

Incidence of Late Presentation and Advanced disease in Newly Diagnosed Patients of HIV infection in Dhofar region of Oman

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ABSTRACT

Objectives: Globally half of the patients with new HIV infection are diagnosed late. This study was carried out to assess incidence of late diagnosis and its impact in newly-diagnosed HIV patients in Dhofar region of Oman.

Methods: The medical records of the patients diagnosed to have new HIV infection during the years 2018 and 2019 were scanned to find out incidence of late (CD4<350) or advanced disease (CD4<200) on presentation and whether diagnosed by screening or related symptoms.

Results: Among 46 new HIV infections during 2018-2019, 63% (29/46) were between age 31-50 years, 23.9% (11/46) were females, 37% (17/46) were unmarried and 37% (17/46) were MSM. Only 8 (17.4%) had CD4 count >350, while 38 (82.6%) were in late categories including 13 (28.3%) late-presenters and 25 (54.3%) with advanced disease. The unmarried and those above 50 had a tendency to present late. Twenty-eight (60.9%) patients were asymptomatic. The patients presenting with HIV-related symptoms had either late or advanced disease, but the probability of being diagnosed in an advanced state was statistically significant (p 0.003; OR 9; 95% CI 2.09-38.79). Patients with advanced disease required 352 days of hospitalization including 72 days in ICU, and 20% (5/25) of them who had CD4<20 died. Nineteen (41.3%) patients had missed opportunity for early diagnosis when they attended the hospital in last 2 years; 28.3% (13/46) had multiple visits.

Conclusion: Late diagnosis in HIV infection is common. Screening strategies for HIV should be revised.

Key words: HIV; AIDS; Newly-diagnosed HIV; late-presentation HIV; advanced HIV disease; missed opportunities; CD4; Oman

INTRODUCTION

According to the factsheets of UNAIDS, there were 37.9 million people living with HIV in 2018 worldwide and 1.7 million were newly diagnosed.¹ Although the annual incidence of new cases in 2018 has dropped by 39%, and mortality by 45%, as compared to those in year 2000² - thanks to increased awareness and better treatment options - HIV remains a global problem and grave suffering for the humanity. In 2014, UNAIDS set an ambitious target of 90-90-90 (90% of all those with HIV should be aware of their diagnosis, 90% of those with the diagnosis should be on treatment, and 90% of those on treatment should be virally

suppressed) for the year 2020 to effectively curb the epidemic.³ At present, only 79% of the patients with HIV are aware of their diagnosis worldwide.¹ To meet the target, it is important to find and treat all the new cases as early as possible, but unfortunately it is seen that almost half of the patients are already at a late stage when first diagnosed.⁴

We carried out this study to see the incidence of late diagnosis and its impact in Dhofar region of Oman.

METHODS

Clinical data of the patients who were above 12 years of age and who were diagnosed to have new HIV infection in the

last two years, from November 2017 to October 2018 (hereafter year 2018) and from November 2018 to October 2019 (hereafter year 2019) were collected through the computerised medical records. The patients whose record was not complete or whose CD4 count was not available were to be excluded from the study. The paediatric patients also were not part of this study. Though the records were scanned retrospectively, we were aware of the clinical status of the patients throughout the study period as we were the primary physicians for these patients.

Depending on their presentation, they were categorized into *late-presentation* if the initial CD4 count was between 350 and 200 or the presentation was with an AIDS-defining event regardless of CD4 count, and *advanced disease* if CD4 count was less than 200 or the presentation was with an AIDS-defining event regardless of CD4 count,⁵ while those with CD4 count more than 350 were considered as non-late presenters.

Among the patients with newly detected HIV infection, some were diagnosed because of a *related symptom* which included those who presented with either an AIDS-defining illness or symptoms suspicious for an HIV infection or unexplained immuno suppressed state, for example, oral candidiasis, undiagnosed fever, persistent diarrhoea or progressive weight loss. On the other hand, there were patients who were asymptomatic but were identified to have an HIV infection during *screening*, for example, in the blood bank, during pregnancy, while seeking certain jobs, in prison, as contacts of other patients living with HIV or those who voluntarily asked for the test during awareness campaigns. Some patients were tested because of a sexually transmitted disease, skin rash, perianal abscess, Bell's palsy or another such relatively innocuous symptom which can be an association but is not directly related to an immunosuppressed state or HIV - they were also kept under the

category of patients diagnosed by screening for the purpose of this study.

