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FULL PAPER

Early Diagnosis and Linkage to Care: an Experience over 14 years of Point of Care Rapid HIV Testing

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SUMMARY

Point-of-care rapid testing is one of the strategies to increase HIV screening. We present data on over 14 years of the "EASY Test Program", an ongoing cross-sectional collaborative project that provides free and anonymous rapid HIV testing in the metropolitan city of Milan, Italy. Overall, 22,186 HIV tests were performed, with a 0.52% prevalence of HIV infection; 100% of those diagnosed with HIV were linked to care. The "EASY Test Program" is an appropriate test-and-treat strategy, allowing a fast HIV assessment (24 hours). Motivated clinicians, in partnership with community associations, can perform an easy HIV screening out of hospitals in alternative settings, among individuals who in the majority of cases had never tested for HIV, ultimately providing an effective linkage to care.

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INTRODUCTION

The World Health Organization set the ambitious "90-90-90" target to help end the HIV epidemic by 2030. The number of HIV infections diagnosed in Italy has been decreasing steadily since 2012, reaching an incidence of 4.2 infections in 2019 and 2.2 infections in 2020 per 100,000 residents (Istituto Superiore di Sanità, 2020, 2021). This reduction may be attributed to several factors, including the high proportion of individuals living with HIV infection receiving antiretroviral therapy in Italy, the huge HIV testing efforts taking place in Italian major cities, and the increasing access to HIV tests and other preventive methods, including HIV pre-exposure prophylaxis (PrEP) (Di Biagio *et al.*, 2017; Girometti *et al.*, 2021). However, the new data published in 2020 are likely influenced by the SARS-CoV-2 pandemic, and a need for continuing and increasing the efforts in the fight against the HIV pandemic is still needed. For instance, point-of-care (POC) testing is already a widely diffused strategy to increase access to HIV testing and the subset of available testing methods, allowing more personalized access to HIV prevention (Mattioli *et al.*, 2014; Deledda *et al.*, 2021; Ibjtoye *et al.*, 2021; Raccagni *et al.*, 2022). Unfortunately, HIV stigma is still widely diffused in European countries, in particular in Italy, and this might discourage access to testing in the in-hospital setting, especially when referring to individuals not belonging to key populations (i.e., men who have sex with men), who have usually demonstrated a higher willingness rate to receive sexual health care in the in-patient setting (Mattioli *et al.*, 2014). Individuals not belonging to key populations might particularly benefit from "easy" and "friendly" access to HIV screening campaigns, taking place outside the hospital setting. Often, individuals apparently without risk factors for HIV infection tend to avoid HIV testing in hospitals and do not participate in screening campaigns offered mostly to key populations: testing campaigns aimed at targeting the general population could help overcome this problem. Moreover, in order to access free HIV testing, most Italian hospitals require enrolment in the Italian National Health Service, which might possibly discourage access to testing, given the bureaucracy and the related costs, especially for foreigners not enrolled in the Italian National Health

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Service. Rapid POC HIV tests, available to everybody free of charge and anonymously, might help increase the acceptability of HIV prevention and help reduce the number of undiagnosed HIV infections. Furthermore, rapid tests could intrinsically help the linkage-to-care process, if followed among individuals with a reactive screening test by a fast diagnostic (same day, in 24 hours) for HIV staging (e.g., Western Blot, HIV-RNA, $CD4^+$ lymphocytes), allowing rapid access to antiretroviral therapy, which benefits PLWH health, and contributing to the reduction of possible secondary transmission (Parisi *et al.*, 2016).

Milan was the first Italian city to join the Fast Track Cities project in December 2018, given the high rates of new HIV diagnoses per year (incidence 4.7:100.000 in 2017, Istituto Superiore di Sanità, 2018). The hidden proportion of undiagnosed HIV infections in Italy is decreasing but still to be considered, highlighting the priority to overcome unawareness and social stigma, to promote easy and friendly access to HIV testing, which could also grant rapid linkage to care, and to rapidly confirm and stage HIV infections and achieve the information necessary to begin antiretroviral therapy. Here we present data on the "EASY Test Program" following over 14 years of activity of this test-and-treat fast track study, showing the acceptability of this testing strategy, describing the rate of individuals diagnosed with HIV infection, and highlighting the direct linkage to care between the POC testing facilities and the Infectious Diseases Unit of San Raffaele Hospital. The aim of the "EASY Test Program" is to offer a free and anonymous test to the general population outside the hospital setting, without specifically targeting individuals belonging to key populations, ultimately providing a rapid linkage to care among individuals with reactive HIV POC tests.

