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Inadequate engagement in HIV care among people with HIV newly diagnosed with an STD: a multi-jurisdictional analysis

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Abstract

Background: A key challenge of HIV surveillance-based HIV care re-engagement is locating people living with HIV (PLWH) who appear to be out of care in order to re-engage them in care. Providing re-engagement services to PLWH diagnosed with an STD - individuals who are in jurisdiction and connected to the health care system - could be an efficient means of promoting HIV treatment and reducing HIV transmission.

Methods: Early and late syphilis (ES/LS) and gonorrhea (GC) cases diagnosed in 2016 and 2017 in Louisiana, Michigan, Mississippi, Oregon, Rhode Island, and Texas were matched to each state's HIV surveillance data to determine the proportion of PLWH with these infections who (1) did not have evidence of a CD4 count or viral load in the prior ≥13 months (out-of-care) or, (2) had a viral load ≥1500 copies/mL on their most recent HIV RNA test prior to STD diagnosis (viremic).

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Results: Previously diagnosed HIV infection was common among persons diagnosed with ES (n=6942, 39%), LS (n=4329, 27%) and GC (n=9509, 6%). Among these ES, LS, and GC cases 26% (n=1543), 33% (n=1113), and 29% (n=2391) were out of HIV medical care or viremic at the time of STD diagnosis.

Conclusions: A large proportion of STD cases with prior HIV diagnosis are out of care or viremic. Integrating relinkage to care activities into STD partner services or the use of matching STD and HIV data systems to prioritize data to care (D2C) activities could be an efficient means for relinking patients to care and promoting viral suppression.

Summary:

This multi-jurisdictional evaluation found that 26%, 33%, and 29% of early syphilis, late syphilis, and gonorrhea cases with a prior HIV diagnosis, respectively, were out-of-care or viremic at STD diagnosis.

Keywords

human immunodeficiency virus (HIV); viremic; engagement in care; sexually transmitted disease (STD); co-infection

Introduction

In 2019, the United States launched the Ending the HIV Epidemic (EtHE) initiative with the goal of reducing new HIV infections by 90% by 2030 [1]. Increasing the successful treatment of HIV is a pillar of the EtHE initiative. In 2017, only approximately 58% of PLWH received continuous HIV medical care and 62% were virally suppressed [2]. Previously diagnosed, but unsuppressed persons, are thought to be the source of over 60% of all HIV transmission in the U.S. [3], highlighting the importance of improving HIV care to prevent ongoing HIV transmission.

In an effort to increase HIV care engagement and viral suppression, the U.S. Centers for Disease Control and Prevention (CDC) requires that health departments receiving federal HIV prevention funding conduct data-to-care (D2C) investigations. These investigations involve using HIV surveillance data to identify individuals with a HIV diagnosis who are not engaged in HIV care and provide them with outreach services to link them back into care and promote their viral suppression. Although health departments have invested substantial resources into D2C investigations, evaluations of these efforts have been discouraging [4-6]. In some studies, only 10% of individuals identified as out-of-care per HIV surveillance data still reside in the jurisdiction, are successfully contacted, and confirmed to be out-of-care, substantially impacting the practicality and efficiency of this intervention [4,5]. Processes that aim to target individuals at the time they present for other services may be more successful and efficient in reaching the population that is truly out of care in real-time.

Leveraging STD surveillance data with partner services programs to re-engage individuals into HIV care and promote their viral suppression is one model of real-time D2C. All state health departments in the US provide STD partner services, which involves outreach by specially trained health department staff (disease intervention specialists; DIS) to interview

persons with STDs – typically syphilis, but also gonorrhea in some jurisdictions – and notifying partners and other persons within the sociosexual network of the need to test and possibly treat. Individuals with syphilis or gonorrhea who are co-infected with HIV but not adequately engaged in HIV care are theoretically an ideal population for public health outreach because they are engaged in partner services and they have an increased risk of transmitting HIV to their partners. Moreover, these individuals are known to seek care in the jurisdiction where they were diagnosed with an STD, surmounting one of the key limitations of D2C program.