We also skimmed the medical records of these patients for previous visits to our hospital in the last two years prior to the diagnosis to scan for any missed opportunities for an earlier diagnosis; however, the record of their visits to other health care settings in government or private sector were not available and were not included in the analysis.

The data was analysed by Microsoft Excel, and logistic regression analysis of the variables was done by the SPSS program. A p-value of less than 0.05 was considered to be statistically significant.

Ethical committee approval and informed consents were not required as the study was based on analysis of routine clinical data without any identification information about the patients.

RESULTS

Usually the yearly incidence of new cases of HIV infection in Dhofar region is only 10-15 patients, but in the year 2018 we found 18 such people, and the number rose to 28 during 2019. No patient who was newly diagnosed was excluded from the study as CD4 counts and medical records were available for all of them.

Among these 46 new patients, about two-thirds were from 31 to 50 years of age, one-third of them were unmarried, and women made up a quarter, as shown in table 1. Thirty-five patients (76.1%) were Omanis, while patients from foreign nationalities included 5 Yemenis, 2 Saudis, and one each from Uganda, Somalia, India and Thailand. Almost one-third (37%) of the patients were MSM (men having sex with men). Intravenous drug abuse is not common here; we found only one such person who tested positive for HIV over the last two years. Half of the patients were smokers and one-fourth consumed alcohol (all of them were smokers as well). Further details about their dependence or the amount or frequency of alcohol use or smoking were not available.

Twenty-eight (60.9%) patients were asymptomatic who were diagnosed by screening. Interestingly the number of such patients diagnosed by screening remained same in the two years (14 in both 2018 and 2019); the higher number of total patients in 2019 was entirely due to higher number of symptomatic and sick patients: 14 of 28 patients (50%) in 2019 were diagnosed due to HIV-related symptoms versus only 4 out of 18 (22.2%) such patients in the year 2018.

As shown in table 1, only 17.4% (n=8/46) patients had CD4 count >350, while all others were either late-presenter (n=13/46; 28.3%) or had advanced disease (n=25/46; 54.3%). In fact, 14 patients (30.4% of all cases and 56% of those with advanced disease) had very advanced disease with CD4 count less than 50. Unfortunately 5 patients (20% of those with

the advanced disease) lost life against the deadly virus, all in 2019, and all of them had profound immunosuppression with CD4 <20.

The proportion of older people above age 50 was quite low. Only 3 (6.5%) patients above 50 were found to have HIV over the span of two years. One of them was late-presenter and the other two had very advanced disease complicated with pulmonary tuberculosis; both of them unfortunately succumbed to the disease.

As can be seen in table 2, the patients with advanced HIV disease (CD4 <200) outnumbered all else as a group. However, the gender, age group, marital status, ethnicity, a particular sex practice, use of alcohol or smoking were not statically significant risk factors to increase the probability of being diagnosed in an advanced stage.

Table 1: Demographic data of the patients

Characteristics	All N (%)	Non-late presentation CD4>350 N (%)	Late presentation CD4<350 N (%)	Advanced disease CD4<200 N (%)
Total	46 (100)	8 (100)	13 (100)	25 (100)
2019*	28 (60.9)	6 (75)	7 (53.8)	15 (60)
2018**	18 (39.1)	2 (25)	6 (46.2)	10 (40)
Gender				
Male	35 (76.1)	5 (62.5)	10 (76.9)	20 (80)
Female	11 (23.9)	3 (37.5)	3 (23.1)	5 (20)
Age (years)				
15-30	14 (30.4)	1 (12.5)	6 (46.2)	7 (28)
31-50	29 (63)	7 (87.5)	6 (46.2)	16 (64)
> 50	3 (6.5)	0	1 (7.7)	2 (8)
Marital status				
Married	23 (50)	5 (62.5)	6 (46.2)	12 (48)
Divorced/widowed	6 (13)	2 (25)	1 (7.7)	3 (12)
Single	17 (37)	1 (12.5)	6 (46.2)	10 (40)
Ethnic group				
Omani	35 (76.1)	6 (75)	11 (84.6)	18 (72)
Expatriate	11 (23.9)	2 (25)	2 (15.4)	7 (28)
Risk group				
Heterosexual	28 (60.9)	5 (62.5)	7 (53.8)	16 (64)
Homo/Bi-sexual	17 (37)	3 (37.5)	6 (46.2)	8 (32)
IV drug abuser	1 (2.2)	0	0	1 (4)
Risk habits				
Smoking	23 (50)	3 (37.5)	8 (61.5)	12 (48)
Alcohol (+ smoking)	12 (26.1)	3 (37.5)	4 (30.8)	5 (20)
None of above	23 (50)	5 (62.5)	5 (38.5)	13 (52)
Reason for testing				
Screening	28 (60.9)	8 (100)	10 (76.9)	10 (40)
Symptom-related	18 (39.1)	0	3 (23.1)	15 (68)
How many died	5 (10.9)	0	0	5 (20)

