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HIV primary care by the infectious disease physician in the United States - extending the continuum of care

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ABSTRACT

Models of care for people living with HIV (PLWH) have varied over time due to long term survival, development of HIV-associated non-AIDS conditions, and HIV specific primary care guidelines that differ from those of the general population. The objectives of this study are to assess how often infectious disease (ID) physicians provide primary care for PLWH, assess their practice patterns and barriers in the provision of primary care. We used a 6-item survey electronically distributed to ID physician members of Emerging Infections Network (EIN). Of the 1248 active EIN members, 644 (52%) responded to the survey. Among the 644 respondents, 431 (67%) treated PLWH. Of these 431 responders, 326 (75%) acted as their primary care physicians. Responders who reported always/mostly performing a screening assessment as recommended per guidelines were: (1) Screening specific to HIV (tuberculosis 95%, genital chlamydia/gonorrhoea 77%, hepatitis C 67%, extra genital chlamydia/gonorrhoea 47%, baseline anal PAP smear for women 36% and men 34%); (2) Primary care related screening (fasting lipids 95%, colonoscopy 95%, mammogram 90%, cervical PAP smears 88%, depression 57%, osteoporosis in postmenopausal women 55% and men >50 yrs 33%). Respondents who worked in university hospitals, had <5 years of ID experience, and those who cared for more PLWH were most likely to provide primary care to all or most of their patients. Common barriers reported include: refusal by patient (72%), non-adherence to HIV medications (43%), other health priorities (44%), time constraints during clinic visit (43%) and financial/insurance limitations (40%). Most ID physicians act as primary care providers for their HIV infected patients especially if they are recent ID graduates and work in university hospitals. Current screening rates are suboptimal. Interventions to increase screening practices and to decrease barriers are urgently needed to address the needs of the aging HIV population in the United States.

Introduction

Life expectancy of people living with HIV (PLWH) on suppressive antiretroviral treatment is similar to those without HIV infection. However, PLWH have a higher prevalence and earlier onset of HIV-associated non-AIDS (HANA) conditions such as cardiovascular disease, hypertension, osteoporosis, malignancies, diabetes and chronic kidney disease when compared to similarly aged patients without HIV infection (Gebo, 2008; Guaraldi et al., 2011; Schouten et al., 2014). HANA conditions represent the leading cause of death among PLWH on suppressive antiretroviral therapy (Antiretroviral Therapy Cohort, 2010; Fultz et al., 2005; Triant, Lee, Hadigan, & Grinspoon, 2007). Historically, PLWH received most of their medical care from infectious disease (ID) physicians, since most of their needs related to the management of opportunistic infections, HIV, and immunizations. However, due to the aging of the HIV population, ID physicians are now commonly faced with the task of screening, identifying and managing HANA. Increasingly, reimbursement programs determine who provides primary care to PLWH. In the United States federal programs, such as Ryan White, the designated HIV provider is responsible for both HIV and primary-care-related issues (Saag, 2009). In contrast, patients with private insurance may receive primary care services from internists or family practice providers other than their HIV care provider. Thus, there is no universal model for determining who or how preventive and primary care is provided to PLWH; Nor are there data to support which model benefits patient outcomes (Chu & Selwyn, 2011).

Screening and prevention guidelines for PLWH are well established, and for the most part, similar to those for the general HIV-negative population. However, due to the higher risk/earlier onset of certain conditions among PLWH, the recommendations for PLWH slightly differ. For example, the US Preventive Services Task Force (USPSTF) recommends cervical PAP smear every 3 years while the HIV Medicine Association of the Infectious Diseases Society of America (IDSA) recommends annual cervical PAP smear. Also osteoporosis screening by USPSTF is commenced at age 65 yrs or older in the general population while that for PLWH it is recommended at age 50. Moreover, the HIV screening and prevention guidelines may also be taken from different scientific societies than those of the general population (Aberg et al., 2014). This may lead to screening-associated knowledge or practice gaps if care providers are not familiar with HIV primary care guidelines.

The primary objectives of this study were to: (1) Assess how often ID physicians provide primary care for PLWH; (2) Evaluate their practice patterns in relation to HIV-related screening, primary care related screening and vaccinations; (3) Identify barriers to providing primary care services to PLWH; and (4) Evaluate differences in screening patterns based on the characteristics of the provider. Results will be used to inform future approaches to improve primary care for PLWH.

Methods

The EIN (Emerging Infections Network) is a provider-based network of ID physicians who are members of the IDSA and engage in active clinical practice. The EIN includes 1248 practicing ID physicians from all 50 US states, the District of Columbia, Canada and Puerto Rico. The network represents approximately 18% of IDSA physician members and 20% US board certified ID physicians. Surveys are distributed to all EIN members involved in clinical practice. Details regarding EIN membership and procedures for distributing surveys have been published elsewhere (Pillai, Beekmann, Santibanez, & Polgreen, 2014). EIN queries are intended to gauge the current landscape of infectious disease practice and are designated as non-human-subjects research by CDC policy and by the institutional review board of the University of Iowa.

On 14 January 2016, a link to an electronic survey created in HTML code was sent via email to 1248 active EIN members (Pillai et al., 2014). Two email reminders were sent to non-responders at weekly intervals. Respondents' practice characteristics such as years of practice, employment setting (Hospital/clinic, Private/group practice, University/Medical School, Veteran Affairs and Military

health centers, State Government), and geographic location were imported from the EIN database. No incentives were provided.

