and testing, use of antiretrovirals to prevent acquisition, and time to initial ART among newly diagnosed MSM.

Methods

Clinic setting, activities and timeline

Since its opening in March 2009 56DS, part of Chelsea and Westminster Hospital NHS Foundation Trust, has provided a free, confidential and comprehensive service for care relating to sexually transmitted infections (STI) and HIV, including the diagnosis and treatment of individuals presenting with symptomatic and asymptomatic STIs, contraception (emergency, initiation and continuation), HIV post-exposure prophylaxis following sexual exposure (PEPSE) and hepatitis B immunisation. Due to increasing demand, 56DS opened Dean Street Express (DSE) in

February 2014, a service capable of delivering HIV, STIs, hepatitis B and C test results within 6 hours [6]. In October 2017 DSE was restructured to deliver pre-exposure prophylaxis (PrEP) [7].

In September 2012, BHIVA guidance advised that ART could be initiated to prevent onward transmission of HIV to sexual partners upon request and irrespective of CD4 count [8] and the clinic systematically promoted this to all newly diagnosed users. In December 2015, BHIVA further clarified its guidance to recommend ART initiation for all HIV-infected individuals at diagnosis for treatment and treatment-as-prevention (TasP) [9] and in July 2016 56DS began a service to routinely offer rapid ART initiation within 48 hours of a confirmed HIV diagnosis [10]. Oral PrEP as co-formulated tenofovir-DF/emtricitabine was licensed by the US Food and Drug Administration in July 2012 [11] and in December of the same year, the first participants in the PROUD study of PrEP were enrolled [12]. In February 2015, the PROUD study reported that daily oral co-formulated tenofovir-DF/emtricitabine (Truvada©) reduced the risk of HIV acquisition by 86% compared to no PrEP use and the French/Canadian IPERGAY study reported the same level of reduction with event driven PrEP compared to placebo [13]. In September 2015, in the absence of oral PrEP provision in the NHS, 56DS opened a weekly clinic offering oral PrEP (as Truvada©) at a cost price of £400 for 30 tablets [14]. Two websites were launched in October 2015 providing information about PrEP: www.PrEPster.info and www.iwantprepnow.com; the latter informing on how to source generic oral PrEP online; both were promoted in the 56DS clinic and social media platform.

56DS launched 'Dean Street PRIME' in January 2016, a web-based package of tailored advice and information around HIV risk reduction dedicated to individuals with an estimated risk of HIV acquisition greater than 10% per year, identified at a previous attendance at our service [15]. Those registered could test monthly for HIV and whenever they felt unwell. In February 2016, the clinic began offering free monitoring for those self-sourcing oral PrEP, in agreement with national PrEP guidance produced by a collaboration of UK doctors, charities and PrEP advocates [16]. On October 12th, 2017 the NHS England-commissioned PrEP IMPACT trial started, providing PrEP free of charge to sexual health clinic attendees in England enrolled on the trial [17] and surveillance data were collected systematically for this

cohort.

Data sources

The number of annual HIV tests performed at 56DS from January, 1st 2012 (Q1 2012) to December 31st 2017 (Q4 2017) was obtained from PHE's GUMCAD STI Surveillance System [18], a mandatory pseudonymised electronic dataset of all STI tests, diagnoses and services from all sexual health services in England. Men who had ever reported being gay or bisexual and tested for HIV during this period were included. For each calendar year, repeat testers were men who had evidence of at least one additional test at 56DS in the previous 12 months. The median time period between tests was calculated separately for each calendar year from 2012-2017.

The number of new diagnoses and time from HIV diagnosis to ART initiation and to viral suppression for the years 2012-2017 were obtained from PHE's HIV and AIDS reporting system (HARS), a national cohort of people diagnosed with HIV in the UK [19]. People are enrolled from the first diagnosis of HIV in the UK with quarterly clinical and treatment updates sent by all HIV clinics. Data are linked using a code derived from their surname and date of birth to identify persons who present at more than one site or transfer their care. For this study, men who were newly diagnosed with HIV at 56DS and reported sex with other men as their probable route of transmission were included. Men with a known previous diagnosis abroad or transfers from another clinic were excluded. Recently acquired HIV infection was evidenced by a recorded HIV negative test in the previous 12 months of HIV diagnosis and/or testing positive to the recent infection testing algorithm (RITA) [19]. Time between date of diagnosis and date of treatment initiation as well as date of first viral count suppression (defined as <200 copies mL) was calculated for each newly diagnosed man. Median times are presented by calendar year 2012-2017.

