Available online at www.sciencedirect.com

Public Health

journal homepage: www.elsevier.com/puhe

Original Research

The persistent problem of late HIV diagnosis in people with AIDS: a population-based study in Italy, 1999–2013

M. Taborelli [a,*,1], S. Virdone [a,1], L. Camoni [b], V. Regine [b], A. Zucchetto [a], L. Frova [c], E. Grande [c], S. Boros [b], L. Dal Maso [a], P. De Paoli [d], D. Serraino [a], B. Suligoi [b]

[a] Unit of Cancer Epidemiology, CRO Aviano National Cancer Institute, Aviano, Italy
[b] Centro Operativo AIDS, Istituto Superiore di Sanità, Rome, Italy
[c] Servizio Sanità, Salute ed Assistenza, Istituto Nazionale di Statistica, Rome, Italy
[d] Scientific Directorate, CRO Aviano National Cancer Institute, Aviano, Italy

ARTICLE INFO

Article history:
Received 28 April 2016
Received in revised form
30 September 2016
Accepted 13 October 2016
Available online 18 November 2016

Keywords:
AIDS
HIV testing
Italy
Late testers
Population-based

ABSTRACT

Objectives: Despite the wide accessibility to free human immunodeficiency virus (HIV) testing and combined antiretroviral therapy (cART), late HIV diagnosis remains common with severe consequences at individual and population level. This study aimed to describe trends of late HIV testing and to identify their determinants in the late cART era in Italy.

Study design: We conducted a population-based, nationwide analysis of the Italian National AIDS Registry data (AIDS – acquired immune deficiency syndrome) for the years 1999–2013.

Methods: Late testers (LTs) were defined as people with AIDS (PWA) whose first HIV-positive test preceded AIDS diagnosis by 3 months or less. Odds ratios (ORs) with the corresponding 95% confidence intervals (CIs) were estimated to examine factors associated with being LTs. Joinpoint analysis was used to estimate annual percent changes (APCs) of LTs' proportion over time.

Results: Among 20,753 adult PWA, 50.8% were LTs. Italian PWA showed a lower proportion of LTs than non-Italian PWA (46.5% vs 68.2%). Among Italian PWA, the odds of being LTs was higher in men than in women (OR = 2.62, 95% CI: 2.38–2.90); in the age groups below 35 years and over 49 years at diagnosis (OR = 1.24, 95% CI: 1.12–1.37 and OR = 1.51, 95% CI: 1.38–1.67, respectively) vs PWA aged 35–49 years; and in those infected through sexual contact as compared with injecting drug use (OR = 13.34, 95% CI: 12.06–14.76 for heterosexual contact and OR = 8.13, 95% CI: 7.30–9.06 for male-to-male sexual contact). The proportion of LTs increased over time among Italians, especially in the latest period ($APC_{2006–2013}$ = 5.3, 95% CI: 3.8–6.9). The LTs' proportion resulted higher, though stable, among PWA aged ≥50 years. Conversely, an increasing trend was observed among PWA aged 18–34 years (APC = 5.3, 95% CI: 4.5–6.1). The LTs' proportion was persistently higher

* *Corresponding author*. Unit of Cancer Epidemiology, CRO Aviano National Cancer Institute, Via Franco Gallini 2, 33081, Aviano, PN, Italy. Fax: +39 0434 659231.
E-mail address: mtaborelli@cro.it (M. Taborelli).
[1] Martina Taborelli and Saverio Virdone contributed equally to this work.
http://dx.doi.org/10.1016/j.puhe.2016.10.009

among PWA who acquired HIV infection through sexual contact, even if a marked increase among injecting drug users was observed after 2005 (APC = 11.4, 95% CI: 5.7–17.5).
Conclusions: The increasing trend of LTs' proportion in the late cART era highlights the need of new strategies tailored to groups who may not consider themselves to be at a high risk of infection. Active promotion of early testing and continuous education of infection, especially among young people, need to be implemented.