* From Nov 1, 2018 to Oct 30, 2019, ** From Nov 1, 2017 to Oct 30, 2018

The table 3 compares all those who presented late or with an advanced disease as one group to all non-late presenters as another group or, in other words, compares those with CD4 count above and below 350. Here also the above mentioned demographic factors did not increase the probability of delayed diagnosis. The unmarried patients were nevertheless more likely to fall in the category of late diagnoses though it did not reach statistically significant

level. As a matter of fact, 16 out of total 17 single patients had CD4<350 and they were males except for two females.

Table 2: Comparison between patients with advanced presentation and all those with non-advanced presentation.

Characteristics	All N (%)	Non-advanced presentation CD4>200 N (%)	Advanced disease CD4<200 N (%)	Odds Ratio (95% confidence interval)	p Value
Total	46 (100)	21 (100%) (45.7% of 46)	25(100) (54.3% of 46)		
2019	28 (60.9)	13 (61.9)	15 (60)		
2018	18 (39.1)	8 (38.1)	10 (40)		
Gender					
Male	35 (76.1)	15 (71.4)	20 (80)	Reference	
Female	11 (23.9)	6 (28.6)	5 (20)	0.63 (0.16-2.44)	0.50
Age (years)					
15-30	14 (30.4)	7 (33.3)	7 (28)	0.50 (0.04-6.86)	0.60
31-50	29 (63)	13 (61.9)	16 (64)	0.62 (0.05-7.57)	0.71
> 50	3 (6.5)	1 (4.8)	2 (8)	Reference	
Marital status					
Married	23 (50)	11 (52.4)	12 (48)	0.76 (0.22-2.71)	0.68
Divorced/widowed	6 (13)	3 (14.3)	3 (12)	0.70 (0.11-4.53)	0.71
Single	17 (37)	7 (33.3)	10 (40)	Reference	
Ethnic group					
Omani	35 (76.1)	17 (80.9)	18 (72)	Reference	
Expatriate	11 (23.9)	4 (19)	7 (28)	1.65 (0.41-6.68)	0.48
Risk group					
Heterosexual	28 (60.9)	12 (57.1)	16 (64)	1.59 (0.48-5.32)	0.45
Homo/Bi-sexual	17 (37)	9 (42.9)	8 (32)	Reference	
IV drug abuser	1 (2.2)	0	1 (4)	-	
Risk habits					
Smoking	23 (50)	11 (52.4)	12 (48)	0.84 (0.26-2.68)	0.77
Alcohol (+ smoking)	12 (26.1)	7 (33.3)	5 (20)	0.50 (0.13-1.90)	0.31
None of above	23 (50)	10 (47.6)	13 (52)	Reference	
Reason for testing					
Screening	28 (60.9)	18 (85.7)	10 (40)	Reference	
Symptom-related	18 (39.1)	3 (14.3)	15 (68)	9.0 (2.09-38.79)	0.003
How many died	5 (10.9)	0	5 (20)		

Table 3: Comparison between all those who presented late or with advanced disease with those who presented early.

