The impact of COVID-19 on UNAIDS 90–90–90 targets calls for new HIV care models

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ABSTRACT

We compared 90-90-90 targets in 2020, during the COVID-19 pandemic, with the targets across the period 2017-2019 in people living with HIV. We observed a significant loss in the 90-90-90 objectives in 2020 when compared to 2017-2019 that might be attributable to COVID-19 crisis.
Background

The impact of the COVID-19 pandemic on health systems around the world has the potential to alter the road map towards the end of AIDS. Mathematical models predict that in high-burden settings, deaths due to HIV over 5 years could increase by up to 10%, compared with if there was no COVID-19 pandemic [1]. This might be the consequence of a shifted focus from HIV to COVID-19 pandemic that leads to less attention given to the needs of people living with HIV (PLWH) in the era of COVID-19 and less funding for HIV care and prevention. Additionally, in the current HIV-COVID-19 syndemic, health care workers that are primarily involved in HIV care at present are also providing COVID-19 care.

The contemporary HIV care framework is based on the “90–90–90 targets” launched by UNAIDS [2]. This promised the end of AIDS by 2030 through achieving three ambitious goals: HIV diagnosis in 90% of all PLWH, provision of ART for 90% of the diagnosed individuals, and viral suppression for 90% of the treated patients. The fear is that each of these targets may encounter specific obstacles in the COVID-19 era.

The objective of the study was to compare the 90-90-90 targets in 2020, during the COVID-19 pandemic, with the targets across the period 2017-2109 in PLWH.

Methods

This retrospective observational study assessed epidemiological and HIV clinical data in the period January-September across 2017-2020 in the province of Modena, Emilia-Romagna region in Northern Italy that comprises 700,000 habitants and 7 hospitals.

The network of laboratories within Modena province and Modena HIV clinic fed the provincial HIV observatory database. The former provided the data regarding number of preformed HIV tests and established HIV diagnosis in the observational period, while the paper and electronic clinical charts of Modena HIV clinic were used to describe the 90-90-90 targets. Of note, 32.5% of PLWH that are followed at Modena HIV clinic has a residence outside Modena province.

The first 90 target was indirectly estimated using the formula: people living with HIV (PLWH) in care for the current year (+) PLWH who entered the care in the subsequent year (-) PLWH who died in the current year.

The second 90 target was calculated as a ratio of PLWH receiving antiretroviral therapy (ART) and PLWH who had a confirmed diagnosis of HIV infection. The third 90 target was defined as a ratio of PLWH with undetectable HIV RNA (<40 copies/ml) and PLWH receiving ART for at least 6 months. Viral blips were defined...
as HIV RNA between 40 and 200 copies/ml. Chi-square test for linear trend was used to describe difference across the observational period.

Categorical variables were described using frequencies and percentages, while continuous variables were described using mean, median, and interquartile range (IQR) values. Means for continuous variables were compared using Student’s t-tests and the Mann–Whitney test. Proportions for categorical variables were compared using the Cochran–Armitage test for linear trend. A multivariable logistic regression was preformed to explore risk factors for the loss of care, using as predictors age, sex, migrant status and being a resident outside of Emilia-Romagna region.

The study was approved by local Institutional Review Board in the context of local HIV cohort description.

Results

In the period Jan-September 2020, 14,712 HIV tests were performed in the Modena province, with an average reduction of about 20% compared to previous years. Eleven new HIV cases were diagnosed, 15 PLWH died, none of COVID-19. 1512 PLWH were in care: median age was 54 (IQR: 45-59), 69.6% were males and median CD4 was 697 (IQR: 511-935).

Table 1 compares epidemiological and clinical variables during the study period. Comprehensively, in the period Jan-September 2017-2020, 116 new HIV diagnoses were observed with no change in the proportion of AIDS presenters (10, 5, 12, 4 cases respectively p=0.07), and 67 deaths were observed. Viral blips and viral failures (>200 copies/ml) were not different across 2017-2020.

The cascade of care across 2017-2020 is shown in Figure 1. The test for linear trend implied a significant loss in the target objectives in 2020 (p<0.001), in particular, the first 90 was the most affected (Figure 1). In comparison to 2019, 249 PLWH who were in care in 2019 did not have access to HIV clinic, depicting an alarming decrease of 14% of PLWH in care (Table 1). In multivariable analyses, predictors to loss to in 2020 care were migrant status OR=1.5 (95%CI:1.04-2.14) and being resident outside Emilia Romagna region OR=3.1 (95%CI: 3.1-2.2) after correction for sex OR=0.99 (95%CI:0.71-1.38) and age OR=0.98 (95%CI: 0.97-1.0).

Discussion

During the study period, the response to the pandemic reduced the availability of routine out-patient HIV care worldwide. Specifically, many infectious disease physicians were redeployed to COVID-19 care and many patients have not been able to reach hospitals and clinics due either to fear of contracting SARS-CoV-2 or to confinement measures [3].
We assume that in Modena province in Italy, in which the 90-90-90 targets of the cascade of care have been already reached since 2017, a significant decrease of each target was due to COVID-19 crisis. In detail, despite an increase of HIV testing in the period June-September, the first 90 goal was lost in 2020.