METHODS

In 2008, the Infectious Diseases Unit of San Raffaele Hospital, Milan, Italy adopted the strategy of the POC testing model, developing a prevention program called "EASY Test Program" by offering rapid HIV and HCV test on oral fluids or capillary blood (Parisi *et al.*, 2009, 2013, 2014, 2015, 2016, 2017). The "EASY Test Program" is an ongoing cross-sectional collaborative project developed by the Infectious Diseases Unit of San Raffaele Hospital in collaboration with Milan Council, Department of Prevention Reference Centre for HIV and Sexually Transmitted Infections (ATS, Local Public Health Unit in Milan) and supported by the National Association for the Fight against AIDS (ANLAIDS-Lombardia) (Parisi *et al.*, 2009, 2013, 2014, 2015, 2016, 2017). Rapid, free and easy tests were offered to the general population and were made available in alternative settings, such as monthly POC testing days and street labs during many public events by means of dedicated mobile laboratories, throughout the metropolitan city of Milan, Italy. Examples of public events were scientific congresses (e.g., Convivio, Italian Conference on AIDS and Antiviral Research, World AIDS day, Health Week of Milan Council), schools open-days and university events, partnerships with general practitioners and local diagnostic centres (e.g., Centro Diagnostico Italiano, CDI). After signing the informed consent form, the subjects who underwent HIV testing were also supported by a psychologist and an infectious disease specialist. Before and following the performance of the HIV test, the individuals received counselling on HIV and other sexually transmitted infections prevention strategies. Subjects were initially tested for HIV by a rapid salivary or capillary assay; when the salivary or capillary test was reactive, diagnosis was confirmed by a standard free blood test at the laboratory of San Raffaele Hospital: IV generation ELISA (Abbott® - Wiesbaden, Germany) confirmed by Western Blot analysis (GeneLabs Diagnostics® - Bangkok, Thailand). HIV-RNA, $CD4^+$ lymphocytes count and all exams required for HIV staging and beginning of antiretroviral therapy were performed within 24 hours. A first medical visit with an infectious diseases physician was provided within 48 hours for individuals diagnosed with HIV infection at the Infectious Diseases Unit of San Raffaele Hospital. Lastly, individuals were asked to complete a survey regarding personal demographic characteristics and their overall rating of the "EASY Test Program". Workflow of the "EASY Test Program" is

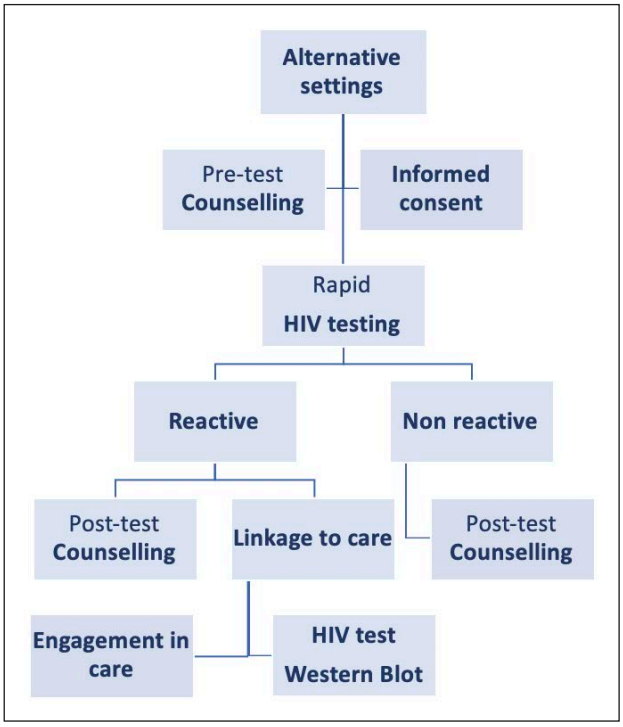

Figure 1 - *Workflow of the "EASY Test Program"*

presented in *Figure 1* (Parisi *et al*., 2013, 2015, 2016). Individuals who received HIV testing from January 2008 to September 2022 were included in this study. The information of interest for this study was collected from all individuals who accessed HIV testing during one monthly appointment or public event of the "EASY Test Program". Recorded data were anonymized and managed according to Good Clinical Practice. The Ethics Committee of San Raffaele Scientific Institute, Milan, Italy, authorized the "EASY Test Program".

RESULTS

Overall, 22,186 HIV rapid tests were performed from 2008 to 2022, with a stable trend over these years and a partial reduction during 2020 probably due to the SARS-CoV-2 pandemic, which also caused a global reduction in access to HIV screening and access to therapy. The tests were taken both during monthly appointments (10 appointments per year available) or during public events (3 public events per year). The median number of daily users during monthly appointments was 85. Individuals accessing HIV testing were 75% men and 25% women; 52.5% were men who have sex with men. Median age was 40 years among men (interquartile 25-50) and 35 among women (interquartile 30-40). During public events, 65% of individuals approached HIV testing for the first time, while during monthly appointments 20% were recurrent users from 2018 to 2022.