Integrating D2C into STD partner services has intuitive appeal, but the potential reach and impact of this integration is unknown. In this multi-jurisdictional study, we quantified the proportion of individuals reported with syphilis or gonorrhea who had a prior HIV diagnosis and were inadequately engaged in HIV care at the time of their STD diagnosis.

Materials and Methods

Study Design and Population

This analysis utilized HIV and STD surveillance data from six US health departments – Louisiana, Michigan, Mississippi, Oregon, Rhode Island, and Texas. Each jurisdiction reviewed all reported syphilis and gonorrhea cases at least 14 years old diagnosed between January 1, 2016 and December 31, 2017. Staff in each health department matched these cases of syphilis and gonorrhea to state HIV surveillance data (described below) to identify STD cases previously diagnosed with HIV. These cases were then analyzed to determine the proportion inadequately engaged in HIV medical care. Inadequate engagement in HIV care was defined as having no documented CD4 count or viral load during the 13 months prior to the STD diagnosis (i.e., out of care) or a last documented viral load in the 13 months prior to STD diagnosis was ≥1,500 copies/mL (i.e., viremic). These two categories are mutually exclusive. The analysis was limited to PLWH diagnosed a minimum of six months prior to STD diagnosis to exclude persons who may not have had enough time to adequately engage in HIV care prior to a gonorrhea or syphilis diagnosis.

Data Sources

Syphilis and gonorrhea cases in each jurisdiction were obtained from each jurisdiction's STD surveillance database. STD surveillance data was matched to each jurisdiction's enhanced HIV/AIDS Reporting System (eHARS) at the state level, using individual state protocols and algorithms (summarized in Supplemental Table 1).

Analysis

The unit of analysis was a case of gonorrhea or syphilis. Because each reported instance of STD represents a potential re-engagement opportunity, PLWH diagnosed with gonorrhea (GC) or syphilis were counted each time they were diagnosed and reported with an STD, during the study period. However, if a PLWH was diagnosed with the same STD twice within 30 days, only one instance of that STD case was counted. Syphilis was categorized as either early syphilis (ES), which included primary, secondary or early latent syphilis, or late syphilis (LS), which included late latent and syphilis of unknown duration. Syphilis

staging varies by state and is summarized in Supplemental Table 1. Investigators in each jurisdiction analyzed their local data and only shared aggregate numbers and proportions with the larger study team. These aggregate data included the number and proportion of cases of each STD occurring in persons with a prior HIV diagnosis, and the number of these persons who were out of care or viremic. Each jurisdiction also produced these numbers stratified by demographic and clinical characteristics. Data from each jurisdiction was then compiled to display aggregate outcomes across all jurisdictions. Evaluating surveillance data to identify PLWH inadequately engaged in care is considered a standard public health activity; therefore, this analysis did not require review by an Institutional Review Board (IRB).

Results

Proportion of PLWH with an STD Diagnosis Who Were Inadequately Engaged in Care

Across the six states included in this study, there were 17,781 ES, 15,950 LS, and 167,118 GC cases diagnosed between January 1st, 2016 and December 31st 2017, and the total number of STDs reported varied dramatically between states based on their size, from 109,741 in Texas to 2,252 in Rhode Island (Table 1). The percentage of STD cases occurring in persons with a prior HIV diagnosis was highest among persons with early syphilis (33% (n=5900), range among states 23-36%) and the lowest occurring in persons with gonorrhea (5% (n=8315), range 3-7%), though the total number of STD cases occurring in persons with a prior HIV diagnosis was greater for gonorrhea than for early syphilis.

Among 17,574 gonorrhea or syphilis cases reported with a prior HIV diagnosis across all jurisdictions, 29% (range 17-34 %) were inadequately engaged with care, including 11% (range 7-20%) who were out of HIV medical care and an additional 18% (range 9-20%) who were viremic (data not shown). Among STD cases with a prior HIV diagnosis, the proportion occurring among those inadequately engaged in care was 26% for ES (range among states 16-37%), 33% for LS (9-43%), and 29% for GC (16-32%) (Table 1). The composition of the inadequately engaged population varied substantially between states. In Mississippi, the majority of ES cases who were inadequately engaged with care were out of care, while in in the other states there were more cases that were in-care but viremic. Mississippi and Texas had the highest proportions of STD cases with prior HIV diagnosis that were inadequately engaged in each STD category.