Characteristics	All N (%)	Non-late presentation CD4>350 N (%)	Late and Advanced disease CD4<350 N (%)	Odds Ratio (95% confidence interval)	p value
Total	46 (100)	8(100) (17.4% of 46)	38 (100) (82.6% of 46)		
2019	28 (60.9)	6 (75)	22 (57.9)		
2018	18 (39.1)	2 (25)	16(42.1)		
Gender					
Male	35 (76.1)	5 (62.5)	30 (78.9)	Reference	
Female	11 (23.9)	3 (37.5)	8 (21.1)	0.44 (0.09-2.27)	0.33
Age (years)					
15-30	14 (30.4)	1 (12.5)	13 (34.2)	1.29 (0.04-38.90)	0.89
31-50	29 (63)	7 (87.5)	22 (57.9)	0.43 (0.02-9.29)	0.59
> 50	3 (6.5)	0	3 (7.9)	Reference	
Marital status					
Married	23 (50)	5 (62.5)	18 (47.4)	0.22 (0.02-2.14)	0.19
Divorced/widowed	6 (13)	2 (25)	4 (10.5)	0.13 (0.01-1.75)	0.12
Single	17 (37)	1 (12.5)	16 (42.1)	Reference	
Ethnic group					
Omani	35 (76.1)	6 (75)	29 (76.3)	Reference	
Expatriate	11 (23.9)	2 (25)	9 (23.7)	0.93 (0.16-5.45)	0.94
Risk group					
Heterosexual	28 (60.9)	5 (62.5)	23 (60.5)	1.03 (0.21-4.97)	0.97
Homo/Bi-sexual	17 (37)	3 (37.5)	14 (36.8)	Reference	
IV drug abuser	1 (2.2)	0	1 (2.6)	-	
Risk habits					
Smoking	23 (50)	3 (37.5)	20 (52.6)	1.85 (0.39-8.87)	0.44
Alcohol (+ smoking)	12 (26.1)	3 (37.5)	9 (23.7)	0.52 (0.10-2.60)	0.42
None of above	23 (50)	5 (62.5)	18 (47.4)	Reference	
Reason for testing					
Screening	28 (60.9)	8 (100)	20 (52.6)	Reference	
Symptom-related	18 (39.1)	0	18 (47.4)	15.34 (0.83-284.6)	0.067
How many died	5 (10.9)	0	5 (13.2)		

As mentioned above, 28 (60.9%) patients were asymptomatic, diagnosed by screening. Though they were asymptomatic, still 35.7% (n=10/28) were late-presenter and another 35.7% (n=10/28) were having advanced disease; only 8/28 patients (28.6%), less than one-third, were in the non-late phase. On the other hand, all of the patients who were diagnosed because of an HIV-related symptom presented in the late categories and, in fact, were significantly more likely to already have drifted into an advanced disease on presentation (p 0.003; OR 9; 95% CI 2.09-38.79). Some of the presenting conditions noticed in the study population included excessive weight loss, persistent diarrhoea, mucosal candidiasis, generalized lymphadenopathy, pulmonary

tuberculosis, pneumocystis jiroveci pneumonia, vasculitis with gangrenous fingers, cerebral toxoplasmosis and brain lymphoma.

Diagnosis in the advanced phase was not without toll. Besides 5 deaths, there were 72 days of ICU, 109 days of high dependency unit and 171 days of admission in the general medical floor for the patients in the advanced disease category (11/25 patients needed admission in the hospital), as compared to just 7 days of general ward admission for those in the late-presenters (1/13 patients needed admission) and none for those who were diagnosed early (Figure 1). The study was not meant to have an estimate of cost but the numbers speak for themselves.

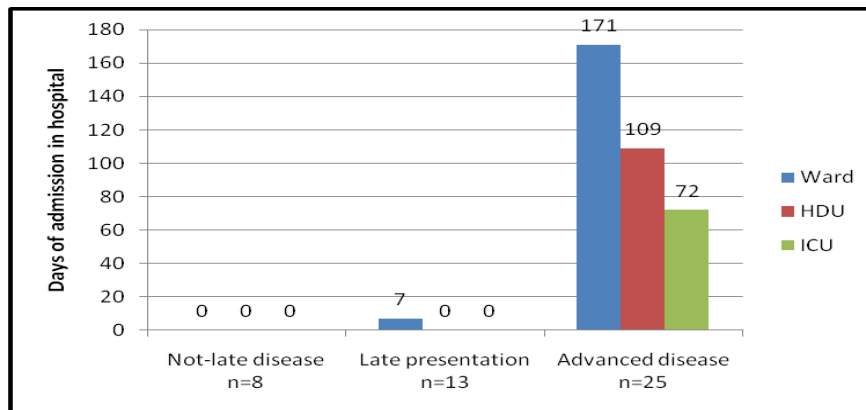


Figure 1: Number of hospital admission days for HIV patients in each category. HDU: High Dependency Unit; ICU: intensive care unit.