Overall, 22,183/22,186 (99.9%) of individuals expressed good satisfaction levels for the program and stated that they would advise a friend to get tested for HIV by means of the "EASY Test Program".

The proportion of individuals with a reactive HIV salivary or capillary test was 116/22,186 (prevalence 0.52%); 73/116 (62%) were tested during monthly appointments and 43 (37%) during public events. We did not find significant differences in terms of HIV positivity rates between the different testing strategies (e.g., monthly appointments and public events). In 116/116 (100%) HIV infection was confirmed by means of a standard blood test and therefore all of them were effectively linked to care. Data on demographic characteristics of individuals tested for HIV and rapid tests results are presented in *Table 1*.

DISCUSSION

For over 14 years, the "EASY Test Program" helped provide wider access to HIV testing in the metropolitan city of Milan, Italy (Parisi *et al*., 2013, 2015, 2016). Although the prevalence of HIV infection was found to be low when compared to other studies targeting individuals belonging to key populations (Uccella *et al*., 2017; Raccagni *et al.*, 2022), these results are in line with other testing strategies which offer HIV testing to the general population (Scognamiglio *et al*., 2018; Falanga *et al*., 2019). In our experience, almost half of those who accessed HIV testing probably did not belong to a key population, and who might therefore not benefit from screening campaigns aimed for specific subgroups. We believe that programs such as the one we present are also needed to engage different populations, who are at low risk of HIV infection, in prevention campaigns. Moreover, the POC testing strategy proved to be very positively accepted by all users, with a very high satisfaction level. Almost all individuals stated that they would advise a friend about this POC testing program: receiving such high satisfaction levels implies that by word of mouth the program might receive a boost in the number of individuals accessing HIV testing. This reinforces the idea that POC and in-hospital based testing are two different strategies that should work synergistically to maximize access to HIV screening, providing a wider and personalized choice regarding which service is more suited for each individual. Moreover, delivering HIV testing both at public events and monthly appointments in different locations has proven to be effective: public events might help target individuals who have never accessed HIV screening, whereas monthly appointments allow establishment of a landmark for routine testing, given the higher proportion of routine users found. However, we did not find significant differences in terms of number of HIV reactive tests between the different delivering solutions, and therefore did not identify a preferred testing strategy in terms of cost-effectiveness. Furthermore, considering the real goal of this program, all individuals were linked to care, confirming that POC testing might contribute to HIV prevention strategies and help control the spread of HIV infection by reaching a larger popula-

Table 1- *Individuals' characteristics and rapid tests results over 14 years of activity of the "EASY Test Program".*

Characteristics of tested individuals	*n*	*Characteristics of tested individuals*	*n*
Gender		*Reactive HIV rapid test*	116/22.186 (0.52%)
Male	16.640/22.186 (75%)	Monthly appointments	73/22.186 (0.33%)
Female	5546/22.186 (25%)	Public events	43/22.186 (0.19%)
MSM	11.648/22.186 (52.5%)	*Linkage to care*	116/22.186 (0.52%)
Age (years, IQR)	40 (25-50)	*Good Satisfactory Levels*	22.183/22.186 (99.9%)

Abbreviations: IQR: interquartile; MSM: men who have sex with men.

tion, particularly when and where regular screening procedures are difficult to obtain or not accepted. However, we acknowledge that we could not provide data on the beginning and follow-up of antiretroviral therapy. A free-of-charge testing campaign in Italy might also particularly benefit individuals who do not have access to the National Health Service, and who would otherwise on most occasions have to pay for testing services. Moreover, we recognize that we could not provide data on the percentage of people without access to the National Health Service who received HIV testing. Lastly, we acknowledge that POC delivery was also an opportunity to provide counselling on HIV and other sexually transmitted infections preventive strategies.

In conclusion, compared to other HIV screening campaigns which target key populations, the free offer of HIV rapid testing to everyone regardless of the presence of risk-factors, has the limit of low prevalence of newly-diagnosed HIV infections, which was found to be similar in all the different testing strategies explored, possibly hindering cost-effectiveness. Moreover, apart from the health advantages provided to individuals who were diagnosed with HIV infection, we underline the importance of HIV screening programs such as the "EASY Test Program," given the possibility of providing information on prevention strategies and the collection of data which are useful for planning national and regional prevention programs.

All in all, the "EASY Test Program" is an appropriate test-and-treat strategy to approach the first "90-90-90" target and increase the prevention goal (Parisi *et al*., 2013, 2015, 2016). Motivated clinicians, in partnership with community associations, can perform easy HIV screening in alternative complimentary settings, ultimately providing an effective linkage to care.

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Transparency declarations

All authors have no conflicts of interest to disclose.

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