Monthly PEPSE prescriptions were estimated from routine clinical coding of PEPSE consultations on the 56DS electronic patient records system. PrEP users were captured on clinical trial registers (PROUD [12] and DISCOVER [20]), and the weekly PrEP clinic register from September 2015. Mandatory reporting of PrEP use through

the GUMCAD surveillance system was introduced in October 2017, but these data have been embargoed by the sponsor of the PrEP Impact trial.

Results

HIV testing implementation and fall in HIV diagnoses

The number of HIV tests in MSM performed at 56DS increased from an average of 4,732 per quarter in 2012 to 10,362 per quarter in 2017 (Figure 1). This number rose sharply in 2014, following the opening of DSE, soaring up to 10,838 tests in the third quarter (Q3) of 2015 and remaining high with similar volumes up to Q3 of 2017. A total of 191,205 HIV tests were performed in 124,521 MSM between January 2012 and December 2017 and these account for 43% (191,205/439,170) and 24% (191,205/810,721) of all HIV tests undertaken by MSM in London and England respectively during that period. The median number of days between HIV tests for the 43,861 MSM testing more than once a year at the clinic declined from 119 days in 2012 to 98 days in 2017. Of all the MSM testing for HIV at 56DS, the percentage of those testing more than once a year grew from 25% in 2012 to 43% in 2017, whilst the number of men testing at least 3 times a year increased almost five-fold over the period (from 957 in 2012 to 4533 in 2017) and accounted for 7% and 19% of testers in those years, respectively.

Over the six-year period, the clinic diagnosed 2111 MSM with HIV, accounting for 32% (2111/6626) of all HIV diagnoses in MSM in London and 18% (2111/12021) of those in England. Figure 1 also shows the quarterly number of new HIV diagnoses made at 56DS from 2012 to 2017. This figure rose from around 80 cases each quarter for 2012-13 to a peak of 128 cases in the first quarter of 2015 and subsequently falling year on year with 31 cases reported in the final quarter of 2017. Over this period, the proportion of men with evidence of a recently acquired HIV infection increased from 25% in 2012 to 65% in 2015 and remained stable thereafter.

Initiation of ART

The median days to ART initiation and viral suppression for men newly diagnosed at the clinic fell from 317 days in 2012 to 7 days (ART initiation) in 2017 and from 520

to 79 days (viral suppression), respectively (Figure 2a). Notably, the largest drop in both these measures was observed between 2012 and 2013, a decrease of 209 and 220 days respectively. The decrease following the universal offer to start ART within 48 hours of diagnosis in 2016 was from 14 days in 2016 to 7 days in 2017.

Since 2012, the proportion of men who started ART within 30 days from HIV diagnosis, has increased overtime irrespective of CD4 count at diagnosis (shown in Figure 2b), reaching 85% in 2017 for those with a baseline CD4 count >350/mmc. Of note, the proportion starting within 30 days who had a CD4 count >500/mmc was only 7% in 2011 but continued to rise year on year prior to the introduction of universal treatment at the end of 2015.

PrEP and PEPSE

In 2015, 119 attendees could access PrEP through the PROUD study. The number of PrEP users attending the weekly clinic increased by an average of 50 users per month from September 2015, to 2620 registered in December 2017 (Figure 3).

The number of PEPSE prescriptions dispensed at 56DS increased from 69 prescriptions per month in January 2012 to 352 in November 2015 (Figure 3). This number remained stable at an average of 335 and 327 prescriptions per month in 2016 and 2017, respectively.

Discussion

Our findings demonstrate that the 56 Dean Street clinic model of care has had a major impact on reducing new HIV infections and ensuring those diagnosed with HIV receive fast and optimal care.

PrEP use was not captured systematically until the end of 2017. However, it is likely that the combination of PrEP, early HIV diagnosis through frequent testing and timely ART for TasP were all pivotal to the success in reducing HIV transmission, although it is impossible to establish the relative contribution of each prevention strategy to the fall in HIV diagnoses seen at 56DS.

For over a decade, public health guidance and testing guidelines have recommended that MSM should test for HIV and have a STI screen annually or every 3 months if they are having unprotected sex with new or casual partners [21]. The opening of

DSE in 2014 and the flexibility adopted in shaping its service to meet a changing demand, resulted in a rapid doubling in HIV tests carried out in the service from 2014 to 2015 with high test volumes sustained in 2017.