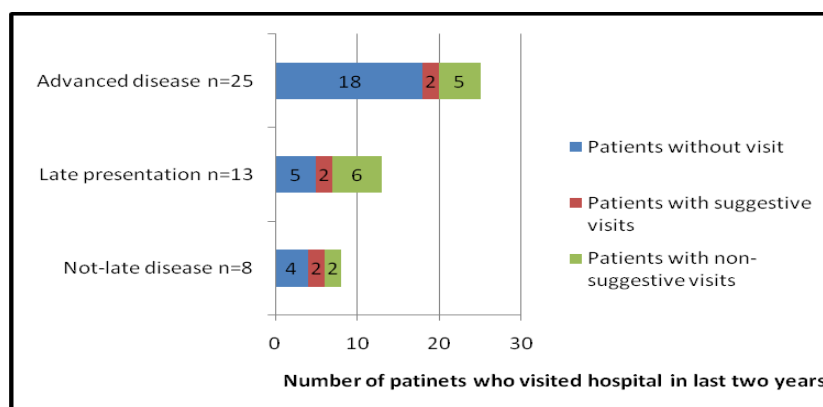


Figure 2: Number of patients with HIV in different categories who visited the hospital for any symptom in last 2 years.

The computerized medical records of the patients were scanned for any missed opportunities for a possible early catch in the previous two years prior to the diagnosis. If they had attended the hospital for a symptom which could possibly be a

hint to an HIV infection or a chronic medical condition, even if not directly related to HIV or an immunosuppressed state - for example visits to dermatology, visits for an abscess needing drainage, recurrent urinary tract infections, or

admission for any reason - it was counted as 'suggestive' visit; but visits with very low suspicion, like ER visits for any trauma or mild pain abdomen, orthopaedic visits for backache, visits to eye clinic etc., were 'non-suggestive.'

Four of 8 patients (50%) in the not-late disease group had visited the hospital in the last two years and 2 (25%) had suggestive visits; 8 of 13(61.5%) patients came to the hospital among the late-presentation group and again 2 (15.4%) had suggestive visits; while only 7 of 25 (28%) who had advanced disease had attended the hospital in the last two years and here also 2 (8%) had the suggestive visits (Figure2). In all, 19 (41.3%) patients had visited the hospital in the last 2 years. Their visits ranged from one to nine in number including two admissions. Thirteen patients (28.3%) had more than one visits.

DISCUSSION

According to UNAIDS, there were 0.24 million people living with HIV in the Middle East and North Africa (MENA) region in 2018, while the number of new HIV cases was only 20,000.¹ As far as Oman is concerned, the total number of people living with HIV was only 3030 in 2018.⁶ Dhofar is a large region and its main city, Salalah, is the second largest city of Oman but has a small population; the annual number of new HIV infection rarely exceeds 15. An aggregate of 46 new cases in this city over last two years does not look like a large number in itself but an increasing trend is a reason for concern.

In 2018, the women constituted about 46% of the total 1.6 million new HIV infections globally; however, their proportion was lower in the MENA region: the women constituted only one-third of the 18,000 new patients above age 15 in this region in 2018.¹ The ratio of women in our study was even lower, 23.9%, which relates to local religious and social customs, but under-screening and under-diagnosis in females remains a possibility as a contributing factor.

About one-third of the newly-diagnosed HIV patients were MSM here. The ratio of this risk population varies in different parts of the world. Whereas they represent 17% of the new HIV infections globally,⁷ they have been reported to be as high as 70% in the United States.⁸

Smoking and alcohol abuse were noticed in one-half, and one-fourth, of our patients respectively; the numbers far exceed the prevalence in the general population here. According to an estimate, 15.1% of the people above age 15 in Oman were smoking in 2015, predicted to rise to 18.7% in 2020;⁹ while alcohol abuse was reported in 5% of school students in one part of Oman.¹⁰