The first 90% target has been also linked to STDs screening and access to pre-exposure prophylaxis (PrEP). As a result of the COVID-19 pandemic, an 85% reduction in HIV/gonorrhea/chlamydia tests were reported in the first quarter of the year in the Boston area [4]. However, a report from Lombardy, Italy showed a rise in acute bacterial STIs during the period of lockdown [5]. A report from Melbourne showed that 25% of PrEP users stopped taking PrEP during the COVID-19 outbreak, and 5% switched from daily to on-demand PrEP [6].

Although the long-term consequences of interruption in the scale up of PrEP in people at risk are still unknown, the potential negative consequences may be mitigated by a reduction in condomless sex and number of partners during the COVID-19 pandemic [6]. Data from a sexual health clinic in London have shown that there was an 80% reduction in post-exposure prophylaxis (PEP) use within 4 weeks of the lockdown [7]. Unfortunately, we did not examine PrEP access and uptake and we could not addressed the contribution of this issue in our population.

Reduction in HIV testing may further worsen the still alarming proportion of PLWH diagnosed with advanced HIV disease. Moreover, the risk of stigma related to COVID-19 may delay presentation of patients with HIV-related opportunistic infections to healthcare services [8], but at the same time, COVID-19 offers an opportunity to increase HIV testing in acute medical settings [9]. In detail, some respiratory manifestations of HIV disease may be similar to COVID-19 and increased hospitalizations due to COVID-19 may be considered as an opportunity to more broad screening for HIV.

On the other hand, COVID-19 crisis could represent an opportunity to increase the availability of self-testing and of rapid test screening in non-hospital settings including community check points, given that “traditional” testing clinics are deployed in providing care for COVID-19. However, it is noteworthy that even if the diagnosis is made in non-hospital settings, it is important to optimize counselling and linkage to care.

This interaction represents a crucial step in the beginning of a long-lasting patient-physician relationship based on mutual trust and compassion, and represents an essential resource for the continuum of care.

The “second 90%” target refers to “retention in care” and is critical to the management of HIV, being associated with improved survival, decreased HIV-
related complications, and reduced HIV transmission. Although small case series have described a positive impact of COVID-19 in terms of service re-engagement, whether this is maintained remains to be seen.

In our clinic, almost 200 PLWH did not have any contact with the hospital during the COVID-19 crisis and some of them could be at risk of being lost to care for a long period of time. Indeed, being lost to care represent an important risk factor for clinical progression and these patients may account for up to 62% of all AIDS cases [10]. In particular, risk factors for progression to AIDS in patients who were lost to care include psychiatric co-morbidities, migration status, and alcohol and substance abuse [11].

Loss to care was more likely observed in the residents outside Emilia-Romagna region. It is easily interpretable by lockdown measures that did not allow mobility between the regions. Some PLWH, who are residents outside Emilia-Romagna, asked to transfer their ART prescription to hospital pharmacies in the region of residence. Conversely, PLWH, who are residents in the Emilia-Romagna (in which Modena province belongs to), had easier and less limited access to provincial pharmacy that supplies ART medications.

More crucial is the risk of loss to care in migrants. We arbitrary defined migrants as people born outside of Italy who came to live in our province searching for work to improve their life condition. They may represent a socially and economically vulnerable group who needs dedicated strategies for retention in care. Anecdotally, a Ghanaian lady was admitted in our unit in June 2020 with HIV associated encephalopathy secondary to ART interruption. She admitted that, due to language barrier, she had not understood where to get ART when infectious disease clinic pharmacy was moved to a different place, in order to avoid PLWH enter the restricted COVID area.

These vulnerable populations may be the most difficult to reach using the telemedicine approach, and therefore dedicated programs, including same-day ART and personalized interventions are needed. This is also true for dedicated programs for re-engagement, particularly for PLWH lost to care at the time of HIV service interruption caused by COVID-19.

Concerning the “third 90%” the difficult access to hospital clinic and drug delivery services could have a deleterious impact on this target. Actually, our data showed that the percentage of PLWH with an undetectable viral load was similar to the previous years. It is to note that during the COVID-19 crisis alternative drug deliveries were organized. A particular problem was represented by blood testing for monitoring HIV infection. As current ART regimens substantially reduce the risk of emergence of drug resistance, HIV societies, in particular, the British HIV Association, recommended the postponement of routine monitoring of viral load
in the current era beyond the usual 6 months. Nevertheless, it will be important to monitor these approaches in a longer period of time since it is not known whether it is safe or how to interpret the viral blips. For sure, a yearly interaction between patients and physicians may be perceived to be insufficient on both sides, and patient–physician virtual encounters should be promoted even beyond the communication of blood test results. In the near future, accessibility to long-lasting HIV drugs, including injectables, will also change HIV care, though this is dependent on the setting where the drugs will be delivered.