Survey

A 6-item survey was used to identify HIV primary care providers, their practices, and barriers to providing recommended primary care services and vaccinations (Survey provided in Supplementary Appendix). The survey was created by the investigators and distributed for testing among a pilot group of ID EIN physician members prior to distribution. Respondents were asked questions regarding the volume of their HIV practice (number of HIV infected patients treated in the outpatient setting) and role of the physician (HIV management only vs. HIV management with primary care).

Practice patterns of ID physicians when providing care for PLWH

Practices were evaluated for routine screening related to HIV infection, primary care screening/health maintenance, and vaccination. Routine screening specific to individuals with HIV infection was assessed as recommended by existing guidelines (Aberg et al., 2014): baseline anal PAP smear for women and men, annual hepatitis C screening in sexually active men who have sex with men (MSM), annual extra genital chlamydia and gonorrhoea screening for MSM, annual genital chlamydia and gonorrhoea screening for sexually active men and women, and baseline tuberculosis (TB) screening.

Screening for health maintenance services/primary care for HIV infected individuals was included as follows (Aberg et al., 2014): baseline osteoporosis screening in men older than 50 years of age and postmenopausal women, annual depression screen, annual cervical PAP smear in women, annual mammogram in women older than 50 years, colonoscopy in patients older than 50 years and annual fasting lipids.

Vaccination related areas included: Zoster vaccine in adults older than 50 years with CD4 counts over 200 cells/mm^3, human papilloma virus (HPV) vaccine in females and males less than 26 years of age, tetanus-diphtheria-acellular pertussis vaccine (Tdap) one time for all HIV infected adults followed by a booster every 10 years, pneumococcal polysaccharide vaccine (PPSV23) and pneumococcal conjugate vaccine (PCV 13) for all HIV infected adults older than 19 years of age, and annual influenza vaccine (Aberg et al., 2014; FDA, 2011.).

Responses regarding practices were assessed using a Likert scale; possible responses were always, most of the time, sometimes and never.

Barriers encountered by ID physicians when providing care for PLWH

Barriers were assessed by providing a list of possible barriers illustrating health, institution/clinic, financial, physician, and patient related barriers (i.e., non- adherence to HIV treatment, test not available at my practice location, not experienced in treating primary care conditions, other health priorities etc.). In addition, specific barriers for performing colonoscopy, osteoporosis screening and mammogram were also assessed. Responses regarding barriers were dichotomized (yes/no) and respondents could respond, "yes" to multiple barriers.

Differences in screening patterns based on geographic location, years of experience since completion of ID training, type of employment setting, and the number of PLWH they cared for was also recorded. Data was analysed using SAS software version 9.3 (SAS institute, Cary, NC). Fisher's exact test and chi-squared tests were used when appropriate.

Table 1. Characteristics of survey respondents who provided HIV primary care ($N = 326$).

Regions*:	N (%)
New England	21 (6)
Mid Atlantic	49(15)
East North central	43 (13)
West North central	32 (10)
South Atlantic	64 (19)
East South Central	19 (6)
West South Central	21 (6)
Mountain	12 (5)
Pacific	65 (20)
Years of experience since ID fellowship:	
<5** years	90 (27)
5–14 years	90 (27)
15–24 years	59 (20)
>25 years	87 (26)
Employment:	
Hospital/clinic	100 (30)
Private/group practice	89 (27)
University/medical school	120 (37)
VA and Military health centers	14 (5)
State government	3 (1)
Primary hospital type:	
Community	86 (27)
Non-university teaching	82 (25)
University	122 (37)
VA hospital	20 (6)
City/county health center	16 (5)
Reported Number of PLWH treated in the outpatient setting:	
<50	119 (36)
50–100	83 (26)
>100	124 (38)
Reported number of PLWH to whom respondents acted as primary care physicians:	
All	36 (11)
About half of them	73 (22)
Most	96 (29)
Some	121 (38)

Note: VA - Veteran Affairs.
*Based on US Census Bureau Regions.
**24 fellows in training responded to the survey.

Results

Survey respondents

Of 1248 active members, 644 responded to the survey (response rate, 52%). Among the 644 respondents, 431 (67%) routinely treated PLWH in an outpatient setting. Of these 431 responders, the majority (326 or 75%) acted as their primary care physicians. Only these responders who acted as primary care physicians for PLWH completed the remainder of the survey. About 60% of responders practiced on the East Coast and were employed by a hospital or in private group practices. About half of them had been in practice for 15 years or less. Approximately three quarters of the responders treated over 50 patients in the outpatient setting, and over 60% acted as primary care physicians for at least half of their patients. (*Detailed description of respondents' demographics in* Table 1).

Non-respondents were significantly more likely than respondents to have fewer than 15 years of infectious disease experience (48% of 704 vs. 57% of 544, $p = 0.004$) and practice in a community hospital (46% of 387 vs. 54% of 861, $p = 0.012$) (not shown in table).

Practice patterns for routine screening services for HIV infected patients

Most providers reported that they always/mostly performed baseline TB screening, annual genital chlamydia/gonorrhoea screening and annual screening for HCV in sexually active MSM. About half of the responders reported that they always/mostly screened for extra genital chlamydia/gonorrhoea. Very few providers reported that they always perform baseline anal PAP smears for women and men. The practice patterns of ID physicians regarding screening for HIV related issues are reported in Figure 1.