The strategic location of the clinic in the heart of the London gay scene and a policy of openness, engagement with the local community through testing campaigns, events and targeted social media content attracted high risk populations.

Social media campaigns aimed at the clinic's target population and the promotion of health and wellbeing events enabled education and allowed 56DS to reach a higher number of individuals who then engaged and were aware of all the other services offered. 56DS enabled frequent testing by offering easily accessible rapid testing services with a rapid turnaround response and with prioritized booking for those falling into high-risk categories. These strategies to promote frequent testing among higher risk MSM resulted in an almost five-fold increase in the number of repeat testers attending the clinic over the study period.

The proportion of those diagnosed with evidence of recent HIV acquisition more than doubled between 2012 and 2015 (Figure 1), coincident with the period when DSE opened, suggesting that ease of access to more frequent testing has facilitated the diagnosis of recently acquired HIV, although this could also be explained by promotion of the clinic within social-sexual networks. It is likely that the peak in HIV diagnoses observed across Q3 2014 to Q1 2015, following the upscale in testing at DSE is also explained by a lag between acquisition and diagnosis for those catching HIV in the earlier period.

Another key finding was the continuing decrease in median time to viral suppression in those initiating antiretroviral therapy over the timeframe considered. 56DS implemented a systematic rapid ART start approach, offering ART at the first medical consultation to prevent onward transmission from 2012, and aiming to do so within 48 hours from HIV diagnosis for all from 2015. The variation in interquartile range of days to ART initiation was wide prior to 2015 suggesting that during this time - even before national guidance advised TasP – some individuals did start ART soon after the HIV diagnosis.

The proportions of rapid ART starters among those with a baseline CD4 count >350 increased from 12% in 2012 onwards, with a sharper rise from 2015 to 2017 (44%

and 85% respectively). Following the systematic offer of TasP, the median time to viral suppression fell to 79 days in 2017, minimising the time for subsequent HIV transmission events [22]. Rapid ART start did not impact on subsequent retention in care, with over 90% of individuals still under routine follow-up at 6 months [23].

PrEP use grew rapidly from late 2015 because of internet access, but we were only able to capture the numbers enrolled in clinical trials or registered at the weekly consultant led clinic during this period, so the numbers are an underestimate. The number of PEPSE prescriptions also increased over the period studied and it is possible that MSM used the antiretrovirals for intermittent PrEP. PrEP upscale targeting those MSM at the highest risk of acquiring and then transmitting HIV may have played a key role in driving the fall of HIV infections.

The 56DS model of care is run by a clinic with is part of the NHS and as such, free of direct costs to the individual and lean in the efficiency of its clinical pathways. We suggest that such a model may be particularly applicable to settings where a high prevalence of at-risk MSM, or indeed other groups at risk, is concentrated in a small area. Capital investment, strategic location, partnerships with companies enabling rapid diagnostics and engagement with the target community through tailored contents are all key factors contributing to the success of this model of care. Facilitating its implementation elsewhere with combination prevention strategies targeted to those individuals at higher risk of HIV acquisition is paramount and could contribute globally to the achievement of zero HIV diagnoses.

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Figure 1. **HIV testing implementation and falling HIV diagnoses.**

The number of HIV tests (solid line, scale on left side) performed between January 2012 and December 2017 and of new HIV diagnoses (columns, scale on right side) in MSM each quarter at 56 Dean Street over the same period. The proportion of individuals with evidence of recent HIV infection (each year) is also reported on the bottom line.