Demographic Characteristics of PLWH with an STD Diagnosis and Inadequate Engagement in Care

In general, compared to all STD cases with a prior HIV diagnosis, those who were inadequately engaged in care were more often younger (25-35), Black/African American, and have self-reported MSM (men who have sex with men) transmission mode (Table 2). Individual state data revealed that in Louisiana, Michigan, Mississippi, and Texas, most ES cases with a prior HIV diagnosis who were also inadequately engaged in care were under 35 years of age, while in Oregon and Rhode Island the majority were 35 years and older (see Supplemental Table 2). Race/ethnicity, gender, and HIV transmission mode among STD cases with a prior HIV diagnosis were mostly similar, with a few exceptions.

In Louisiana, Michigan, and Mississippi, STD cases with a prior HIV diagnosis – including those inadequately engaged in care – were mostly Black/African American, while in Oregon and Rhode Island they were White. In Texas the plurality of ES cases with prior HIV diagnosis were Hispanic, while those who were inadequately engaged in care were more often to be Black/African American.

Across all states, the plurality of STD cases with a prior HIV diagnosis who were out of medical care had been out of medical care for 37 months or more: 39% among ES diagnoses, 52% among LS diagnoses, and 41% among GC diagnoses (Table 3). There were some state-specific exceptions (see Supplemental Table 3). In Mississippi, ES cases with a prior HIV diagnosis who were out of medical care were more likely to be out of care between 13-24 months. In Louisiana, high percentages of ES and GC cases with a prior HIV diagnosis had never engaged in medical care.

Discussion

This analysis found that a substantial proportion of ES, LS, and GC diagnoses from 2016 to 2017 were among PLWH (39%, 27%, and 6%, respectively). A sizable proportion of ES, LS, and GC cases with a prior HIV diagnosis were inadequately engaged in care at the time of their STD diagnosis (26% (n=1543), 33% (n=1113), 29% (n=2391), respectively). GC cases represented the largest number of individuals who were inadequately engaged at the time of STD diagnosis. The number and proportion of STD cases with a prior HIV diagnosis who were inadequately engaged in care serves as a reminder that a reported STD does not necessarily indicate adequate HIV care engagement. The analysis indicates that the lack HIV care engagement assessments at the time of STD diagnosis is potentially a missed opportunity to re-engage persons into HIV medical care.

The results suggest that integrating HIV care engagement into STD services, including STD partner services, and/or prioritizing D2C lists via routine matching to STD surveillance data would potentially be a more efficient approach to D2C. Although health departments throughout the US have implemented D2C programs these efforts have faced significant challenges. Inaccurate surveillance data that incorrectly classifies people as out of care and provides out-of-date locating information for persons who are truly out of care are some of the most significant limitations to the D2C program. These limitations result in an inefficient program in which health department staff initiate many investigations to relink a very small number of persons [7-9]. When a PLWH is diagnosed with a new STD, the reported diagnosis confirms that the PLWH has recently been in the jurisdiction and interacted with a healthcare provider. Therefore, integrating assessment of HIV care engagement and provision of linkage to care support into STD partner services and/or routinely matching STD data to HIV surveillance data to prioritize D2C lists, may yield higher results and be less resource intensive than traditional D2C activities. Future program evaluations should assess the efficiency and effectiveness of D2C focusing on persons with reportable STDs.