Practice patterns for primary care/health maintenance in patients on suppressive antiretroviral treatment

The majority of respondents reported that they always/ mostly perform annual fasting lipids, age appropriate colonoscopy, annual mammogram, annual cervical PAP smear for women. About half of them reported that they always/mostly perform annual depression screening and osteoporosis screening for postmenopausal women. Very few responders reported that they screen for osteoporosis for men >50 years of age. The practice patterns for primary care/health maintenance issues are reported in Figure 2.

HIV Related Screening

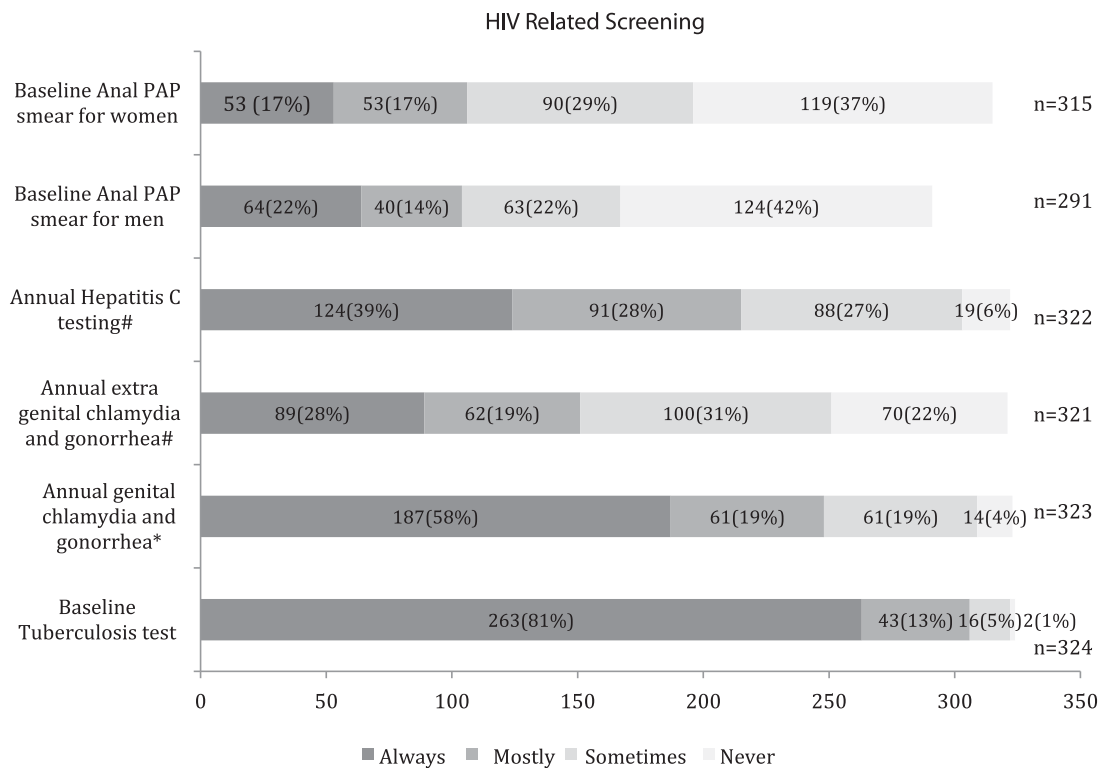| Screening	Always	Mostly	Sometimes	Never	n
Baseline Anal PAP smear for women	53 (17%)	53(17%)	90(29%)	119(37%)	n=315
Baseline Anal PAP smear for men	64(22%)	40(14%)	63(22%)	124(42%)	n=291
Annual Hepatitis C testing#	124(39%)	91(28%)	88(27%)	19(6%)	n=322
Annual extra genital chlamydia and gonorrhea#	89(28%)	62(19%)	100(31%)	70(22%)	n=321
Annual genital chlamydia and gonorrhea*	187(58%)	61(19%)	61(19%)	14(4%)	n=323
Baseline Tuberculosis test	263(81%)	43(13%)	16(5%)	2(1%)	n=324