Nevertheless, the most important observation was an alarmingly high percentage of the new cases diagnosed in the late or advanced categories: 82.6% (n=38/46) of the cases were delayed diagnoses, including 54.3% (n=25/46) already with an advanced disease. The numbers are worrying as compared to 53.8% late-presentations including 33.2% with advanced cases in Europe (years 2000-2011),¹¹ 60% late-presenters including 33% with advanced disease in South Africa (years 2014-2015),¹² 70.2% late-presenters including 45.1% with advanced disease in China (years 2012-2016),¹³ and 73% late-presenters including 35% with advanced disease in Netherlands (years 1996-2014).¹⁴ Worldwide about half of cases are diagnosed in a late stage.⁴

Due to small number of cases, it is not possible to identify any demographic factors predicting a late or advanced presentation. Nonetheless, the patients who presented with a related symptom were highly likely to be already in an advanced stage (p 0.003; OR 9; 95% CI: 2.09-38.79). Although many patients, 60.9% (n=28/46), were asymptomatic, diagnosed during screening, but being asymptomatic was not protective: two-thirds of them were also in the late or advanced category with CD4 count less than 350.

Only 3 (6.5%) patients were above age 50 but all of them were in the late categories. Owing to small number of patients, the age could not attain statistical significance for predicting a disease category in our study, but the age above 50 has been recognized to be a high risk for advanced disease.^{13, 14}

The observation that unmarried patients had a tendency to present late is interesting. In fact, 16 out of 17 such patients presented with late or advanced disease. It is a matter of concern and raises the question of stigma and avoidance of hospital till last moments.

The lower CD4 count is a predictor of higher mortality. Mortality rates of 12% have been noticed in those with CD4<100 after starting ART.¹⁵ One-year mortality of 9.4% among those with CD4<50, and 4.5% for CD4 count 50-99, was found in another study.¹⁶ If the patients are diagnosed when CD4 counts are already very low, the rate of complications and cost of care also increase dramatically. While a high number of late-presenters in our study defeat the 90-90-90 WHO target, 5 deaths and 352 days of hospital admission, including 72 days of care in ICU, for just 12/46 patients who needed in-patient treatment, is an awfully high cost of care, let alone the suffering the patients and their families have to undergo.

As only half of people living with HIV in Oman were aware of their diagnosis in 2018,⁶ so many more patients are there who need to be traced and treated. We tried to work out if an opportunity to diagnose these patients earlier was missed when they attended this hospital in the last two years for any reason. Almost half of patients in the non-late and late-presentation groups did show up; on the other hand, only one quarter of those with advanced disease visited the hospital. It was probably a mere chance but it can be that those with advanced disease were somehow avoiding the hospital for some reason or stigma. The proportion of visits which could possibly hint to a chronic hidden disease, called as 'suggestive' visits, was quite low. Hence a

policy of universal screening for all patients attending the hospital, rather than selective screening, might be more useful in making an early diagnosis of HIV.

We noticed missed opportunities for an early diagnosis in 41.3% of patients here. However, such missed opportunities are universal and happen at almost a similar rate. In a Swiss hospital, prospects to make an early diagnosis were missed in 47% of cases.¹⁷ Another recent study in Canada showed missed opportunities in 7% and 12% patients over the previous one and three years respectively.¹⁸ An American study also showed 57% of newly diagnosed HIV patients with an average of 4.7 clinical encounters had missed an opportunity to get diagnosed earlier despite the CDC recommendation of universal screening for all individuals 14-63 years of age in health care settings,¹⁹ and 31% of them ended up in an advanced disease with CD4 < 200.

CONCLUSION

Whereas the screening strategies to find HIV cases earlier, both in the healthcare settings and in public, need to be revised, further work on alleviating the stigma associated with the disease is also urgently required. Most of the cases are being diagnosed in late stages of the disease. An early diagnosis will help reduce cost of care and turn out to be cost-effective in the end. Policies to reduce smoking and alcohol use may produce indirect beneficial effects on reducing the incidence of new infections.