Health departments routinely provide partner services to persons with newly diagnosed early syphilis, and this population is an obvious focus for real-time D2C. However, relatively few health departments routinely provide partner services to persons newly diagnosed with

gonorrhea because of the large number of cases. Attempting to provide partner services to all persons reported with gonorrhea, or even all PLWH reported with gonorrhea, is likely a heavier workload than most health departments can undertake. Our findings highlight how a very targeted approach to gonorrhea partner services, one that focuses on the relatively small number of persons who are diagnosed with HIV and inadequately engaged with care – a population that likely represents approximately 1.4% of all reported gonorrhea cases, could be an efficient and strategic expansion of partner services. Of note, the number of inadequately engaged persons with gonorrhea is substantially larger than the number of inadequately engaged persons with early syphilis, a population that typically receives partner services. Thus, the D2C opportunity associated with gonorrhea is larger than the opportunity associated with early syphilis, however, this involves additional work and will require more funding. We believe that a focused expansion of partner services among persons with gonorrhea designed to improve care engagement is aligned with the goals of the new EtHE initiative and might be fundable through that effort. It will require regular, timely matching of STD and HIV surveillance data, something that CDC has sought to require of all STD programs. However, among the six jurisdictions included in this study, at the time of analysis, three routinely matched HIV and STD surveillance data to enhance disease investigation and/or partner services. Additionally, four regularly provided partner services to persons with gonorrhea in some capacity (Supplemental Table 1).

These data highlight how STD diagnoses among PLWH inadequately engaged in care may serve as an important opportunity to address missed initial engagement or re-engagement into HIV medical care. Across states participating in our study, the majority of individuals who were out of care had been out of care for greater than 24 months and the plurality were out of care for greater than 37 months. This most likely represents individuals who are truly out of care and virally unsuppressed as there were no care indicators during this time period. Additionally, LS cases with prior HIV diagnosis had been out of care for greater than 37 months. A LS diagnosis is usually an infection that has been undetected for 12 months or more, or that occurs in a person with no recent syphilis testing, preventing public health staff from defining when the initial infection may have occurred. In both instances, persons with LS may have a higher chance of being entirely disengaged from medical care, including HIV medical care, for longer periods of time. A LS diagnosis may represent the only recent interaction with healthcare systems offering a rare opportunity to assess and potentially provide HIV care engagement and support services. New STD diagnoses also indicate engagement in unprotected sex, and therefore potential for HIV transmission especially among PLWH who are not virally suppressed. STD screening, treatment, and partner services programs have the potential to improve HIV care engagement and viral suppression.

Strengths of this study include incorporating data from geographically heterogeneous states with diversity in age, race, ethnicity, and STD morbidity, and matching STD surveillance data to HIV surveillance data to ascertain HIV status among STD cases. There were also several limitations to this study. Each participating state operates their own state specific STD surveillance program which may lead to differences in reporting and matching completeness. This study assumes PLWH are living in the same state as their STD diagnosis, but some individuals may be receiving medical care in bordering states or country and as a

result appear to be out of care. Also, this analysis relies on the reporting of CD4 counts and viral loads as indications of HIV medical care. Not all laboratory results may be reported for PLWH who are engaged in care, possibly inflating the number of PLWH who are out of care. Additionally, for those STD cases who appeared out of care, the last viral load and, if applicable, the first viral load after being out of care, were not assessed for viral suppression. This possibly included STD cases adherent to their medication and virally suppressed who do not routinely attend medical appointments or receive viral loads, inflating the number of individuals out of care. Some states had small sample sizes for sub-populations defined by demographic characteristics, making estimates of the proportion of these subpopulations inadequately engaged in care unstable in those states. Lastly, while duplicate diagnoses of STDs were removed, individuals with multiple unique STD diagnoses were included multiple times, which does not allow estimates of total (across all three STD) PLWH who were inadequately engaged to be generated.