■ Always ■ Mostly ■ Sometimes ■ Never

Figure 1. Practices of infectious disease physicians regarding screening for HIV related conditions. Results expressed in percentage.
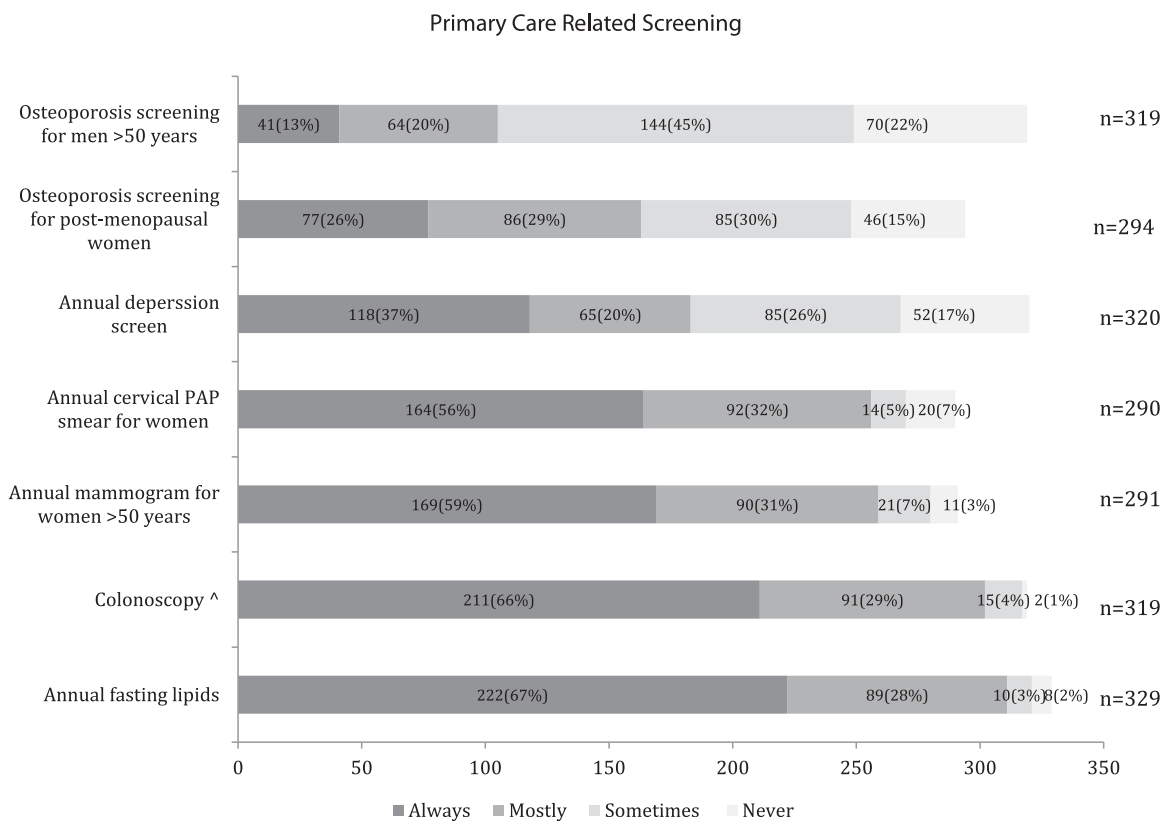Notes: *In sexually active men and women, #In sexually active MSM.

Primary Care Related Screening

Screening	Always	Mostly	Sometimes	Never	n
Osteoporosis screening for men >50 years	41(13%)	64(20%)	144(45%)	70(22%)	n=319
Osteoporosis screening for post-menopausal women	77(26%)	86(29%)	85(30%)	46(15%)	n=294
Annual deperssion screen	118(37%)	65(20%)	85(26%)	52(17%)	n=320
Annual cervical PAP smear for women	164(56%)	92(32%)	14(5%)	20(7%)	n=290
Annual mammogram for women >50 years	169(59%)	90(31%)	21(7%)	11(3%)	n=291
Colonoscopy ^	211(66%)	91(29%)	15(4%)	2(1%)	n=319
Annual fasting lipids	222(67%)	89(28%)	10(3%)	8(2%)	n=329

■ Always ■ Mostly ■ Sometimes ■ Never

Figure 2. Practices of infectious disease physicians regarding screening for health maintenance and primary care related issues. Results are noted in percentages.
Note: ^For men and women >50 yrs. (earlier if family risk factors).

Vaccination

Vaccination practices varied widely. Influenza vaccination was reported as always/mostly performed by majority of the providers, followed by pneumococcal PCV 13, PPSV23 and Tdap vaccinations. About two thirds of the providers reported providing HPV vaccine. Zoster vaccine was least likely to be reported as always/mostly provided.

The practice patterns for vaccination are reported in Figure 3.

General barriers to performing primary care screening services

The most commonly reported barrier to screening was that the patient declined to have a screening test performed (see Table 2). Close to half of the respondents felt that the presence of other health priorities, inadequate time allocated during clinic visits and non-adherence to HIV treatment were important issues that hindered provision of primary care. Other barriers cited included: patient financial/insurance limitations, lack of ancillary support services and poor reimbursement. The most common reason for not performing colonoscopy or mammogram when recommended was that the patient declined screening (65%, 33% respectively) and financial/insurance limitations (26%, 13% respectively). Regarding osteoporosis screening, providers cited insurance/financial limitations as the most common barrier (34%) followed by insufficient evidence of benefits (20%) (Not shown in table). (General barriers to performing primary care screening are illustrated in Table 2).

Differences in screening patterns based on provider characteristics: number of patients who are HIV-positive, years since completion of ID training and type of employment setting