Some limitations of our study must be acknowledged. Firstly, we considered relatively small number of variables to address HIV cascade of care that comprises a huge variety of aspects. Secondly, our formula to calculate the first 90 target is not standardized, relied on the previous proposals regarding the estimation of the first 90 [12]. Thirdly, as already mentioned, we did not explore PrEP use during observational period.

Despite these limitations, our findings contribute to the better understanding of the current HIV cascade of care. We were able to estimate all three 90 targets that provided an important insight in the management of HIV care during COVID-19 pandemic. However, we are still missing a national and an European “snapshot” that might helped us to provide tailored intervention in the COVID-19 era.

The impact of COVID-19 on health challenges faced by PLWH is very relevant, including HIV itself, chronic non-communicable diseases, mental health burden, substance abuse, and other infections, all of which are catalyzed by biological, behavioral, psychosocial and structural drivers. COVID-19 pandemic imposed many challenges in HIV cascade of care, as most of the out-patient and non-urgent services were interrupted during the lockdown. This has also compromised careful and comprehensive assessment of adherence, ART toxicity and efficacy. Without these aspects in HIV cascade, it is difficult to guarantee the second and the third 90 target.

Given the lockdown restrictions that were in place in Modena province from 9 March to 18 May 2020, that limited access to HIV out-patient services, we argue that the reverse trend in HIV cascade might be attributable to COVID-19 crisis. Understanding the impact of COVID-19 crisis in PLWH in a syndemic framework provides a meaningful and robust paradigm to understand how to re-design health services for PLWH in light of the COVID-19 era.
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Potential conflict of interest

GG and CM received research grant and speaker honorarium from Gilead, Viiv, MERCK and Jansen. GG and CM attended advisory boards of Gilead, Viiv and MERCK. Other authors reported no conflict of interest.

Patient Consent Statement

This study does not include factors necessitating patient consent.
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Table 1. Epidemiological and clinical variables during the study period.

|                      | 2017       | 2018       | 2019       | 2020       | p       |
|----------------------|------------|------------|------------|------------|---------|
| **90-90-90 targets** |            |            |            |            |         |
| Number of HIV tests, N | 18324      | 18529      | 18726      | 14712      |         |
| Incident HIV diagnosis, N | 47         | 30         | 28         | 11         |         |
| AIDS presentation at diagnosis, N (%) | 10 (21.7%) | 5 (19.2%)  | 12 (44.4%) | 4 (44.4%)  | 0.07    |
| Estimated PLWH, N (%) | 1708 (100) | 1721 (100) | 1741 (100) | 1761 (100) |         |
| In care, N (%)       | 1604 (93.9)| 1631 (94.8)| 1673 (96.9)| 1512 (85.9)| 0.003   |
| New patients linked to care, N |          | 144        | 143        | 73         |         |
| On treatment, N (%)  | 1574 (98.1)| 1608 (98.6)| 1659 (99.2)| 1510 (99.9)| <0.01   |
| Undetectable HIV RNA (≤40 c/ml), N (%) | 1388 (93.8)| 1466 (95.3)| 1500 (95.1)| 1382 (94.3)| <0.01   |
| **Demographic and HIV characteristics** |            |            |            |            |         |
| Age, years, median (IQR) | 51 (43-56) | 52 (43-57) | 53 (44-58) | 54 (45-59) | 0.84    |
| Sex, males, N (%) | 1111 (69.3)| 1132 (69.4)| 1163 (69.5)| 1052 (69.6)| 0.27    |
| Italians, N (%)      | 1287 (80.2)| 1310 (80.3)| 1318 (78.8)| 1196 (79.1)| 0.27    |
| Migrants, N (%)      | 317 (19.8)| 321 (19.7)| 355 (21.2)| 316 (20.9)| 0.27    |
| Men who have sex with men, N (%) | 467 (29.1)| 484 (29.7)| 499 (29.8)| 460 (30.4)| 0.43    |
| Intravenous drug users, N (%) | 376 (23.4)| 368 (22.6)| 357 (21.3)| 319 (21.1)| 0.08    |
| Heterosexual intercourse, N (%) | 663 (41.3)| 675 (41.4)| 711 (42.5)| 640 (42.3)| 0.46    |
| Others, N (%)        | 98 (6.1) | 104 (6.4) | 106 (6.3) | 93 (6.2) | 0.97    |
| CD4+ T-cell count, c/mL, median (IQR) | 664 (476-884)| 689 (480-892)| 684 (481-899)| 697 (511-935)| 0.01    |
| Deaths, N            | 13        | 23         | 16         | 15         |         |
| Detectable HIV RNA (>40 - ≤200 c/ml), N (%) | 42 (2.8) | 46 (3.0) | 42 (2.7) | 47 (3.2) | 0.70    |
| Detectable HIV RNA (>200 c/ml), N (%) | 50 (3.4) | 26 (1.7) | 36 (2.3) | 36 (2.5) | 0.23    |
FIGURE LEGENDS

Figure 1 shows the cascade of care across 2017-2020.