The current national initiative to end the HIV epidemic will require expanding or developing new interventions to promote HIV care re-engagement and viral suppression, and through that effort reduce HIV incidence. This study demonstrates that the integration of HIV and STD surveillance data can identify substantial numbers of PLWH who are out of care or not virally suppressed and should prompt health departments to integrate ascertainment of HIV treatment status into STD partner services interviews and to make linkage to HIV treatment an explicit and monitored partner services outcome. This data also suggests that current D2C activities could be prioritized by matching surveillance-based lists of PLWH identified as being out of care or unsuppressed with STD surveillance data. Insofar as partner services proves to be an effective way to promote linkage to successful HIV care, health departments should consider expanding STD partner services programs as part of broader D2C work. Although additional programmatic research is needed to prove that STD partner services can be used to promote HIV care, the findings of this study should prompt greater integration of HIV and STD control, and through that effort improve the highly connected landscape of HIV/STD care and transmission.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Conflicts of Interest and Source of Funding:

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Table 1:

Numbers and Proportions of Adult Early Syphilis, Late Syphilis, and Gonorrhea Cases, Co-infection with HIV, and Inadequate Engagement in HIV Care in Six States[1], 2016-2017

	Louisiana		Michigan		Mississippi		Oregon		Rhode Island		Texas		Total	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Early Syphilis														
Total adult[2] cases	2620		1484		1677		1182		289		10529		17781	
Living with HIV[3] (% of total adult cases)	845	(32)	635	(43)	522	(31)	407	(34)	80	(28)	4453	(42)	6942	(39)
Previously Diagnosed[4] (% of total adult cases)	730	(28)	537	(36)	419	(25)	384	(32)	66	(23)	3764	(36)	5900	(33)
Inadequately engaged in care[5] (% of previously diagnosed with HIV)	147	(20)	123	(23)	153	(37)	61	(16)	17	(26)	1042	(28)	1543	(26)
Out of care[6] (% of previously diagnosed with HIV)	39	(5)	42	(8)	96	(23)	19	(5)	5	(8)	323	(9)	524	(9)
Viremic[7] (% of previously diagnosed with HIV)	108	(15)	81	(15)	57	(14)	42	(11)	12	(18)	719	(19)	1019	(17)
Late Duration Syphilis														
Total adult[2] cases	2728		1824		170		528		171		10529		15950	
Living with HIV[3] (% of total adult cases)	584	(21)	316	(17)	29	(17)	103	(20)	33	(19)	3264	(31)	4329	(27)
Previously Diagnosed[4] (% of total adult cases)	403	(15)	222	(12)	21	(12)	79	(15)	22	(13)	2612	(25)	3359	(21)
Inadequately engaged in care[5] (% of previously diagnosed with HIV)	127	(32)	69	(22)	9	(43)	24	(30)	2	(9)	882	(34)	1113	(33)
Out of care[6] (% of previously diagnosed with HIV)	24	(6)	18	(8)	6	(29)	11	(14)	2	(9)	271	(10)	332	(10)
Viremic[7] (% of previously diagnosed with HIV)	103	(26)	51	(23)	3	(14)	13	(16)	05	(0)	611	(23)	781	(23)
Gonorrhea														
Total adult[2] cases	22797		28279		16186		9381		1792		88683		167118	
Living with HIV[3] (% of total adult cases)	1440	(6)	1350	(5)	480	(3)	680	(7)	127	(7)	5432	(6)	9509	(6)
Previously Diagnosed[4] (% of total adult cases)	1240	(5)	1186	(4)	421	(3)	627	(7)	102	(6)	4739	(5)	8315	(5)
Inadequately engaged in care[5] (% of previously diagnosed with HIV)	275	(22)	349	(29)	135	(32)	101	(16)	18	(18)	1513	(32)	2391	(29)
Out of care[6] (% of previously diagnosed with HIV)	95	(8)	187	(16)	73	(17)	31	(5)	6	(6)	615	(13)	1007	(12)

	Louisiana		Michigan		Mississippi		Oregon		Rhode Island		Texas		Total	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Viremic[7] (% of previously diagnosed with HIV)	180	(15)	162	(14)	62	(15)	70	(11)	12	(12)	898	(19)	1384	(17)

[1]The six states include Louisiana, Michigan, Mississippi, Oregon, Rhode Island, and Texas.

[2]>=14 years old at STD diagnosis.