Respondents who treated more HIV-infected patients were more likely to act as their primary care physician (45% of 139 respondents treating >100 patients vs. 24% of 292 respondents treating ≤100 patients provided primary care to all or most of their HIV-infected patients; $p < 0.0001$). The respondents with more HIV outpatients were also more likely to provide certain screening/prevention services such as genital gonorrhoea/chlamydia screening ($p = 0.002$), zoster vaccination ($p = 0.003$) and Tdap vaccine ($p = 0.024$).
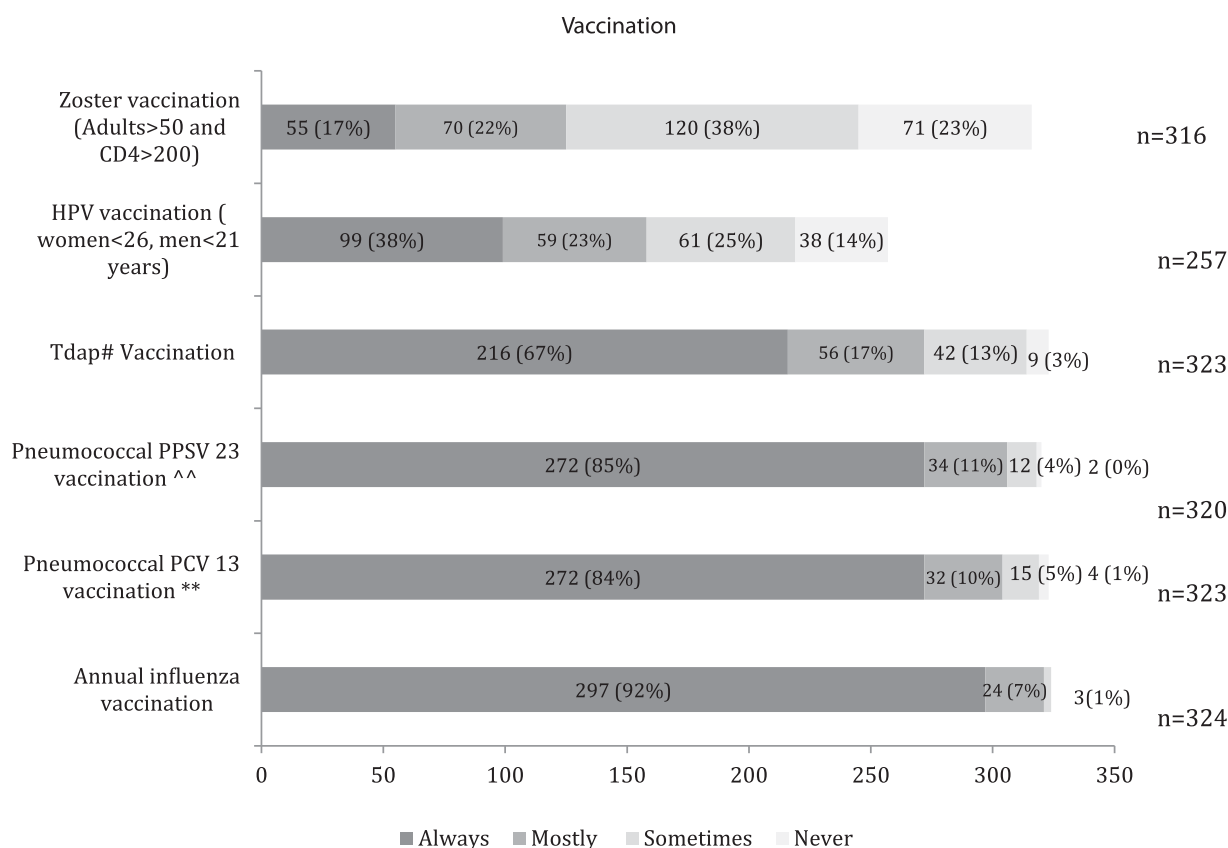
Vaccination

Figure 3. Vaccination practices among ID physicians in their HIV primary care. Results are expressed in percentages.
Notes: **PCV (Pneumococcal conjugate vaccine), ^^PPSV (Pneumococcal polysaccharide vaccine), #Tdap (Tetanus-diphtheria-acellular pertussis).

Table 2. General barriers to performing primary care screening.

Reported barriers	N (%)
Health related barriers:	
1. Other health priorities	142 (44%)
2. Non-adherence to HIV treatment	137 (43%)
Institution/clinic related barriers	
1. Allocated time for clinic visit is not enough	137 (43%)
2. Lack of ancillary support services	81 (25%)
3. Test(s) not available at my practice location	78 (24%)
4. Lack of EMR* system reminders in my practice	58 (18%)
Financial barriers:	
1. Patient financial or insurance limitations	129 (40%)
2. Poor reimbursement	37 (11%)
Physician related barriers:	
1. Not aware of all updates in primary care guidelines	68 (21%)
2. Not experienced in treating comorbidities (e.g., osteoporosis)	56 (17%)
3. Difficulties performing anal PAP smears	13 (8%)
Patient related barriers:	
1. Patient declines some screening	232 (72%)
2. Patient non-compliance with screening recommendations	5 (1%)
3. N/A, no barriers	12 (4%)

Notes: Respondents were given a list of possible barriers and could select any that applied, so numbers add to more than 100%. 322 respondents selected at least one of these options.
*EMR – Electronic Medical Records.

Respondents with fewer than 5 years of ID experience (includes fellows-in-training) were more likely to provide primary care for all or most of their patients than respondents with more than 5 years of experience (36% of 106 respondents with fewer than 5 years of experience vs. 29% of 325 respondents with ≥5 years of experience provided primary care to all or most of their HIV-infected patients; $p = 0.015$). They were also more likely to provide screening/prevention services such as annual depression screen ($p = 0.015$), osteoporosis screening for men >50 years ($p = 0.013$), genital gonorrhoea/chlamydia screening ($p < 0.001$), extra genital screening for gonorrhoea/chlamydia ($p = 0.009$), HCV screen in MSM ($p < 0.001$), PCV 13 ($p = 0.025$), HPV vaccine ($p = 0.005$), but not prostate cancer screening ($p = 0.34$).

The respondents who worked in university hospitals were also more likely to provide more screening measures than responders providing care in other clinic settings: annual depression screen ($p = 0.010$), osteoporosis screening for men >50 yrs ($p = 0.002$), genital gonorrhoea/chlamydia screening ($p = 0.035$), HCV screening in MSM ($p = 0.039$) and HPV vaccine ($p = 0.030$), baseline anal PAP smear in men ($p = 0.023$) and annual tuberculosis screening ($p = 0.033$).

Discussion

Our results show that the majority of ID physicians caring for PLWH also act as their primary care physicians. Provision of primary care to PLWH is more common among ID physicians who care for a greater number of HIV-positive patients and among ID physicians who are in training or have recently completed their clinical training. Adherence to current guidelines is suboptimal primarily due to patient-related factors and clinic infrastructure.