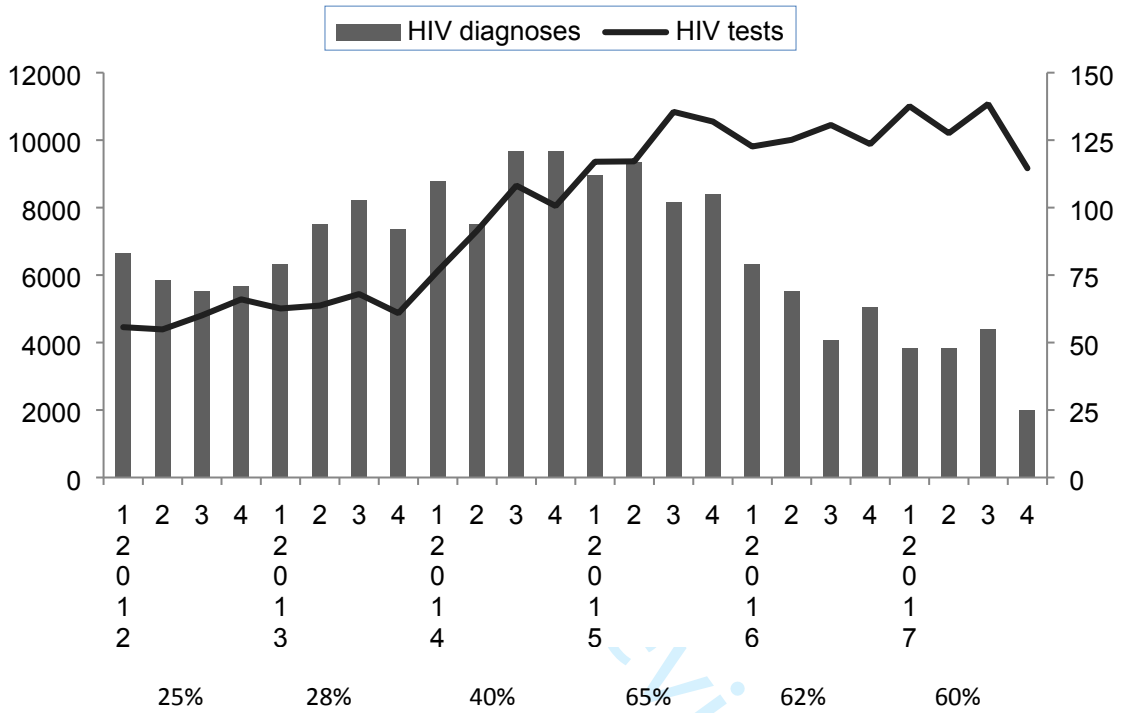


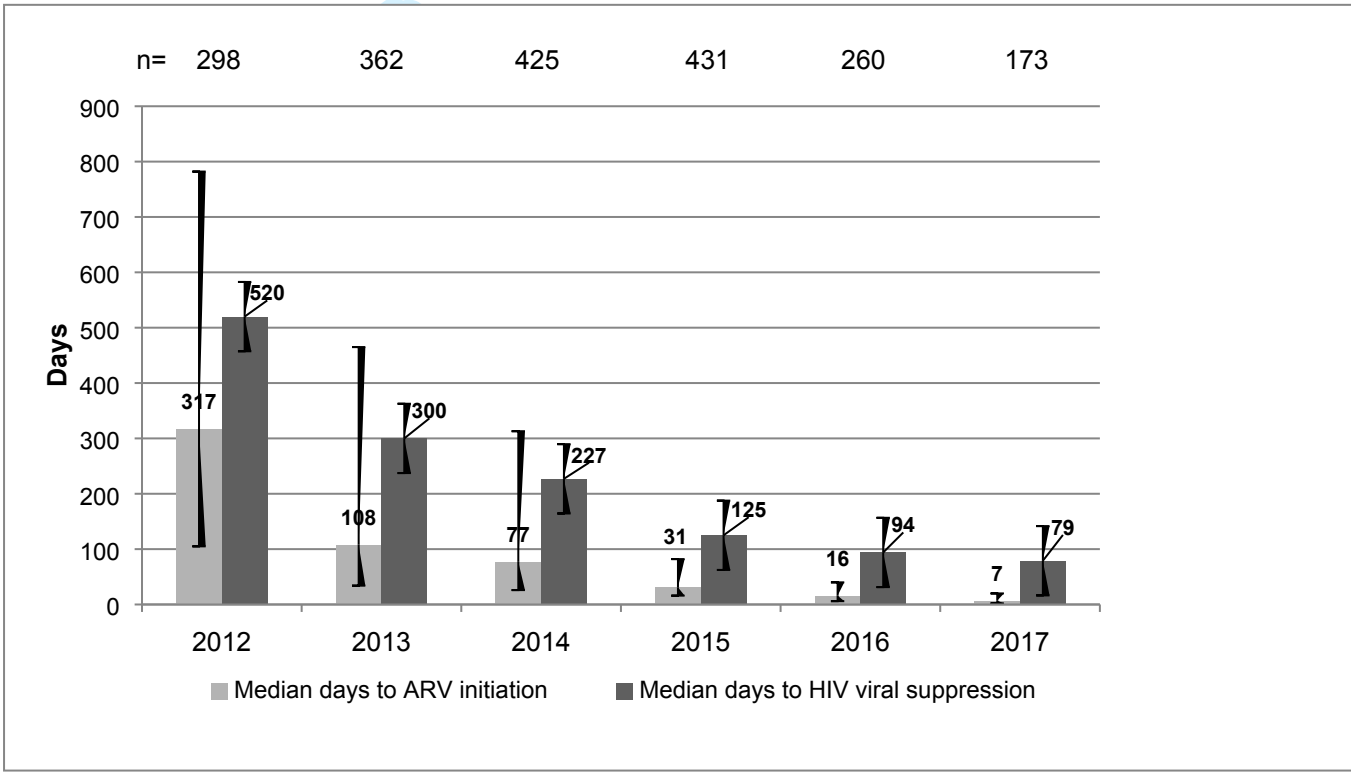
Figure 2a. Falling time from HIV diagnosis to ART initiation and HIV viral load suppression.