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REFERENCES

1. UNAIDS. <http://aidsinfo.unaids.org/> (Accessed March 2, 2020).
2. WHO data and statistics. <https://www.who.int/hiv/data/en/> (Accessed March 2, 2020).
3. 90-90-90: An ambitious treatment target to help end the AIDS epidemic

- [UNAIDS.<http://www.unaids.org/en/resources/documents/2014/90-90-90>. (Accessed March 2, 2020).
4. Lazarus JV, Hoekstra M, Raben D, et al. The case for indicator condition-guided HIV screening. *HIV Med.* 2013; 14(7):445-448. <https://doi.org/10.1111/hiv.12022>
 5. Antinori A, Coenen T, Costagiola D, Dedes N, Ellefson M, et al. Late presentation of HIV infection: a consensus definition. *HIV Med* 2011; 12(1):61-64. doi: 10.1111/j.1468-1293.2010.00857.x.
 6. Elgalib A, Shah S, Al-Habsi Z, et al. The cascade of HIV care in Oman, 2015–2018: A population-based study from the Middle East. *Int J Inf Dis* 2020; 90:28-34. <https://doi.org/10.1016/j.ijid.2019.09.017>
 7. Communities at the centre. Global AIDS update 2019. Available at: https://www.unaids.org/sites/default/files/media_asset/2019-global-AIDS-update_en.pdf (Accessed March 2, 2020).
 8. U.S. Statistics. <https://www.hiv.gov/hiv-basics/overview/data-and-trends/statistics> (Accessed March 2, 2020).
 9. World Health Organization. WHO global report on trends in prevalence of tobacco smoking; 2015. Available at: <http://www.who.int/tobacco/publications/surveillance/reportontrendstobaccosmoking/en/index4.html>. Accessed March 5, 2020
 10. Hamed Al-Alawi AS, Shaikh J. Prevalence of Substance Abuse among the School Students in Al-Dhahirah Governorate, Sultanate of Oman. *Madridge J Nurs.* 2018; 3(1):118-123. doi: 10.18689/mjn-1000121.
 11. Mocroft A, Lundgren JD, Sabin ML, Monforte Ad, Brockmeyer N, et al. Risk Factors and Outcomes for Late Presentation for HIV-Positive Persons in Europe: Results from the Collaboration of Observational HIV Epidemiological Research Europe Study (COHERE). *PLoS Med* 10(9): e1001510. doi:10.1371/journal.pmed.1001510
 12. Fomundam HN, Tesfay AR, Mushipe SA, et al. Prevalence and predictors of late presentation for HIV care in South Africa. *S Afr Med J.* 2017 Nov 27; 107(12):1058-1064. doi: 10.7196/SAMJ.2017.v107i12.12358.
 13. Hu X, Liang B, Zhou C, et al. HIV late presentation and advanced HIV disease among patients with newly diagnosed HIV/AIDS in Southwestern China: a large-scale cross-sectional study. *AIDS Res Ther.* 2019; 16:6. <https://doi.org/10.1186/s12981-019-0221-7>
 14. Op de Coul ELM, van Sighem A, Brinkman K for the ATHENA national observational HIV cohort, et al. Factors associated with presenting late or with advanced HIV disease in the Netherlands, 1996–2014: results from a national observational cohort. *BMJ Open* 2016;6:e009688. doi: 10.1136/bmjopen-2015-009688
 15. Siika A, McCabe L, Bwakura-Dangarembizi M, et al. Late Presentation With HIV in Africa: Phenotypes, Risk, and Risk Stratification in the REALITY Trial. *Clinical Infectious Diseases* 2018; 66 (Issue suppl_2, 1):S140–S146. <https://doi.org/10.1093/cid/cix1142>
 16. Walker AS1, Prendergast AJ, Mugenyi P, et al. Mortality in the year following antiretroviral therapy initiation in HIV-infected adults and children in Uganda and Zimbabwe. *Clin Infect Dis.* 2012 Dec; 55(12):1707-1718. doi: 10.1093/cid/cis797).
 17. Lhopitallier L, Moulin E, Hugli O, Cavassini M, and Darling K.E.A. Missed opportunities for HIV testing among patients newly presenting for HIV care at a Swiss university hospital: a retrospective analysis. *BMJ Open.* 2018; 8(6):e019806. doi: 10.1136/bmjopen-2017-019806
 18. Nanditha NGA, St-Jean M, Tafessu H, et al. Missed opportunities for earlier diagnosis of HIV in British Columbia, Canada: A retrospective cohort study. *PLoS ONE* 2019; 14(3):e0214012. <https://doi.org/10.1371/journal.pone.0214012>
 19. Liggett A, Futterman D, Umanski GI, Selwyn PA. Missing the mark: ongoing missed opportunities for HIV diagnosis at an urban medical center despite universal screening recommendations. *Family Practice* 2016; 33 (6):644-648. <https://doi.org/10.1093/fampra/cmw075>

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