The evolution of HIV disease from an acute illness with high mortality to a manageable chronic illness has introduced additional responsibilities to the ID physician (Justice, 2006). This increased responsibility to provide primary care alongside HIV therapy is also unfolding in the backdrop of an impending shortage of HIV care providers. Thus, there is an urgent need for new and effective models of HIV care (American Academy of HIV Medicine [AAHIVM], 2009). To some extent, PLWH expect that their ID physicians who are responsible for their HIV care will also provide primary care. In one study by Cheng et al., where patients had access to general internists for primary care services through their health insurance, it was noted that over half of the PLWH used their HIV physician for primary care and almost all would prefer their ID physician to provide both HIV treatment and primary care (Cheng, Engelage, Grogan, Currier, & Hoffman, 2014). However, a few studies have reported that ID specialists feel less comfortable dealing with primary care issues and that they are four times more likely than other non ID trained physicians to refer their HIV-positive patients for hypertension and diabetes management (Duffus et al., 2003; Fultz et al., 2005).

Thus far there is no universal model for primary care delivery for PLWH (Handford, Tynan, Rackal, & Glazier, 2006). Traditional HIV care centers (many of which are supported by the Ryan White CARE Act) are often academically affiliated/hospital-based programs where the HIV provider also performs health maintenance services (Gallant et al., 2011). In areas of high HIV prevalence, traditional HIV care centers may offer the advantage of "one stop shopping" and a range of services including case management, substance abuse treatment, pharmacy etc. (Ojikutu et al., 2014). One solution to address the increasing demands placed on ID physicians would be to integrate general practitioners, nurse practitioners and physician assistants into the traditional HIV care centers to provide management of non-HIV conditions. Enhancing HIV education for these non-ID physician providers would be necessary as specific HIV medicine focus is often lacking in primary care training program curricula. Alternatively, in areas of lower HIV prevalence, use of consultants (HIV specialist consultation by the patient's primary care physician) will allow for patients to stay in their own communities and receive primary care along with HIV specific therapy (Saag, 2011). Future studies are needed to explore which

model of care is most effective to deliver appropriate primary care and HIV specific services to the aging HIV population.

Screening for major primary care conditions (colonoscopy, mammograms, cervical cancer, depression and hyperlipidaemia) is increasingly important for PLWH. In our study, reported screening rates for conditions, for which screening recommendations do not vary by HIV status, were high, and comparable to those reported by general internists. (Costanza, Stoddard, Zapka, Gaw, & Barth, 1992; Klabunde et al., 2009). However, there are medical conditions where discrepancies in recommendations by HIV status exist, such as osteoporosis screening or cervical/anal PAP smear. Prior studies evaluating provision of health maintenance services to PLWH have noted suboptimal rates, which are reflected in this study as well (Reinhold, Moon, Tenner, Poles, & Bini, 2005; Sheth, Moore, & Gebo, 2006).

It is likely that HIV guidelines and screening recommendations for PLWH will change over time as new evidence accumulates from ongoing research as well as improved understanding of the unique comorbidities associated with HIV infection. Hence timely strategies to increase providers' awareness become vital to providing comprehensive and quality care.

An unexpected finding was the low uptake of screening for infections highly prevalent in the HIV population such as extra genital gonorrhoea/chlamydia, hepatitis C virus, anal HPV, vaccinations for HPV and zoster. We found this surprising because all of these conditions are infectious in origin, and closely related to the ID physicians' subspecialty, unlike cancer and osteoporosis screening. One possible reason is recent changes in existing guidelines and in adaptation by the different scientific societies (e.g., hepatitis C, HPV vaccination and extra genital STI). Another potential barrier to providing screening is inability to provide the test in the clinic setting (e.g., extra genital STI, anal PAP) (Berry et al., 2010; Newman, Roberts, Masongsong, & Wiley, 2008). Some decrease in compliance may also be due to lack of agreement with guidelines and poor reimbursement. For example, the zoster vaccination has been approved by the FDA for age >50 yrs but ACIP recommendations for the same vaccine is age >60 yrs (Aberg et al., 2014; FDA, 2011.). While we await ongoing research to determine timing and need for certain screening conditions (e.g., Anal PAP smears, HPV vaccination etc.) for PLWH, strategies to ensure adherence to HCV and STI testing are urgently needed given the high prevalence of these infections in the US ((CDC), 2016; Services, 2014).

In addition to screening and vaccination practices, this study also assessed barriers to provision of primary care to HIV infected patients by ID specialists. The most common barrier reported was patients who declined screening advice. There are a multitude of factors that have been shown to affect the acceptance and utilization of health care services among patients (i.e., health literacy, socioeconomic status, self efficacy, patient attitudes and beliefs) that need to be explored in this population in order to develop interventions to increase acceptability of screening for HANA conditions (Adams, 2010; Anthony et al., 2007; Whitehead, Shaver, & Stephenson, 2016).