The median number of days from HIV diagnosis to antiretroviral therapy (ART) initiation (light grey) and to HIV viral suppression (dark grey) for MSM newly diagnosed with HIV infection at 56 Dean Street, shown yearly (2012-2017). Interquartile ranges are shown.

Figure 2b. Increased numbers of MSM starting ART within 30 days from HIV diagnosis.

Proportion (%) of MSM who started ART within 30 days from HIV diagnosis by year between 2009 and 2017, stratified by baseline CD4 cell count (/mmc).

2a.



2b.

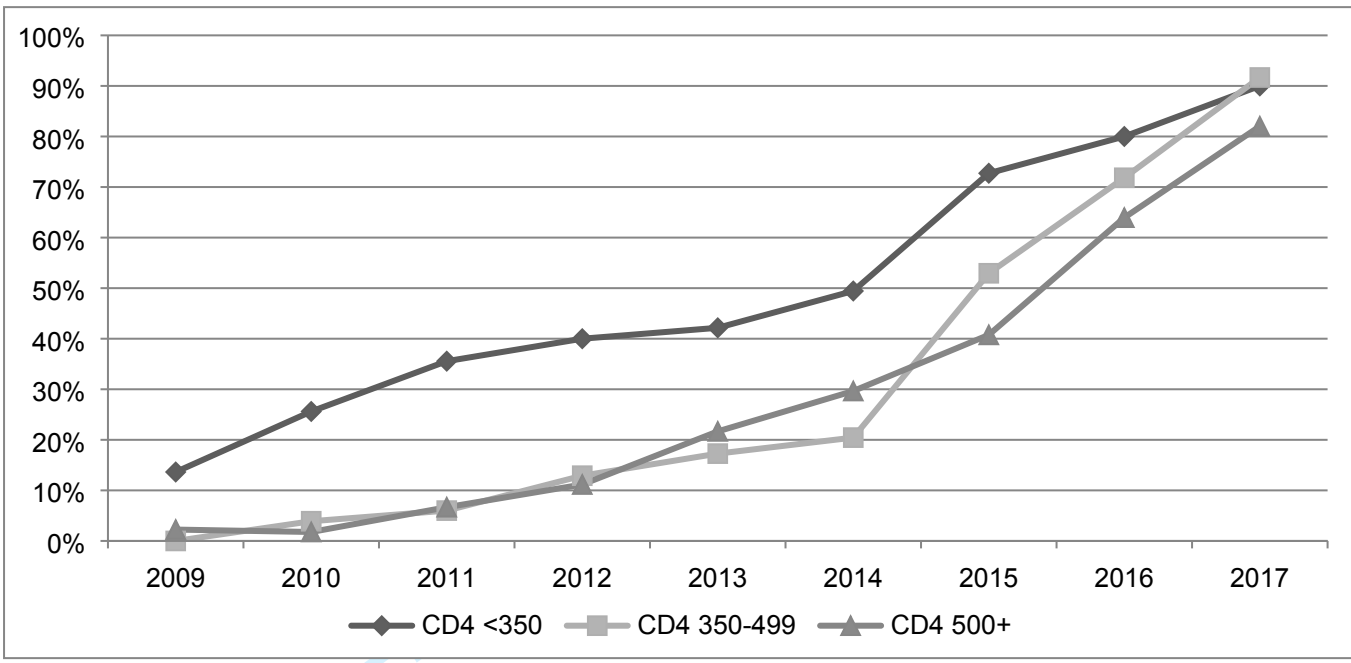


Figure 3. PEPSE and PrEP users over time.

The number of post-exposure prophylaxis following sexual exposure (PEPSE) prescriptions (dark grey line, left scale) dispensed each month between January 2012 and December 2017 and the number of unique pre-exposure prophylaxis (PrEP) users (light grey line, right scale) over the same period at 56 Dean Street.