Introduction

Since the introduction of combined antiretroviral therapy (cART) in the mid-1990s, the prognosis of human immunodeficiency virus (HIV) infection has considerably improved. The benefits of this treatment have been well established,[1] especially among asymptomatic HIV-infected people with early initiation.[2]

Timely access to care for infected people is considered a very relevant public health issue, and in many industrialized countries, guidelines are provided to reduce the diagnostic lag time.[3,4] However, late diagnosis remains common,[5,6] and this delay may occur because HIV-infected people are not aware of their risk of infection or because they experience difficulties in accessing HIV-testing. Late initiation of medical care has severe consequences at an individual level, with a major impact on subsequent morbidity and mortality.[7] Furthermore, late diagnosis has negative consequences for the wider population, as those who remain undiagnosed do not adopt a risk reduction behaviour. From a cost-effectiveness view-point, late HIV-testing represents a largely avoidable high medical cost.[8]

In Italy, anonymous HIV-testing is voluntary, and cART is administered free-of-charge according to regularly updated guidelines.[9] Some Italian investigations[10–12] have already highlighted that the proportion of delayed HIV-testing has increased over time in the early cART era, and the magnitude of this public health issue has been identified and quantified. Nevertheless, the recent trends of late HIV-diagnosis in Italy have not yet been captured.

Late testing burden should be considered an important indicator to tailor specific awareness and intervention campaigns to control the spread of HIV infection. The aim of this study was to evaluate the extent and the determinants of late HIV-testing in the late cART era in Italy, as well as the variations of this phenomenon over time.

Methods

A population-based nationwide study was conducted using the data collected by the Italian National AIDS Registry (RNAIDS) in the period 1999–2013. The RNAIDS records – in accordance with the 1993 revised European AIDS Surveillance Case Definition[13] – information on people newly diagnosed with AIDS (PWA) in health facilities nationwide (e.g. hospitals, outpatient medical units, university clinics). RNAIDS included a total of 66,336 AIDS cases at the end of 2013, and information at AIDS diagnosis included age, gender, area of residence, nationality, education, HIV transmission mode (i.e. injecting drug use (IDU), heterosexual contact, male-to-male sexual contact, other), date of AIDS diagnosis and date of first HIV-positive test (i.e. the earliest date of a documented positive HIV-antibody test).

We considered a study period postdating the widespread use of cART; as compared with the following years, 1997 and 1998 were not included because of their high proportion of missing data circa the time at first HIV-positive test (from 13% to 17%). Between 1999 and 2013, 22,271 PWA were reported to RNAIDS. Specifically excluded from this analysis were 126 PWA aged less than 18 years at diagnosis and 1392 (6.3%) PWA with missing information on date of first HIV-positive test. Therefore, 20,753 adult PWA constituted the study group.

For the purpose of this analysis, and in accordance with previous European studies,[10,14,15] 'late testers' (LTs) were defined as 'PWA whose first HIV-positive test preceded AIDS diagnosis by three months or less.' To identify factors associated with delayed diagnosis of HIV infection, LTs were compared with 'early testers' (ETs), defined as: 'PWA who firstly tested HIV-positive twelve months or more before AIDS diagnosis.' To allow a better distinction between LTs and ETs, PWA who first tested HIV-positive from 4 to 11 months before AIDS ($n = 851$) were excluded from this analysis. Odds ratios (ORs) of being LTs as compared with ETs, with the corresponding 95% confidence intervals (CIs) were computed using a multivariable logistic regression analysis, adjusted for variables that were statistically significant (significance level set at $P < 0.05$) at univariate analysis.

In addition, a time-trend Joinpoint regression analysis was performed to analyze LTs' proportion variations among PWA by nationality, gender, age groups at AIDS diagnosis (18–34, 35–49, ≥50 years) and mode of HIV transmission, according to calendar year at AIDS diagnosis. This technique provides annual percent change (APC) estimates by fitting a linear regression line to the natural logarithm of annual proportion of LTs using calendar year as a regressor. This calculation assumes that the proportions changed at a constant rate over the entire calendar-year interval examined, and the validity of this assumption was checked by merely examining the plotted curves. Joinpoint analysis allowed to detect points in time at which significant changes in the trends occurred. For each APC estimate, 95% CIs were calculated to assess their statistical significance. Statistical analyses were performed by means of SAS software, version 9.2 (SAS Institute, Cary, North