Our study has several limitations. This survey had a response rate of 52%. Thus, our results may be subject to some degree of response bias. However, this rate is similar to other surveys conducted by the EIN network and relatively high for physician surveys (Cunningham et al., 2015; Liang, Beekmann, Polgreen, & Warren, 2016). EIN is the largest network of infectious diseases practitioners in the country; participation in surveys is voluntary, and potential participants are not selected based on the characteristics of the survey. Our results are not based on a random sample, but are instead based on a convenience sampling of physicians from the EIN network. As a result, the findings may not be generalizable to all ID physicians. Our study does not take into account the practice patterns and approaches of non-ID general practitioners, physician assistants and nurse practitioners that also provide primary care to HIV-infected patients. The reported and actual practices may vary due to recall bias. We did not collect data on respondents' gender and race, which have been shown by prior studies to affect healthcare utilization and outcomes (LaVeist, Nuru-Jeter, & Jones, 2003; Tsugawa et al., 2017). Lastly, analysis by rural versus urban status of respondents was not feasible as this practice data was not uniformly available for all of our respondents.

Conclusion

Most ID physicians act as primary care providers for their HIV infected patients especially if they are recent ID graduates and work in university hospitals. Provision of primary care screening services is suboptimal based on current guidelines. Multiple patient, health systems barriers such as patient refusal, competing health priorities, lack of clinic infrastructure and non-adherence to HIV treatment are common. Interventions to increase screening practices, decrease barriers and determine the best way of healthcare provision for PLWH are urgently needed to address the needs of the aging HIV population.

References

Aberg, J. A., Gallant, J. E., Ghanem, K. G., Emmanuel, P., Zingman, B. S., Horberg, M. A., & Infectious Diseases Society of, A. (2014). Primary care guidelines for the management of persons infected with HIV: 2013 update by the HIV medicine association of the infectious diseases society of America. *Clinical Infectious Diseases*, 58(1), e1–e34. doi:10.1093/cid/cit665

Adams, R. J. (2010). Improving health outcomes with better patient understanding and education. *Risk Management and Healthcare Policy*, 3, 61–72. doi:10.2147/RMHP.S7500

American Academy of HIV Medicine (AAHIVM). (2009). The American Academy of HIV Medicine (AAHIVM) and the HIV Medicine Assoication (HIVMA). Averting a Crisis in HIV Care: A Joint Statement of the American Academy of HIV Medicine (AAHIVM) and the HIV Medicine Association (HIVMA) on the HIV Medical Workforce. American Academy of HIV Medicine and HIV Medicine Association.

Anthony, M. N., Gardner, L., Marks, G., Anderson-Mahoney, P., Metsch, L. R., Valverde, E. E., … Access Study Study, G. (2007). Factors associated with use of HIV primary care among persons recently diagnosed with HIV: Examination of variables from the behavioural model of health-care utilization. *AIDS Care*, 19(2), 195–202. doi:10.1080/09540120600966182

Antiretroviral Therapy Cohort, C. (2010). Causes of death in HIV-1–infected patients treated with antiretroviral therapy, 1996–2006: Collaborative analysis of 13 HIV cohort studies. *Clinical Infectious Diseases*, 50(10), 1387–1396. doi:10.1086/652283

Berry, S. A., Ghanem, K. G., Page, K. R., Thio, C. L., Moore, R. D., & Gebo, K. A. (2010). Gonorrhoea and chlamydia testing rates of HIV-infected men: Low despite guidelines. *Sexually Transmitted Infections*, 86(6), 481–484. doi:10.1136/sti.2009.041541

(CDC), C. f. D. C. a. P. (2016). *Sexually transmitted disease surveillance 2015*. Centers for Disease Control and Prevention; U.S. Department of Health and Human Services. Retrieved April 5, 2017, from https://www.cdc.gov/std/stats

Cheng, Q. J., Engelage, E. M., Grogan, T. R., Currier, J. S., & Hoffman, R. M. (2014). Who provides primary care? An assessment of HIV patient and provider practices and preferences. *Journal of Aids & Clinical Research*, 5(11). doi:10.4172/2155-6113.1000366

Chu, C., & Selwyn, P. A. (2011). An epidemic in evolution: The need for new models of HIV care in the chronic disease era. *Journal of Urban Health*, 88(3), 556–566. doi:10.1007/s11524-011-9552-y

Costanza, M. E., Stoddard, A. M., Zapka, J. G., Gaw, V. P., & Barth, R. (1992). Physician compliance with mammography guidelines: Barriers and enhancers. *The Journal of the American Board of Family Practice / American Board of Family Practice*, 5(2), 143–152.

Cunningham, C. T., Quan, H., Hemmelgarn, B., Noseworthy, T., Beck, C. A., Dixon, E., … Jette, N. (2015). Exploring physician specialist response rates to web-based surveys. *BMC Medical Research Methodology*, 15, 32. doi:10.1186/s12874-015-0016-z

Duffus, W. A., Barragan, M., Metsch, L., Krawczyk, C. S., Loughlin, A. M., Gardner, L. I., … Access Studies Study, G. (2003). Effect of physician specialty on counseling practices and medical referral patterns among physicians caring for disadvantaged human immunodeficiency virus-infected populations. *Clinical Infectious Diseases*, 36(12), 1577–1584. doi:10.1086/375070

FDA, U. S. (2011). *FDA approves Zostavax vaccine to prevent shingles in individuals 50 to 59 years of age*. Retrieved from http://www.fda.gov/newsevents/newsroom/pressannouncements/ucm248390.htm

Fultz, S. L., Goulet, J. L., Weissman, S., Rimland, D., Leaf, D., Gibert, C., … Justice, A. C. (2005). Differences between infectious diseases-certified physicians and general medicine-certified physicians in the level of comfort with providing primary care to patients. *Clinical Infectious Diseases*, 41(5), 738–743. doi:10.1086/432621