[3]Diagnosed with HIV on the same date or prior to STI diagnosis

[4]Diagnosed with HIV >=6 months prior to STI diagnosis

[5]No HIV labs in >=13 months, no HIV labs ever, or most recent VL in prior 13 months >=1500

[6]No HIV labs in >= 13 months or no HIV labs ever

[7]Most recent VL in prior 13 months >=1500

Table 2:

Demographic Characteristics of Early Syphilis, Late Syphilis, and Gonorrhea Cases Previously Diagnosed (PD) with HIV and Inadequately Engaged in Care (IEC) in Six States[1], 2016-2017

	Early Syphilis				Late Syphilis				Gonorrhea			
	PD[2]		IEC[3]		PD[2]		IEC[3]		PD[2]		IEC[3]	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Total	5900		1543		3359		1113		8315		2391	
Age												
14-24	723	(12)	259	(17)	292	(9)	136	(12)	1449	(17)	471	(20)
25-34	2371	(40)	744	(48)	1305	(39)	535	(48)	3799	(46)	1197	(50)
35+	2806	(48)	540	(35)	1762	(52)	442	(40)	3067	(37)	723	(30)
Race/Ethnicity												
Black/African American	2450	(42)	771	(50)	1452	(43)	588	(53)	4349	(52)	1475	(62)
White	1609	(27)	335	(22)	783	(23)	212	(19)	1936	(23)	408	(17)
Hispanic	1561	(26)	359	(23)	991	(30)	271	(24)	1699	(20)	424	(18)
Other	280	(5)	78	(5)	133	(4)	42	(4)	331	(4)	84	(4)
Gender												
Male	5754	(98)	1493	(97)	3200	(95)	1043	(94)	7769	(93)	2156	(90)
Female	57	(1)	22	(1)	82	(2)	37	(3)	454	(5)	202	(8)
Transgender	89	(2)	28	(2)	77	(2)	33	(3)	92	(1)	33	(1)
Transmission mode												
MSM[4]	5396	(91)	1385	(90)	2890	(86)	920	(83)	7053	(85)	1862	(78)
Heterosexual Contact	116	(2)	34	(2)	120	(4)	48	(4)	443	(5)	184	(8)
Non-MSM PWID[5] and Other	378	(6)	124	(8)	349	(10)	145	(13)	819	(10)	345	(14)

[1]The six states include Louisiana, Michigan, Mississippi, Oregon, Rhode Island, and Texas.

[2]PD=Previously Diagnosed (adult cases of syphilis or gonorrhea diagnosed with HIV >=6 months prior to STI diagnosis).

[3]IEC=Inadequately Engaged in Care (meets one of these criteria: no HIV labs in >=13 months, no HIV labs ever, or VL in last 13 months >=1500)

[4]MSM=Men who have sex with men

[5] PWID=Persons who inject drugs

Table 3:

Length of Time Out of Care Among Early Syphilis, Late Syphilis, and Gonorrhea Cases Previously Diagnosed with HIV in Six States[1], 2016-2017

	Early Syphilis				Late Syphilis				Gonorrhea			
	N	**(Range)**	**%**	**(% range)**	**N**	**(Range)**	**%**	**(% range)**	**N**	**(Range)**	**%**	**(% range)**
Total Out of Care [2]	524	(5-323)			332	(2-271)			1007	(6-615)		
6-12 months[3]	35	(0-16)	7	(0-31)	16	(0-11)	5	(0-17)	94	(0-46)	9	(0-48)
13-24 months	196	(3-125)	37	(26-60)	85	(1-76)	26	(8-50)	358	(3-252)	36	(20-50)
25-36 months	87	(1-52)	16	(5-21)	58	(0-46)	17	(0-25)	147	(2-92)	15	(11-33)
≥37 months	206	(1-130)	39	(20-52)	173	(1-138)	52	(50-72)	408	(1-233)	41	(14-67)

[1] The six states include Louisiana, Michigan, Mississippi, Oregon, Rhode Island, and Texas.

[2] No HIV labs >=13 months or no HIV labs ever.

[3] This category is only applicable to cases never linked to care.

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