Gallant, J. E., Adimora, A. A., Carmichael, J. K., Horberg, M., Kitahata, M., Quinlivan, E. B., … Ryan White Medical Providers, C. (2011). Essential components of effective HIV care: A policy paper of the HIV medicine association of the infectious diseases society of America and the Ryan white medical providers coalition. *Clinical Infectious Diseases*, 53(11), 1043–1050. doi:10.1093/cid/cir689

Gebo, K. A. (2008). Epidemiology of HIV and response to antiretroviral therapy in the middle aged and elderly. *Aging Health*, 4(6), 615–627. doi:10.2217/1745509X.4.6.615

Guaraldi, G., Orlando, G., Zona, S., Menozzi, M., Carli, F., Garlassi, E., … Palella, F. (2011). Premature age-related comorbidities among HIV-infected persons compared with the general population. *Clinical Infectious Diseases*, 53(11), 1120–1126. doi:10.1093/cid/cir627

Handford, C. D., Tynan, A. M., Rackal, J. M., & Glazier, R. H. (2006). Setting and organization of care for persons living with HIV/AIDS. *Cochrane Database of Systematic Reviews*, 00(3), CD004348. doi:10.1002/14651858.CD004348.pub2

Justice, A. C. (2006). Prioritizing primary care in HIV: Comorbidity, toxicity, and demography. *Topics in HIV Medicine*, 14(5), 159–163.

Klabunde, C. N., Lanier, D., Nadel, M. R., McLeod, C., Yuan, G., & Vernon, S. W. (2009). Colorectal cancer screening by primary care physicians: Recommendations and practices, 2006–2007. *American Journal of Preventive Medicine*, 37(1), 8–16. doi:10.1016/j.amepre.2009.03.008

LaVeist, T. A., Nuru-Jeter, A., & Jones, K. E. (2003). The association of doctor-patient race concordance with health services utilization. *Journal of Public Health Policy*, *24*(3-4), 312–323.

Liang, S. Y., Beekmann, S. E., Polgreen, P. M., & Warren, D. K. (2016). Current management of cardiac implantable electronic device infections by infectious disease specialists. *Clinical Infectious Diseases*, *63*(8), 1072–1075. doi:10.1093/cid/ciw431

Newman, P. A., Roberts, K. J., Masongsong, E., & Wiley, D. J. (2008). Anal cancer screening: Barriers and facilitators among ethnically diverse gay, bisexual, transgender, and other men who have sex with men. *Journal of Gay & Lesbian Social Services*, *20*(4), 328–353. doi:10.1080/10538720802310733

Ojikutu, B., Holman, J., Kunches, L., Landers, S., Perlmutter, D., Ward, M., … Hirschhorn, L. (2014). Interdisciplinary HIV care in a changing healthcare environment in the USA. *AIDS Care*, *26*(6), 731–735. doi:10.1080/09540121.2013.855299

Pillai, S. K., Beekmann, S. E., Santibanez, S., & Polgreen, P. M. (2014). The infectious diseases society of America emerging infections network: Bridging the gap between clinical infectious diseases and public health. *Clinical Infectious Diseases*, *58*(7), 991–996. doi:10.1093/cid/cit932

Reinhold, J. P., Moon, M., Tenner, C. T., Poles, M. A., & Bini, E. J. (2005). Colorectal cancer screening in HIV-infected patients 50 years of age and older: Missed opportunities for prevention. *The American Journal of Gastroenterology*, *100*(8), 1805–1812. doi:10.1111/j.1572-0241.2005.50038.x

Saag, M. S. (2009). Ryan white: An unintentional home builder. *The AIDS Reader*, *19*(5), 166–168.

Saag, M. S. (2011). HIV now firmly established in the middle ages. *Clinical Infectious Diseases*, *53*(11), 1140–1142. doi:10.1093/cid/cir629

Schouten, J., Wit, F. W., Stolte, I. G., Kootstra, N. A., van der Valk, M., Geerlings, S. E., … Group, A. G. C. S. (2014). Cross-sectional comparison of the prevalence of age-associated comorbidities and their risk factors between HIV-infected and uninfected individuals: The AGEhIV cohort study. *Clinical Infectious Diseases*, *59*(12), 1787–1797. doi:10.1093/cid/ciu701

Services, U. S. D. o. H. a. H. (2014). *Viral hepatitis surveillance report, 2014*. Retrieved from https://www.cdc.gov/hepatitis/statistics/2014surveillance/index.htm

Sheth, A. N., Moore, R. D., & Gebo, K. A. (2006). Provision of general and HIV-specific health maintenance in middle aged and older patients in an urban HIV clinic. *AIDS Patient Care and STDs*, *20*(5), 318–325. doi:10.1089/apc.2006.20.318

Triant, V. A., Lee, H., Hadigan, C., & Grinspoon, S. K. (2007). Increased acute myocardial infarction rates and cardiovascular risk factors among patients with human immunodeficiency virus disease. *The Journal of Clinical Endocrinology & Metabolism*, *92*(7), 2506–2512. doi:10.1210/jc.2006-2190

Tsugawa, Y., Jena, A. B., Figueroa, J. F., Orav, E. J., Blumenthal, D. M., & Jha, A. K. (2017). Comparison of hospital mortality and readmission rates for medicare patients treated by male vs female physicians. *JAMA Internal Medicine*, *177*(2), 206–213. doi:10.1001/jamainternmed.2016.7875

Whitehead, J., Shaver, J., & Stephenson, R. (2016). Outness, stigma, and primary health care utilization among rural LGBT populations. *PLoS One*, *11*(1), e0146139. doi:10.1371/journal.pone.0146139